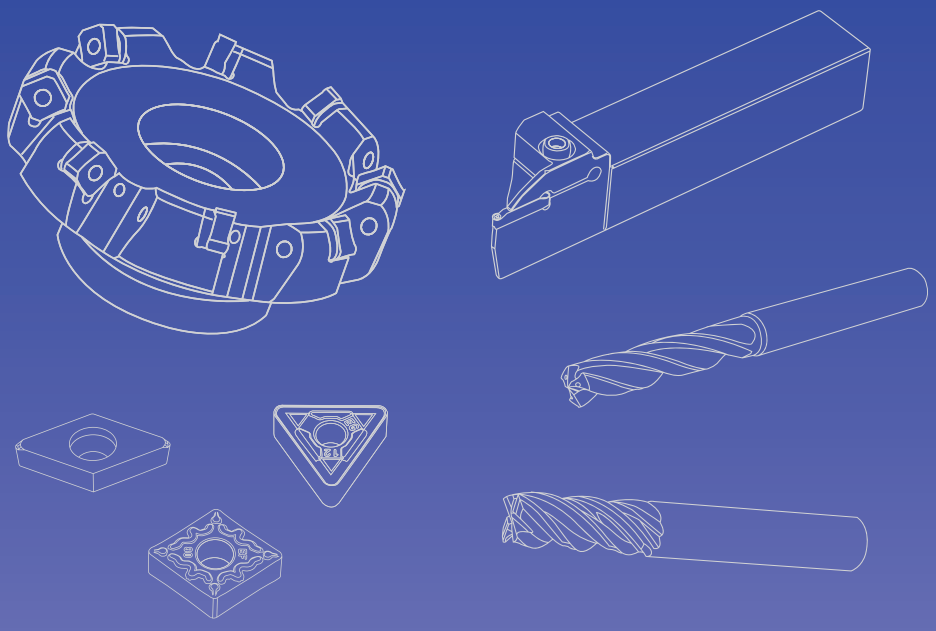
2014

General Catalogue

# SUMITOMO

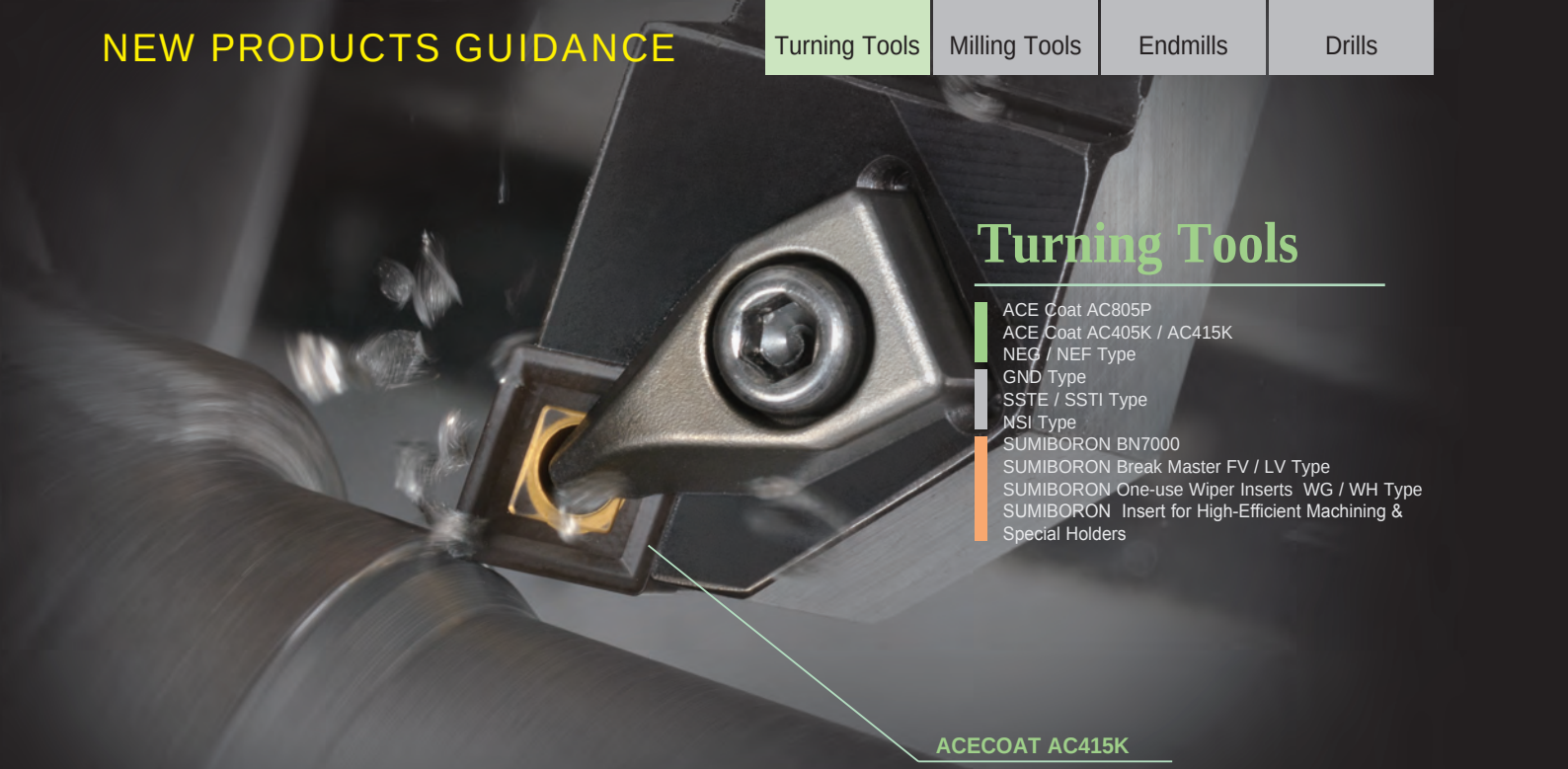
## CARBIDE - CBN - DIAMOND

# PERFORMANCE CUTTING TOOLS



Sumitomo Electric Hartmetall GmbH
Sumitomo Electric Hardmetal Ltd.

SUMITOMO ELECTRIC




# Turning Tools

ACE Coat AC805P
ACE Coat AC405K / AC415K
NEG / NEF Type
GND Type
SSTE / SSTI Type
NSI Type
SUMIBORON BN7000
SUMIBORON Break Master FV / LV Type
SUMIBORON One-use Wiper Inserts WG / WH Type
SUMIBORON Insert for High-Efficient Machining & Special Holders



**New High-Speed Turning Grade for Steel**

## ACECOAT AC805P

☞ A6

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

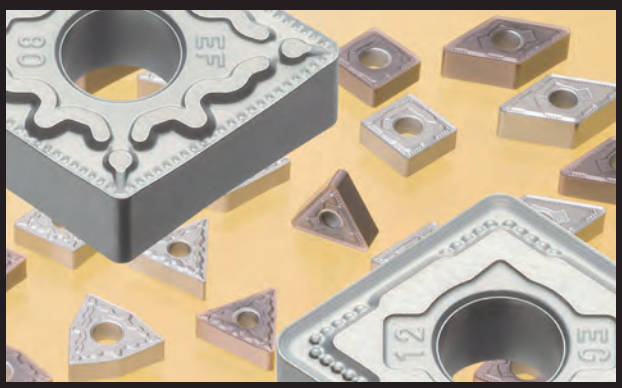


**New High-Speed and High-Performance Turning Grades for Cast Irons**

## ACECOAT AC405K / AC415K

☞ A15

- AC405K : Suitable for high-speed continuous cutting. Excellent resistance to wear and plastic deformation.
- AC415K : First recommended grade for cast iron turning. Provides stability and long tool life in a wide range of processes.

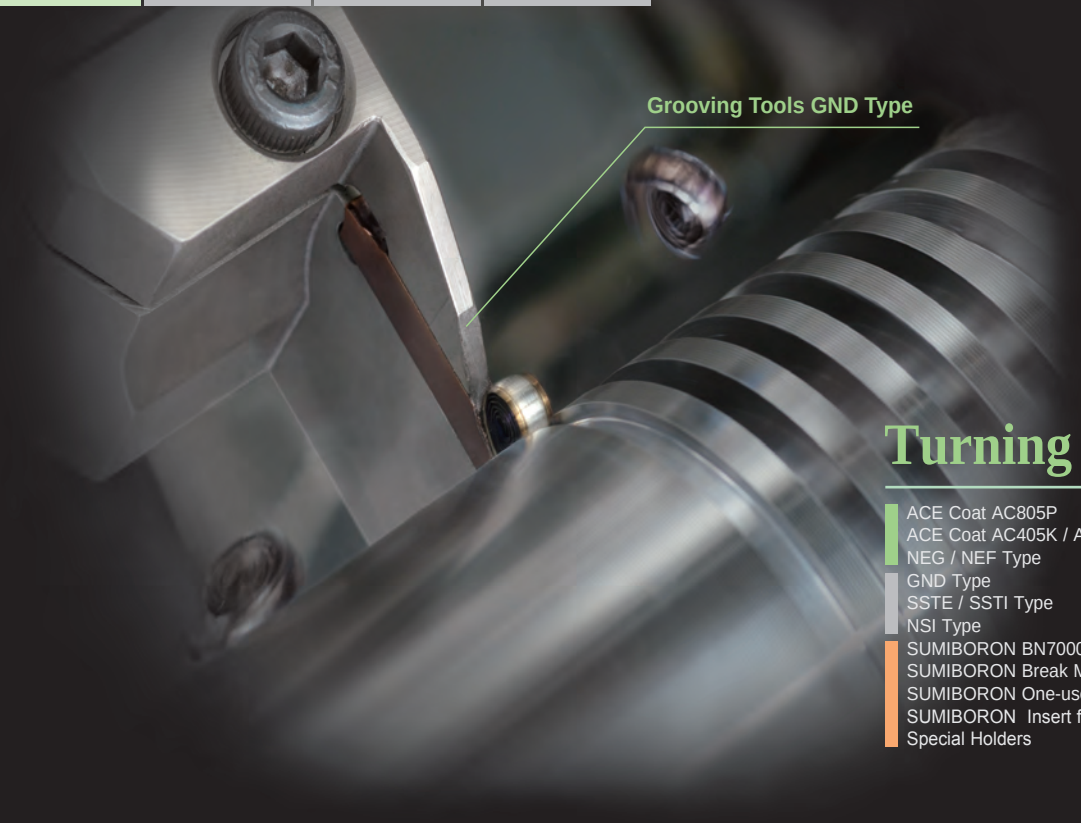


**New Chipbreakers for Exotic Alloys**

## NEG / NEF Type

☞ C4 – C5

- A combination of chipbreakers providing superior chip control and long life is ideal for titanium alloys, heat-resistant alloys and other exotic alloys. EG type is for roughing and EF type is for finishing.

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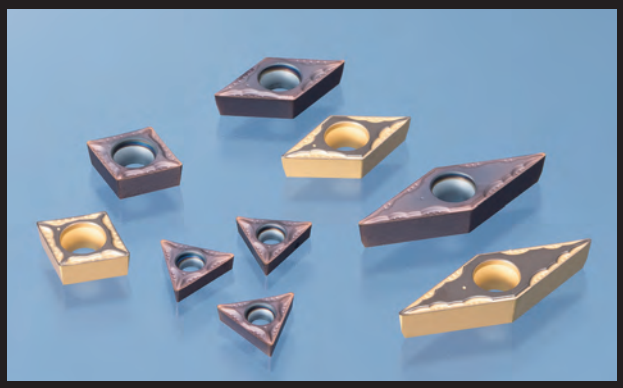

**New Chipbreaker for G Class High Precision Steel Turning**

## NSI Type

☞ C6

- New chipbreaker for G class positive insert with emphasis on cutting performance is applicable for tasks from finishing to light cutting. Superior cutting ability covers a wide range from steel and stainless steel to exotic alloys. Nose radius is made with negative tolerance.



**New Grooving and Cut-Off Tools**

## GND Type

☞ F2 – F13

- For a variety of applications from grooving to cut-off with high precision and high efficiency.
  High rigidity one-piece body construction coupled with high precision inserts in 6 different chipbreaker designs.



**New Threading Tools**

## SSTE / SSTI Type

Stock in Japan

- 3-cornered inserts with chipbreakers and polished flank faces provide both high precision and low-cost threading.
  Various thread types and sizes are stocked.

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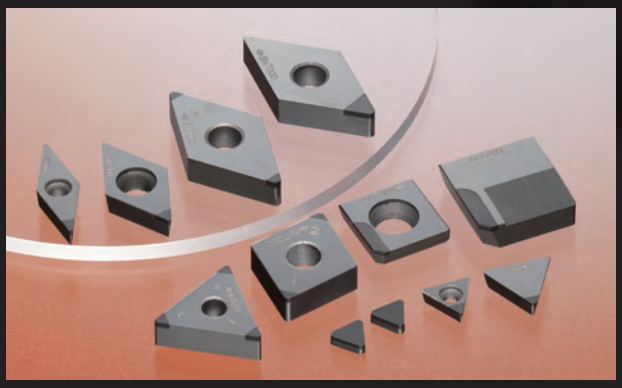
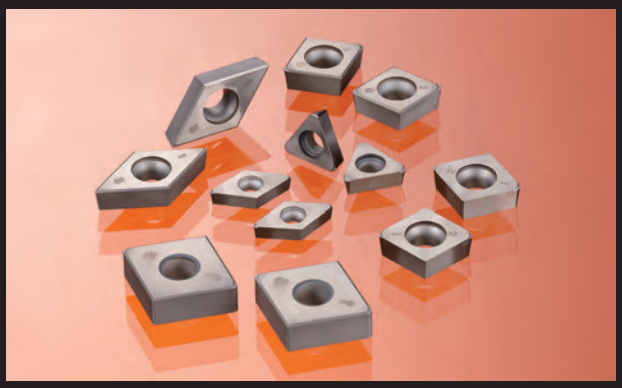


**New CBN Grades for Cast Iron / Sintered Alloy Machining**

## SUMIBORON BN7000

☞ L15

- High thermal conductivity and superior fracture resistance deliver high-speed finishing of cast iron, sintered alloy and exotic alloys. This is a reliable replacement for grinding.

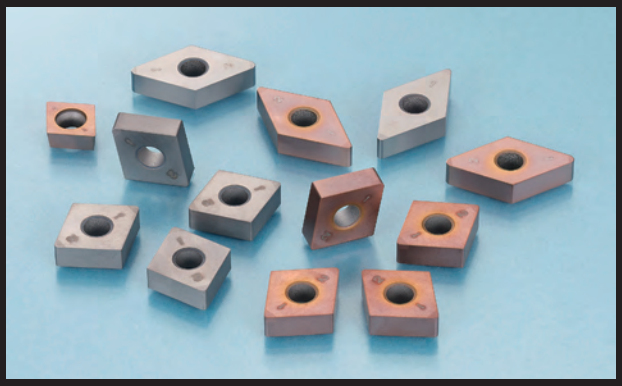


One-use Insert with Chipbreaker for Hardened Steel Finishing

## SUMIBORON Break Master FV / LV Type

☞ L6

- A new series is added to Break Master, the pioneer of CBN insert with fully-fledged chipbreaker. It reduces the formation of uncurled chips even during fine finishing and prevents failures in automatic production lines.



**For High Efficiency Hardened Steel Machining**

## SUMIBORON One-use Wiper Inserts WG / WH Type

☞ L7

- Excellent surface finish similar to that produced by grinding. Two series are available: WG type for low feed and WH type for high feed.



**For High Efficiency Hardened Steel Machining**

## SUMIBORON Insert for High-Efficient Machining & Special Holders

☞ Stock in Japan

- Powerful product lineup to further promote high efficiency machining of hardened steel. The combination of an insert with large nose radius and custom-designed holder achieves a reduction in machining time without decreasing surface roughness.

# Milling Tools

SEC-Sumi Dual Mill DGC Type
SEC-WAVEMILL WGX Type
SEC-WAVEMILL WFX Type






**General Purpose High Efficiency Face Milling Cutters**

## SEC-Sumi Dual Mill DGC Type

☞ G8 , H6

- Original body design accepts two different types of inserts: double-sided 8-cornered insert and double-sided 16-cornered insert. High precision design produces excellent surface finish and achieves high efficiency machining economically. A high efficiency face milling cutter icon.

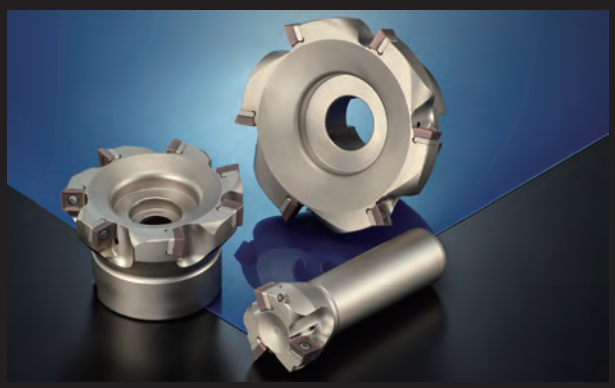


**General Purpose Face Milling Cutters**

## SEC-WAVEMILL WGX Type

☞ G10 , H7

- Utilising leading edge coating technology, the high precision 4-corner positive insert brings innovation to the finishing performance of the face milling cutter.



**General Purpose Shoulder Milling Cutters**

## SEC-WAVEMILL WFX Type

☞ G20 – G23

- Wavemill shoulder milling cutter WFX type is a screw locking type cutter capable of using 4-cornered inserts. Ideal cutting edge design delivers superior squareness.
  The insert shape optimized for shoulder milling combined with a high-precision body leaves a superior machined surface finish.

# Endmills / Drills

- GSX Mill Anti-Vibration Type / Ballnose Type
- SSEH Anti-Vibration Type
- SAFE-LOCK Applicable Endmills
- PDL Type / PCT Type






New-Generation "Global Standard" Carbide Endmills

## GSX Mill Anti-Vibration Type
## GSX Mill Ballnose Type

☞ J4–21, J36

- Ballnose and anti-vibration types now available in our new "Global Standard" endmill series "GSX MILL". Enhanced product range.



Carbide Endmills for Exotic Alloys

## SSEH Anti-Vibration Type

☞ J22–24, J41

- New anti-vibration type added to the SSEH type endmill for exotic alloys. Optimised irregular pitch and lead significantly reduces chattering. Achieves beautiful finished surface.




For Exotic Alloy / High Load Machining

## SAFE-λOCK™ Applicable Endmills

☞ J21, J23–24

- High thermal conductivity and superior fracture resistance deliver high-speed finishing of cast iron, sintered alloy and exotic alloys. This is a reliable replacement for grinding.




Plunge Drill / Plunge Mill

## SEC-Drill PDL Type
## SEC-Mill PCT Type

☞ K56 – K57

- This high efficiency milling cutter can produce flat bottom profiles. Delivers excellent performance for drilling deep holes and pocketing with long tool overhang!

# Drills

Strong MultiDrill HX/HY Type
Sumi-Power Drills SPD Type
Micro Long Drills MLDH Type
SUMIDIA Coated Drill SDC Type



Strong MultiDrill HX Type

Strong MultiDrill HY Type



**Drills for High Efficiency Machining**

## Strong MultiDrill HX/HY Type

☞ Stock in Japan

- Strong MultiDrill for high feed drilling. HX type has a design best suited for high feed drilling of cast iron and is a versatile drill which can be used in many types of applications from high feed to general purpose drilling. HY type is a 3-flute drill for high feed drilling.

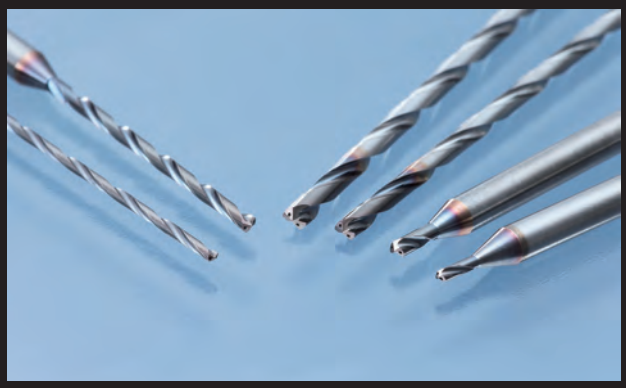


**DIN Type Sumi-Power Drills for Long Tool Life and Excellent Chip Evacuation**

## Sumi-Power Drills SPD Type

☞ K6 – K11

- m7 DIN type Sumi-Power Drills are solid carbide drills that employ a new flute design and wide chip pocket to achieve excellent chip management and evacuation.
  DEX coating enables stable and long tool life over a wide range of work materials and applications.

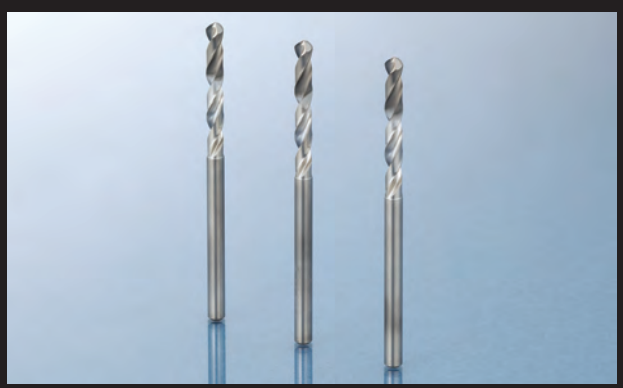


**Small-diameter Hole Drills**

## Micro Long Drills MLDH Type

☞ K30 – K31

- The series lineup has been expanded with many new items. The new flute design increases strength while the special coating achieves longer tool life. It promotes the progressive development of small diameter, deep hole drilling.



**Drills for Carbon Fibre Reinforced Plastic (CFRP)**

## SUMIDIA Coated Drill SDC Type

☞ K33

- Diamond coated drill ideal for machining of CFRP which is in increasing demand. The original multi-angled design effectively reduces burrs and delamination. High strength, high density SUMIDIA coating assures unrivalled long tool life.

# Sumitomo Electric's

## Innovative Tools Support a Variety of Industries

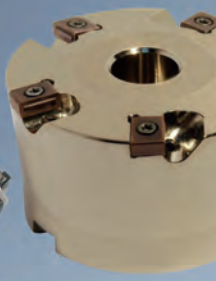


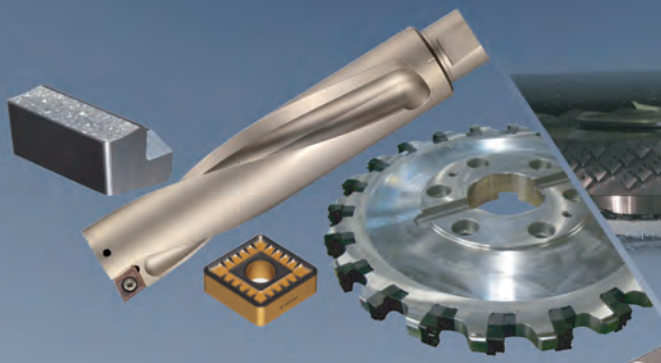












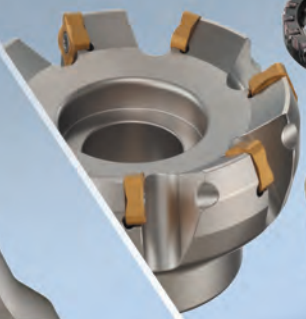




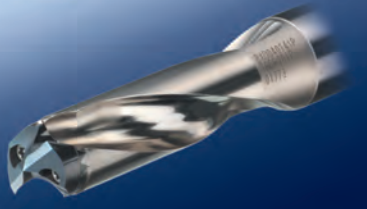


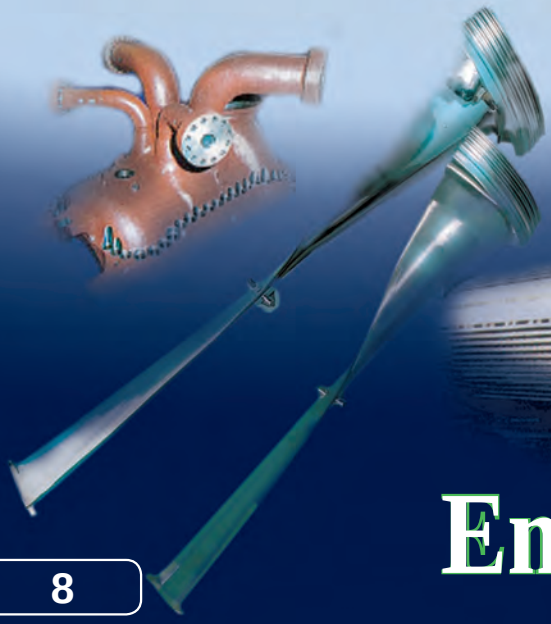
















# Energy

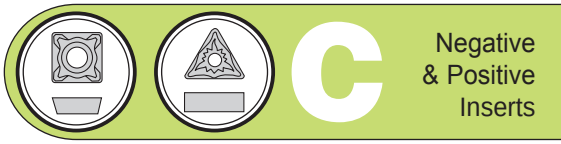

Aerospace
Automotive
Steel and
Construction Equipment







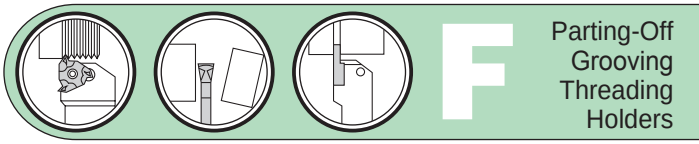


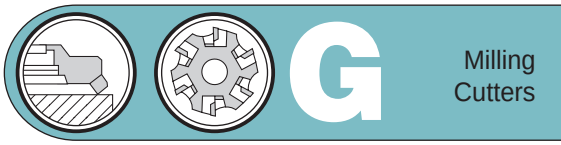







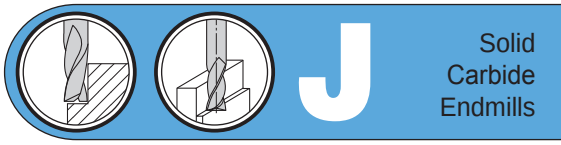




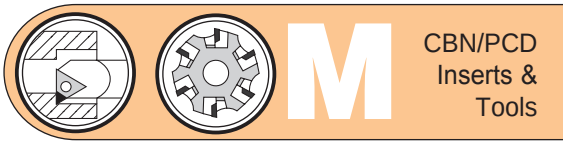


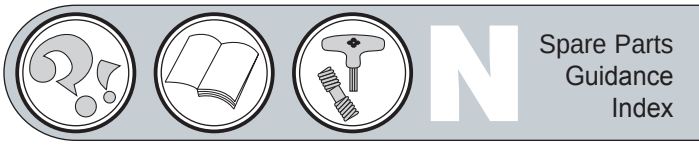








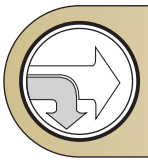


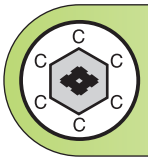
**Stock marking chart**

- ● : 1-st recommended stock item
- ● : Euro stock item
- ○ : Japan stock item
  (Delivery on request)
- ▲ : To be replaced by new item
  (Please confirm stock availability)
- □ : Made to order
- — : We cannot produce

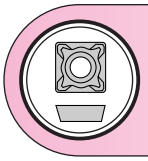
**Note:**
Stocking policy may change without prior notice, please consult our sales representative for actual stock situation.

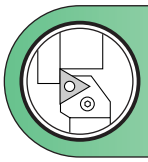
# Contents

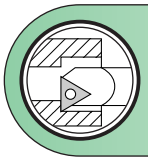


Insert Selection A1~

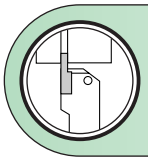

Grades B1~

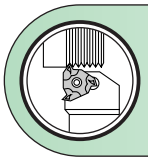

Inserts
Negative Type C1~


Inserts
Positive Type C37~


External Holders D1~


Boring Bars E1~


Grooving Holders
Parting-Off Holders F1~

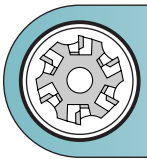

Threading Holders F11~

| | Negative | Positive |
|---|---|---|
| C 80° Diamond Type | C12 | C37 |
| D 55° Diamond Type | C17 | C40 |
| R Round Type | | C42 |
| S Square Type | C21 | C43 |
| T 60° Triangular Type | C26 | C46 |
| V 35° Diamond Type | C31 | C51 |
| W 80° Trigon Type | C33 | C53 |

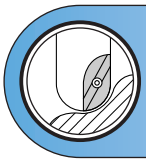
CBN Inserts M1~

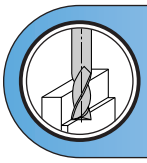
PCD Inserts M1~

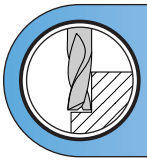

Guidance N1~

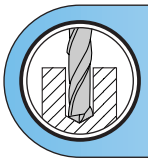

Milling Cutters G1~

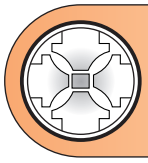

Milling Cutters G30~
High Feed / Special Purpose Cutters


Indexable Endmills H1~

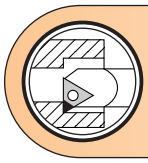

Endmills J1~
Coated Solid Types


Endmills J41~
Uncoated Solid Types


Multi-Drills K1~


SumiBoron L1~
CBN Grades


SumiDia L18~
PCD Grades


CBN / PCD M1~
Inserts and Tools


Spare Parts P1~


Index P9~

# Insert Selection

A

**A1 ~ A26**








Insert Selection

**Sumitomo Grades (Turning)** ..... A2
**Sumitomo Grades (Milling)** ..... A3

Chipbreaker and Grade Selection

**Steel Turning Inserts** ..... A4 - 11
**Stainless Steel Turning Inserts** ..... A12-13
**Cast Iron Turning Inserts** ..... A14-17
**Exotic Alloy Inserts** ..... A18-19
**Hardened Steel Turning Inserts** ..... A20-23
**Non-Ferrous Metal Turning Inserts** ..... A24-25

# 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 | |
|---|---|---|---|---|---|
| ISO | P01 | P10 | P20 | P30 (M30) | P40 (M40) |
| Coated **Carbide** | AC805P (New) | AC810P | AC820P | AC830P | |
| Coated **Cermet** | T2000Z | T3000Z | | | |
| Uncoated **Cermet** | T110A | T1500A | | | |
| **Ceramic** | | | | | |
| Uncoated **Carbide** | | | A30 | | |
| **CBN** | | | | | |

## K — Cast iron

| Finishing | Medium cutting | |
|---|---|---|
| K01 | K10 (M10) | K20 (M20) |
| AC405P (New) | AC415K (New) | AC420K / AC820P |
| T110A | | |
| G10E | | |
| BNC500 | | |
| BN7000 (New) | | |
| BNS800 | | |

## H — Hardened steel

| Application | Finishing ~ Light | Medium ~ Rough |
|---|---|---|
| Coated **CBN** | BNC100, BNC160, BNC200, BNC300 | |
| **CBN** | BN1000 (New), BN2000, BNX20, BNX25, BN300, BN350 (New) | |

## M — Stainless steel

| Application | Finishing ~ Light | Medium ~ Rough |
|---|---|---|
| Coated **Carbide** | AC610M, AC630M, AC530U | |
| **Cermet** | T1500A | |

## S — Super alloy

| Application | Finishing ~ Light | Medium ~ Rough |
|---|---|---|
| Coated **Carbide** | AC510U, AC520U, AC530U | |
| **CBN** | BN7000 (New), BNS800 | |

## N — Non-ferrous metals

| Application | Finishing ~ Light | Medium ~ Rough |
|---|---|---|
| **PCD** | DA1000, DA150 | |
| **Carbide** | | H1 |

### Sintered Compoment

| | | |
|---|---|---|
| **CBN** | BN7500 | BN7000 |
| Coated **HM** | | AC510U |

# Selection of Sumitomo Grades (Milling)



## P — Steel (Carbon steel, Alloy steel)

| Application | Finishing ~ Light cutting | | Medium cutting | Roughing ~ Heavy roughing | |
|---|---|---|---|---|---|
| ISO | P01 | P10 | P20 | P30 (M30) | P40 (M40) |
| Coated **Carbide** | ACP100 | ACP100 / ACP200 | ACP100 / ACP200 / ACP300 | ACP200 / ACP300 | ACP300 |
| Uncoated **Cermet** | T250A | T250A | T250A | | |
| **Ceramic** | | | | | |
| Uncoated **Carbide** | | | A30N | A30N | A30N |
| **CBN** | | | | | |

## K — Cast iron

| Finishing | Medium cutting | |
|---|---|---|
| K01 | K10 (M10) | K20 (M20) |
| ACK100 | ACK100 / ACK200 | ACK200 / ACK300 |
| | | |
| | | |
| | G10E | G10E |
| New BN7000 / BNS800 | New BN7000 / BNS800 | BNS800 |

## H — Hardened steel

| Application | Finishing |
|---|---|
| CBN | New BN7000 / BN350 |

## M — Stainless steel

| Application | Finishing ~ Light | Medium ~ Rough |
|---|---|---|
| Coated carbide | ACP200 | ACP200 / ACP300 |
| Uncoated carbide | | A30N |
| Cermet | T250A | T250A |

## S — Super alloy

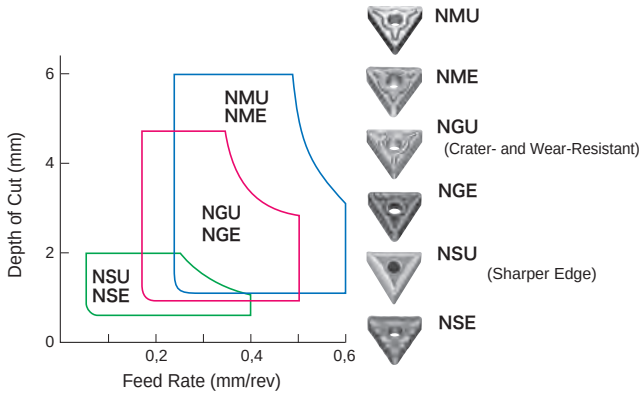
| Application | Finishing ~ Light | Medium ~ Rough |
|---|---|---|
| Coated carbide | ACK300 | ACK300 / ACP300 |
| Uncoated carbide | — | — |

## N — Non-ferrous metals

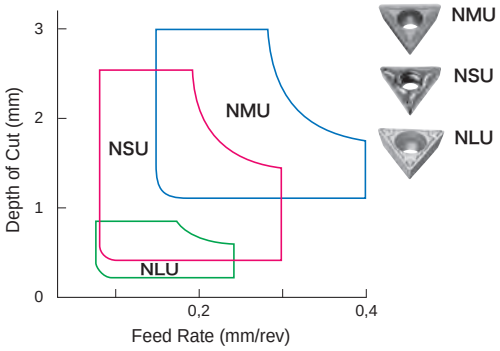
| Application | Finishing ~ Light | Medium ~ Rough |
|---|---|---|
| PCD | New DA1000 | New DA1000 |
| Coated carbide | DL1000 | DL1000 |
| Uncoated carbide | H1 | H1 |

## Main Chipbreakers

### Negative Type



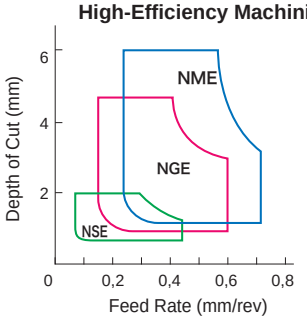

### Positive Type



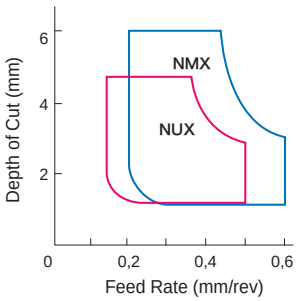

## Sub-Chipbreakers

### Negative Type

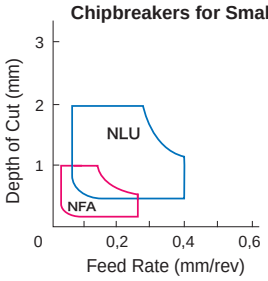
**Chipbreakers for High-Efficiency Machining**



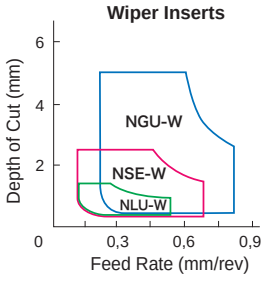

**Strong Edge Chipbreakers**



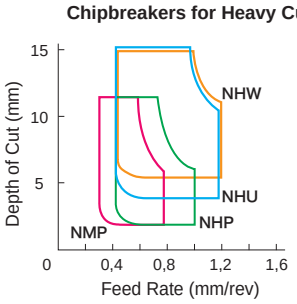

**Chipbreakers for Small Depths**




**Wiper Inserts**

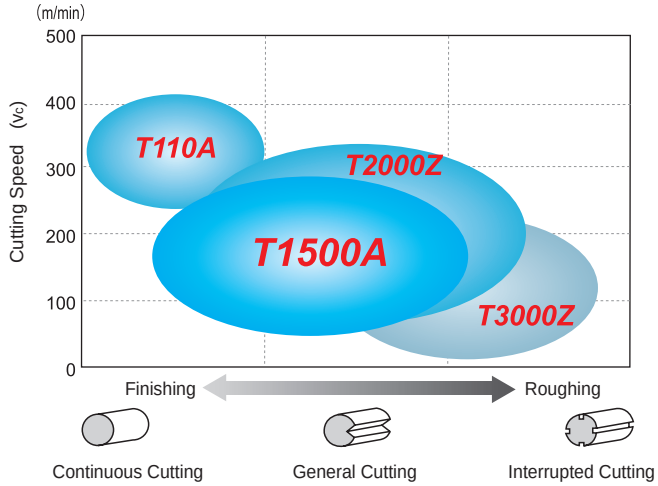



**Chipbreakers for Heavy Cutting**

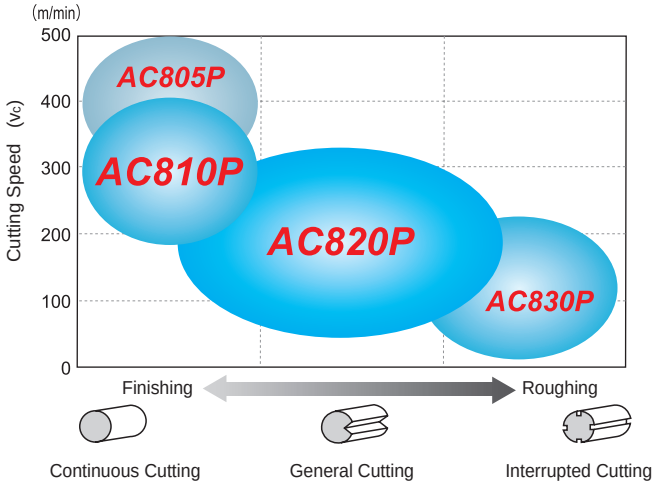



## Grades

● Fine Finishing To Finishing




● Finishing to Rough Cutting



## P Recommended Cutting Conditions

(Min. - **Optimum** - Max.)

| Work Material | Cutting Process | Chipbreaker | Grade | Depth of Cut (mm) | Feed Rate (mm/rev) | Cutting Speed (mm/min) |
|---|---|---|---|---|---|---|
| Soft Steel | Fine Finishing | NFA | **T2000Z** | 0,2-**0,6**-1,0 | 0,05-**0,15**-0,25 | 100-**250**-400 |
| | Finishing | NLU | **AC810P** | 0,5-**1,0**-1,5 | 0,1-**0,25**-0,4 | 260-**340**-420 |
| | Medium Cutting | **NGU** | **AC820P** | 1,0-**2,5**-4,0 | 0,2-**0,35**-0,5 | 200-**260**-320 |
| | Roughing | NMU | **AC830P** | 2,0-**4,0**-6,0 | 0,3-**0,45**-0,6 | 140-**180**-220 |
| Medium Carbon Steel | Fine Finishing | NFA | **T2000Z** | 0,2-**0,6**-1,0 | 0,05-**0,15**-0,25 | 100-**200**-300 |
| | Finishing | NLU | **AC810P** | 0,5-**1,0**-1,5 | 0,1-**0,25**-0,4 | 210-**275**-340 |
| | Medium Cutting | **NGU** | **AC820P** | 1,0-**2,5**-4,0 | 0,2-**0,35**-0,5 | 150-**190**-230 |
| | Roughing | NMU | **AC830P** | 2,0-**4,0**-6,0 | 0,3-**0,45**-0,6 | 110-**135**-160 |
| High Carbon Steel | Fine Finishing | NFA | **T2000Z** | 0,2-**0,6**-1,0 | 0,05-**0,15**-0,25 | 50-**150**-250 |
| | Finishing | NLU | **AC810P** | 0,5-**1,0**-1,5 | 0,1-**0,25**-0,4 | 170-**225**-280 |
| | Medium Cutting | **NGU** | **AC820P** | 1,0-**2,5**-4,0 | 0,2-**0,35**-0,5 | 130-**165**-200 |
| | Roughing | NMU | **AC830P** | 2,0-**4,0**-6,0 | 0,3-**0,45**-0,6 | 90-**120**-150 |

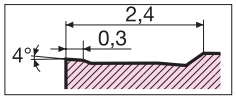
(Red text indicates 1st recommendation.)

## Chipbreaker

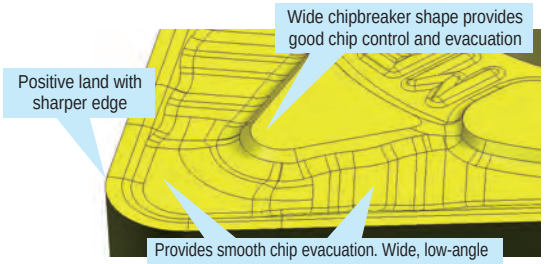
### ● NME Type Chipbreaker for Roughing

Achieves high efficiency and longer tool life with reduced rake face wear.
Delivers stable chip control from shallow cutting depths onwards.



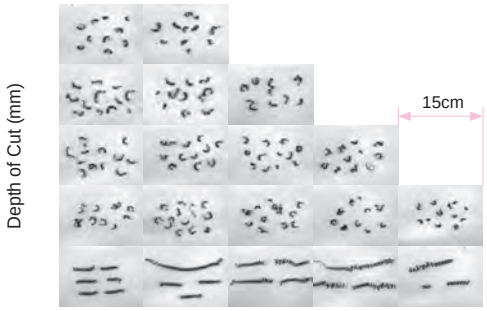


Cross Section of Chipbreaker




### ● Chip Management

Work Material: 15CrMo5
Cutting Conditions: $v_c$=200m/min, Dry




Delivers stable chip control from cutting depths as shallow as 1mm.

### ● Wear Resistance

Work Material: 100Cr6 Bearing Component
Insert: CNMG 160612 NME
Cutting Conditions: $v_c$=240m/min, f=0,4mm/rev, $d_{oc}$=2,5mm, Wet


NME Type (AC810P)
No. of Workpieces 30

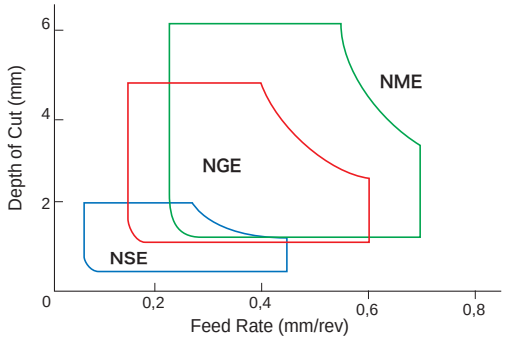


Competitor's Roughing Chipbreaker (P10)
No. of Workpieces 30

Drastically reduced rake face wear achieves stable tool life.

## ● Shared Features of the High Efficiency Chipbreaker Series

### ● Application Range




### ● Characteristics

**Rake face profile relieves stress concentration with smooth chip evacuation**

● Conventional chip flow


Limited chip contact area increases stress and causes insert damage

● Chip flow by NSE, NGE and NME


Smooth flow improves chip direction and shape.

## Grades AC805P / AC810P / AC820P / AC830P

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

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

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

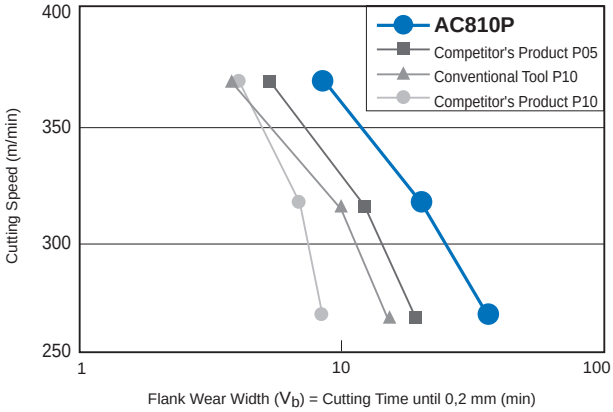
**AC810P** : In addition to FF-TiCN, which has excellent peel-off and wear resistance, this grade features a tough, thick Alumina coating enhanced by newly developed grain growth control technology, excellent wear resistance and long tool life in high-speed, high-feed cutting.

**AC820P** : In addition to FF-TiCN, which has excellent peel-off and wear resistance, this grade features a high-density structured FF-$Al_2O_3$ layer using new smooth surface treatment technology, and also employs coating thickness control technology to achieve excellent versatility, stability, and long tool life.

**AC830P** : In addition to FF-TiCN, which has excellent peel-off and wear resistance, this grade features a strengthened FF-$Al_2O_3$ layer using new stress control technology, and moreover provides excellent reliability and wear- resistance in heavy interrupted cutting to achieve long tool life.

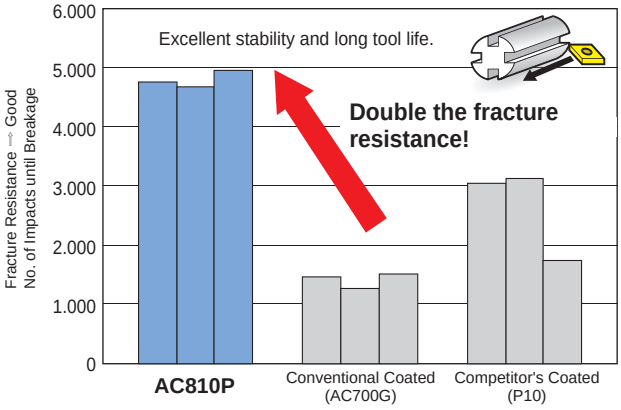
## AC810P Cutting Performance

### ● Continuous Cutting (V-T chart)




Work Material: 34CrMo4 (Continuous), Insert: CNMG 120408
Cutting Conditions: $v_c$=270 ~ 370m/min, f=0,3mm/rev, $d_{oc}$=1,5mm, Wet

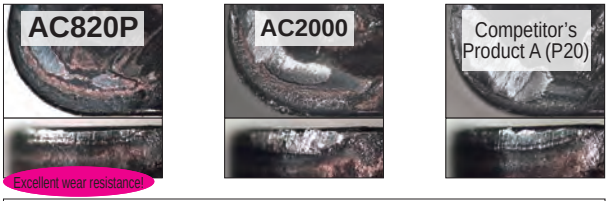
### ● Interrupted Cutting




Work Material: 34CrMo4 (Interrupted), Insert: CNMG 120408 NGU
Cutting Conditions: $v_c$=330 ~ 350m/min, f=0,19 ~ 0,22mm/rev, $d_{oc}$=1,5mm, Wet

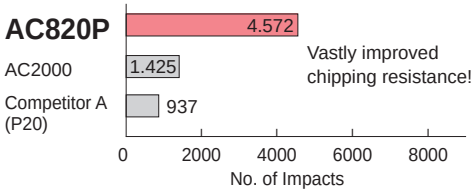
## AC820P Cutting Performance

### ● Continuous Cutting




Work Material: S45C (Continuous), Insert: CNMG 120408 NGE
Cutting Conditions: $v_c$=270m/min, f=0,4mm/rev, $d_{oc}$=1,2mm, Wet, $T_c$=21min

### ● Interrupted Cutting




Work Material: 34CrMo4 (Interrupted), Insert: CNMG 120408 NGE
Cutting Conditions: $v_c$=350m/min, f =0,2mm/rev, $d_{oc}$=1,5mm, Wet

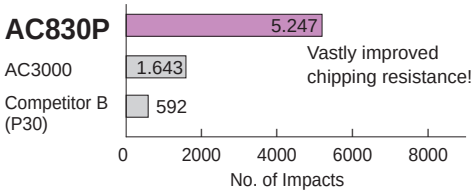
## AC830P Cutting Performance

### ● Continuous Cutting




Work Material: 34crMo4 (Continuous), Insert: CNMG 120408 NGU
Cutting Conditions: $v_c$=240m/min, f=0,3mm/rev, $d_{oc}$=1,5mm, Wet, $T_c$=18min

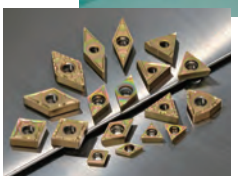
### ● Interrupted Cutting




Work Material: 34CrMo4 (Interrupted), Insert: CNMG 120408 NGU
Cutting Conditions: $v_c$=250m/min, f =0,24mm/rev, $d_{oc}$=1,5mm, Wet

## Grades T1500A / T2000Z / T3000Z





T1500A: A general purpose cermet made from hard grains with different grain sizes and functionality that provides a good balance of wear resistance and toughness. Also achieves good surface finish.

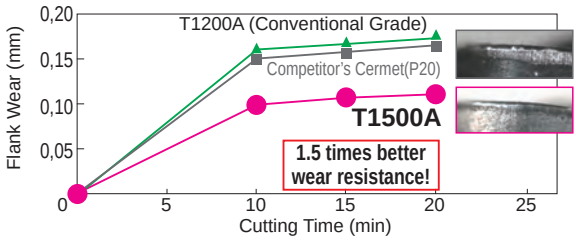
T2000Z : ZX-Coated cermet grades are suitable for light to medium turning of alloy steels, carbon steels, and soft steels at depths of cut up to 3mm.T2000Z makes holding size more reliable, increases tool life, gives excellent surface finish, and can be used wet or dry.

T3000Z : ZX-Coated tough grade for roughing and interrupted cuts.

## Performance

### T1500A Performance

**● Wear Resistance**




Insert: CNMG 120408 NSU
Work material: 34CrMo4
Cutting data: $v_c$ = 230 m/min, f = 0,20 mm/rev, $d_{oc}$ = 1,0 mm
Wet

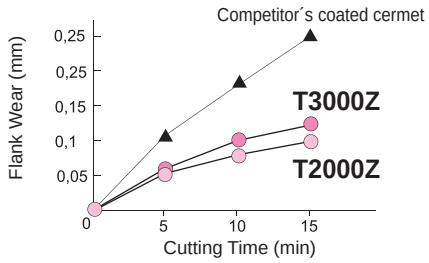
**● Machined Surface Finish**



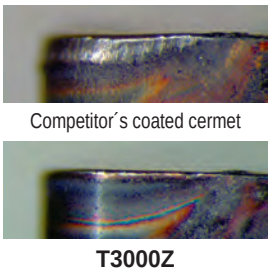

Insert: CNMG 120408 NLU
Work material: C45
Cutting data: $v_c$ = 150 m/min, f = 0,12 mm/rev
$d_{oc}$ = 1,0 mm, Wet

### T2000Z / T3000Z Performance

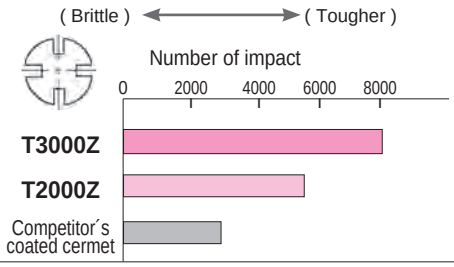
**● Wear Resistance**




**● Edge Comparison**




**● Breakage Resistance**




Insert: CNMG 120408 (HB260)
Work material: 34CrMo4
Cutting data: $v_c$ = 200 m/min, f = 0,30 mm/rev, $d_{oc}$ = 1,5 mm, Wet

Insert: CNMG 120408
Work material: 34CrMo4
Cutting data: $v_c$ = 200 m/min, f = 0,25 mm/rev
$d_{oc}$ = 1,5 mm, Wet

## P Recommended Cutting Conditions

(Min. - **Optimum** - Max.)

| Work Material | Cutting Process | Chipbreaker | Grades | Depth of Cut (mm) | Feed Rate (mm/rev) | Cutting Speed (m/min) |
|---|---|---|---|---|---|---|
| Soft Steel | Fine Finishing | NFA / NFL | T1500A | 0,2-**0,5**-1,0 | 0,05-**0,15**-0,25 | 150-**280**-400 |
| | Finishing | NLU | T3000Z | 0,3-**1,0**-1,8 | 0,08-**0,20**-0,35 | 150-**280**-400 |
| Alloy Steel Carbon Steel | Fine Finishing | NFA / NFL | T1500A | 0,2-**0,5**-1,0 | 0,05-**0,15**-0,25 | 100-**200**-300 |
| | Finishing | NSU / NSE | T2000Z | 0,5-**1,0**-2,0 | 0,08-**0,20**-0,35 | 100-**200**-300 |
| | Medium | NGU | T3000Z | 0,8-**2,2**-4,0 | 0,15-**0,25**-0,50 | 100-**200**-300 |
| High Carbon Steel Carbon Steel | Fine Finishing | NFA / NFL | T1500A | 0,2-**0,5**-1,0 | 0,05-**0,15**-0,25 | 50-**150**-250 |
| | Finishing | NSU / NSE | T2000Z | 0,5-**1,0**-2,0 | 0,08-**0,20**-0,35 | 50-**150**-250 |
| | Medium | NGU | T3000Z | 0,8-**2,2**-4,0 | 0,15-**0,25**-0,50 | 50-**150**-250 |

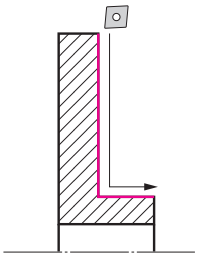
(Red text indicates 1st recommendation.)

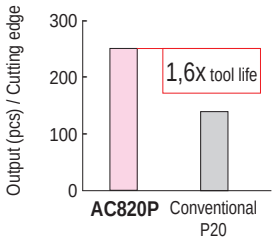
## Application Examples

### AC820P

#### Ck45, Turbine Hub

Good stability and wear resistance in rough cutting of mill-scaled work with 1,6x tool life.

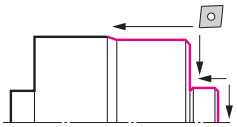


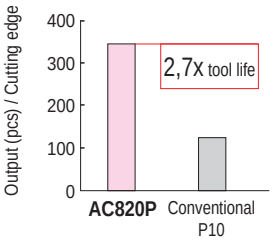



Insert: CNMG 120408 NGE (AC820P)
Cutting Conditions: $v_c$ =210m/min, f=0,3mm/rev, $d_{oc}$ =1,0mm, Wet

#### 20Cr4, Output Shaft

Good wear resistance in high-speed conditions and 2,7x tool life.

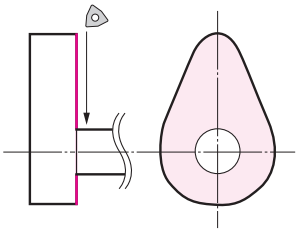


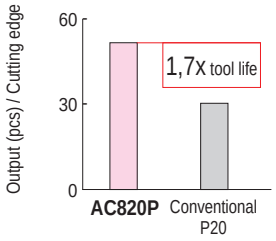



Insert: CNMG 120408 NSX (AC820P)
Cutting Conditions: $v_c$ = ~ 400m/min, f=0,25mm/rev, $d_{oc}$ =0,5 ~1,2mm, Wet

#### 34CrMo4, Balancer

High reliability in interrupted cutting with 1,7x tool life.

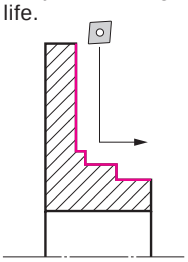


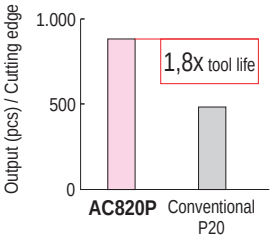



Insert: WNMG 080408 NGU (AC820P)
Cutting Conditions: $v_c$ =220m/min, f=0,18mm/rev, $d_{oc}$ =1,0mm, Wet

#### 15CrMo5, Turbine Hub

Low alloy steel and good finishing. Stable cutting with 1,8x tool life.

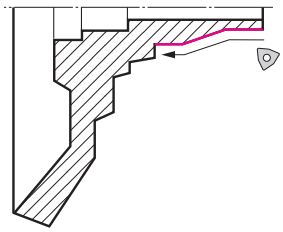


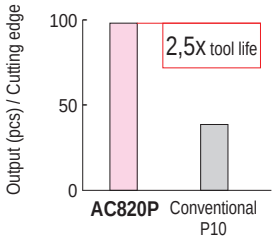



Insert: CNMG 120408 NGU (AC820P)
Cutting Conditions: $v_c$ =200m/min, f=0,25mm/rev, $d_{oc}$ =2,0mm, Wet

#### Ck45, Compact Knuckle

No sudden breakages and significantly improved stability with 2,5x tool life.

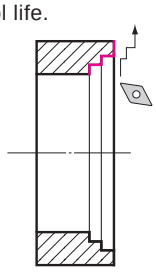


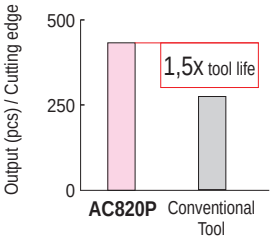



Insert: WNMG 080412 NLU (AC820P)
Cutting Conditions: $v_c$ =192m/min, f=0,45mm/rev, $d_{oc}$ =1,0 ~ 2,0mm, Wet

#### C45, Ring

Good wear resistance in rough cutting of mill-scaled work and 1,5x tool life.

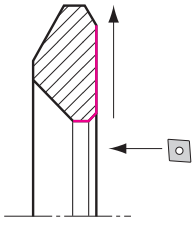


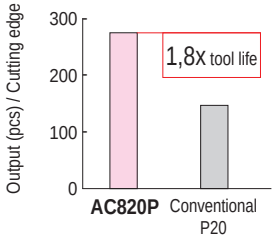



Insert: DNMG 150612 NSX (AC820P)
Cutting Conditions: $v_c$ =200m/min, f=0,15 ~ 0,35mm/rev, $d_{oc}$ =1,0 ~ 2,0mm, Wet

#### 25CrMo4, Gear

Good wear resistance in high-feed conditions with 1,8x tool life.

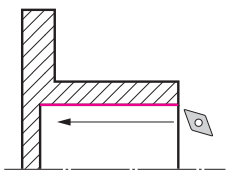


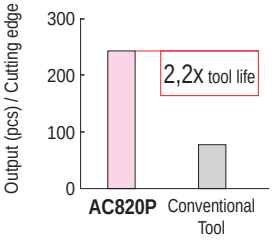



Insert: CNMG 120408 NMU (AC820P)
Cutting Conditions: $v_c$ =220m/min, f=0,5mm/rev, $d_{oc}$ =5mm, Wet

#### C35, Carrier Flange

Positive type with good wear resistance and 2,2x tool life.






Insert: DCMT 11T308 NSU (AC820P)
Cutting Conditions: $v_c$ =180m/min, f=0,17mm/rev, $d_{oc}$ =1mm, Wet

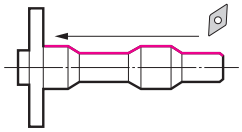
## Application Examples

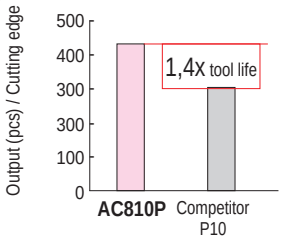
# AC810P

### 15CrMo5, Hub

Good tool life in rough cutting of mill-scaled work.

In rough cutting of mill-scaled work, AC810P provides superior wear resistance and cutting edge stability compared to competitor's grade(P10 coating) and has achieved 1,4 times longer tool life.



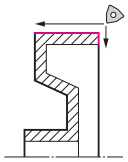


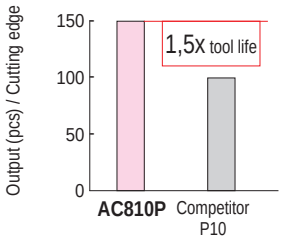

Insert: DNMG 150612 NGE (AC810P)
Cutting Conditions: $v_c$ =204m/min, f=0,35 ~ 0,45mm/rev, $d_{oc}$ =1,5 ~ 3,0mm, Wet

### C45, Hub

Good tool life in rough cutting of mill-scaled work.

In rough cutting of mill-scaled work, AC810P provides superior wear resistance compared to competitor's grade (P10 coating) and has achieved 1,5 times longer tool life.



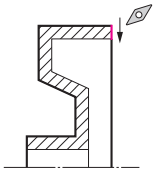


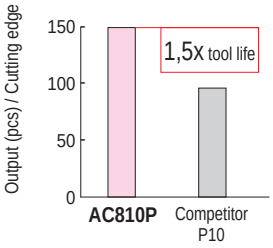

Insert: WNMG 080412 NGU (AC810P)
Cutting Conditions: $v_c$ =250m/min, f=0,4mm/rev, $d_{oc}$ =1,5mm, Wet

### C45, Hub

Long tool life and stable cutting edge.

AC810P gives higher cutting edge stability than competitor's grade (P10 coating) and achieves 1,5 times longer tool life.



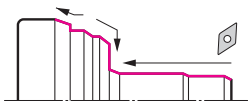


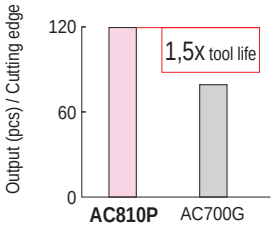

Insert: VBMT 160408 NSU (AC810P)
Cutting Conditions: $v_c$ =240m/min, f=0,25mm/rev, $d_{oc}$ =0,7mm, Wet

### C45, CVJ (constant velocity joints) Outer Race

Long tool life in high speed machining applications.

In high-speed dry machining, AC810P provides superior wear resistance compared to conventional grade (AC700G) and has achieved 1,5 times longer tool life.



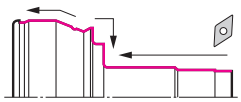


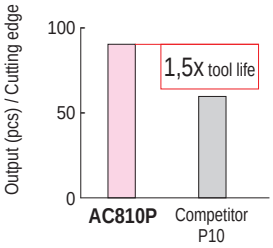

Insert: DNMG 150612 NLU (AC810P)
Cutting Conditions: $v_c$ =350m/min, f=0,20 ~ 0,45mm/rev, $d_{oc}$ =0,4 ~ 0,5mm, Dry

### Ck53, CVJ (constant velocity joints) Outer Race

Long tool life in dry cutting applications.

In dry machining, AC810P provides superior wear resistance compared to competitor's grade (P10 coating) and has achieved 1,5 times longer tool life.



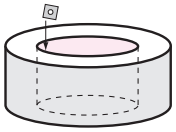


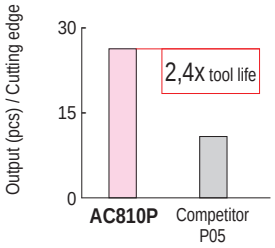

Insert: DNMG 150612 NGE (AC810P)
Cutting Conditions: $v_c$ =270m/min, f=0,35 ~ 0,38mm/rev, $d_{oc}$ =1,5mm, Dry

### C45, Coupling

On par with P05 grade.

In high-feed cutting, AC810P provides superior wear resistance compared to competitor's grade (P05 coating) and has achieved 2,4 times longer tool life.





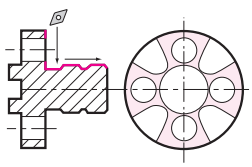

Insert: SNMG 150616 NMU (AC810P)
Cutting Conditions: $v_c$ =175m/min, f=0,66mm/rev, $d_{oc}$ =2,6mm, Wet

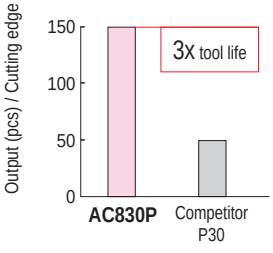
# AC830P

### C55, Hub Unit

Long tool life in both interrupted and continuous cutting!

AC830P offers reduced chipping compared to competitor's grade (P30) in both continuous and interrupted cutting to give 3x tool life.



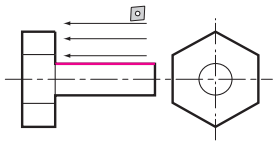


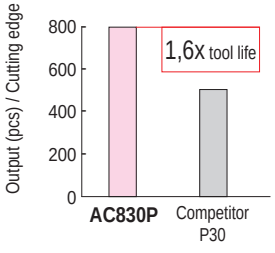

Insert: DNMG 150612 NUX (AC830P)
Cutting Conditions: $v_c$ =150m/min, f=0,25mm/rev, $d_{oc}$ =1,0mm, Wet

### USt.42-2, Bolt

Long tool life in both interrupted and continuous cutting!

AC830P offers superior chipping and wear resistance compared to competitor's grade (P30) and has 1,6x tool life.






Insert: CNMG 120408 NGU (AC830P)
Cutting Conditions: $v_c$ =170m/min, f=0,25mm/rev, $d_{oc}$ =2,5mm, Wet

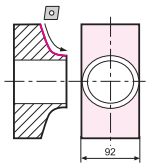
## Application Examples

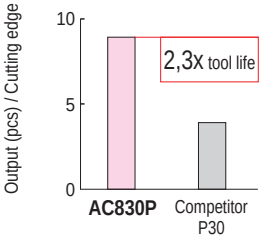
# AC830P

### C50, Machine Component

Improved efficiency and long tool life.

AC830P provides cutting speed that is 25% faster than competitor's grade (P30 coating) and achieves 2,3 times longer tool life.



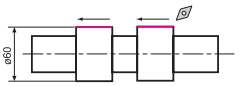



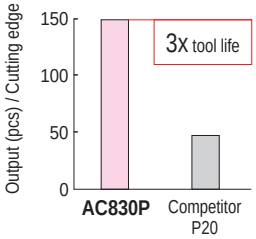

Insert: CNMG 120412 NMU (AC830P)
Cutting Conditions: $v_c$ =120 ~ 150m/min, f=0,25mm/rev, $d_{oc}$ =1,5mm, Wet

### 15CrMo5, Cam Shaft

On par with P20 grade.

In comparison to competitor's grade (P20 coating) which suffered from sudden breakages leading to unstable tool life (30 to 70 workpieces), AC830P provides stable tool life that is 3 times longer (140 to 160 workpieces).



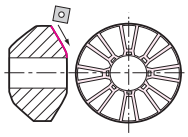



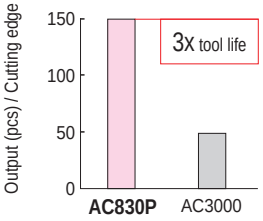

Insert: DNMG 150608 NGU (AC830P)
Cutting Conditions: $v_c$ =220m/min, f=0,25mm/rev, $d_{oc}$ =1,0mm, Wet

### 20Cr4, Pinion Gear

Stable, long tool life in heavy interrupted cutting.

In heavy interrupted cutting of gears, AC830P provides less abnormal damage compared to conventional grade (AC3000) and has achieved stable tool life that is 3 times longer.



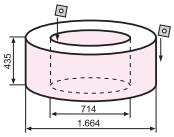


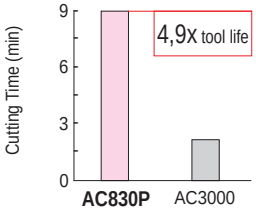

Insert: SNMG 120412 NUX (AC830P)
Cutting Conditions: $v_c$ =170m/min, f=0,35mm/rev, $d_{oc}$ =1,5mm, Wet

### 40NiCrMo6, Gear

Stable, long tool life in heavy cutting.

In heavy cutting with varying cut depths, AC830P achieves stable tool life that is 4,9 times longer compared to conventional grade (AC3000).

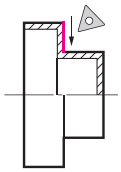


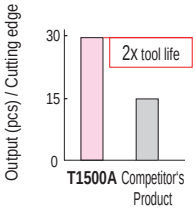




Insert: SNMM 190616 NHG (AC830P)
Cutting Conditions: $v_c$ =115m/min, f=0,8mm/rev, $d_{oc}$ =5 ~ 10mm, Wet

# T1500A (Uncoated Cermet, G Class)

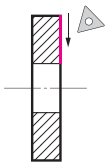
### Hot Press Steel, Automotive Component

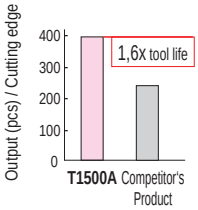





Insert: TNGG 160402 LUM (T1500A)
Cutting Conditions: $v_c$ =180m/min, f=0,25mm/rev
$d_{oc}$ =0,25mm, Wet

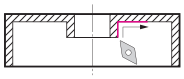
### C45, Transmission Part

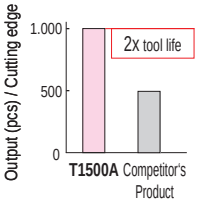





Insert: TNGG 160402 LFY (T1500A)
Cutting Conditions: $v_c$ =300m/min, f=0,05mm/rev
$d_{oc}$ =0,1mm, Wet

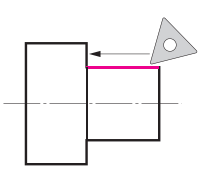
### Hot Plate Steel, Drum Brake Component

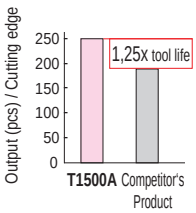





Insert: DNGG 150404 RUM (T1500A)
Cutting Conditions: $v_c$ =280m/min, f=0,07mm/rev
$d_{oc}$ =0,25mm, Wet

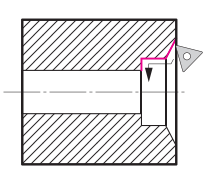
### 34CrMo4, Pump Part

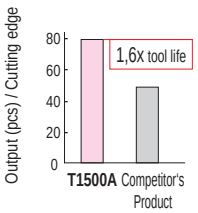





Insert: TNGG 160404 RUM (T1500A)
Cutting Conditions: $v_c$ =100m/min, f=0,25mm/rev
$d_{oc}$ =1.0mm, Wet

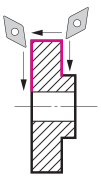
### C45, Sleeve

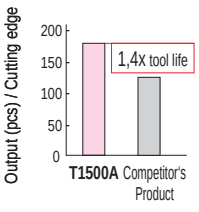





Insert: TPGT 110304 LSD (T1500A)
Cutting Conditions: $v_c$=200m/min, f=0,15mm/rev
$d_{oc}$ =0.2mm, Wet

### C45, Machine Component



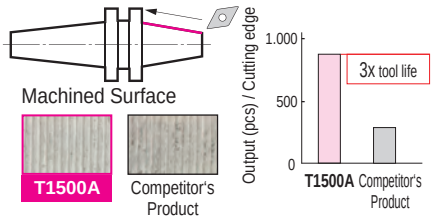



Insert: DCGT 070202 LFX (T1500A)
Cutting Conditions: $v_c$ =240m/min, f=0,03mm/rev
$d_{oc}$ =0,05mm, Wet

## Application Examples

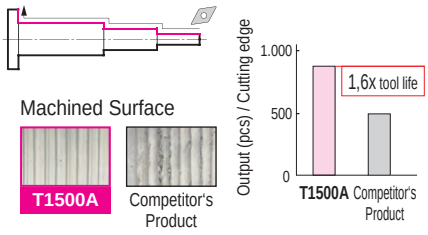
### T1500A (Uncoated Cermet, M Class)

**15CrMo5, Arbour**



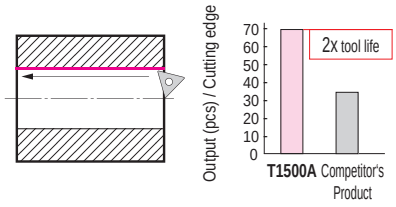

Insert: DNMG 150608 NLU (T1500A)
Cutting Conditions: $v_c$ =200m/min, f=0,25mm/rev
$d_{oc}$ =0,3mm, Wet

**34CrMo4, Shaft**




Insert: DNMG 150408 NSU (T1500A)
Cutting Conditions: $v_c$ =200m/min, f=0,18mm/rev
$d_{oc}$ =0,15mm, Wet

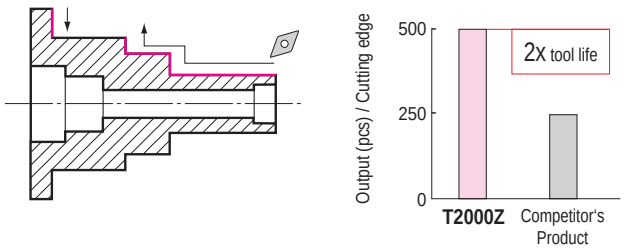
**St.34-2, Machine Component**




Insert: TNMG 160404 NSU (T1500A)
Cutting Conditions: $v_c$ =150m/min, f=0,07mm/rev
$d_{oc}$ =0,1mm, Wet

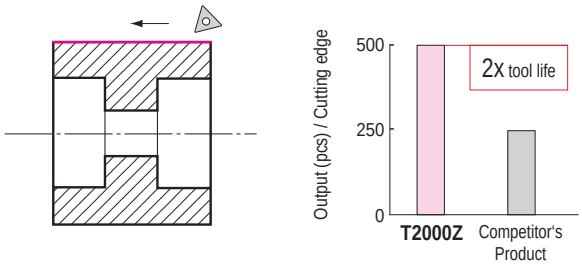
### T2000Z (Coated Cermet)

**C45, Flange**




Insert: DNMG 150608 NSU (T2000Z)
Cutting Conditions: $v_c$ =200m/min, f=0,28mm/rev, $d_{oc}$ =1,5mm, Wet

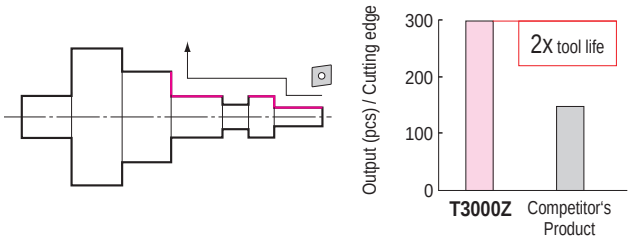
**C45, Gear (Interrupted Cutting)**




Insert: TNGG 160404 RUM (T2000Z)
Cutting Conditions: $v_c$ =300m/min, f=0,15mm/rev, $d_{oc}$ =2,0mm, Wet

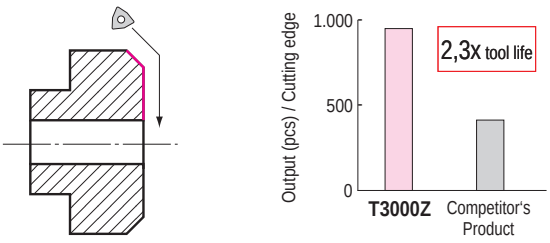
### T3000Z (Coated Cermet)

**Ck45, Shaft (Interrupted Cutting)**



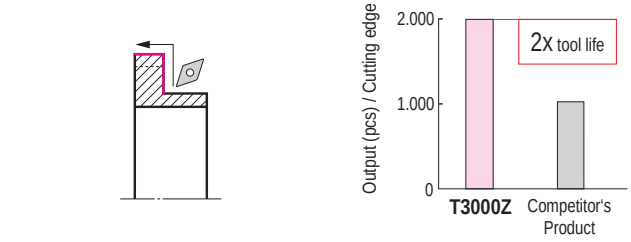

Insert: CNMG 120408 NSX (T3000Z)
Cutting Conditions: $v_c$ =220m/min, f=0,25mm/rev, $d_{oc}$ =1,8mm, Wet

**20Cr4, Cone Clutch**



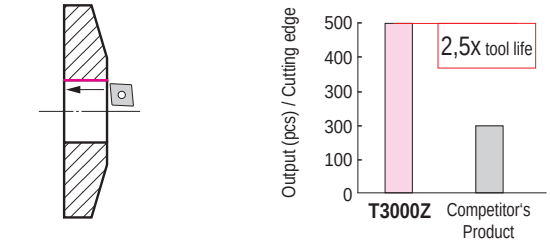

Insert: WNMG 080408 NLU(T3000Z)
Cutting Conditions: $v_c$ =200m/min, f=0,20mm/rev, $d_{oc}$ =1,0mm, Wet

**20Cr4, Clutch Gear (Interrupted Cutting)**




Insert: DNMG 150608 NLU (T3000Z)
Cutting Conditions: $v_c$ =200m/min, f=0,3mm/rev, $d_{oc}$ =0,3 ~ 0,5mm, Wet

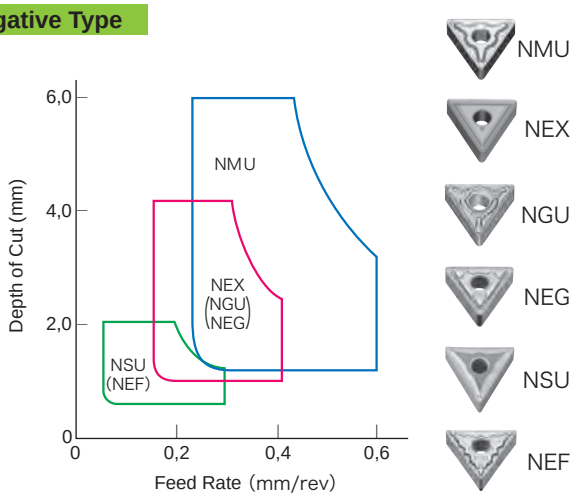
**C45, Machine Component**



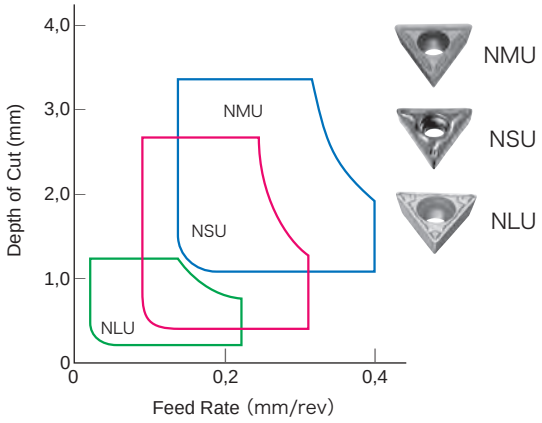

Insert: CPMT 090304 NSU (T3000Z)
Cutting Conditions: $v_c$ =100m/min, f=0,20mm/rev, $d_{oc}$ =1,0mm, Wet

## Chipbreakers

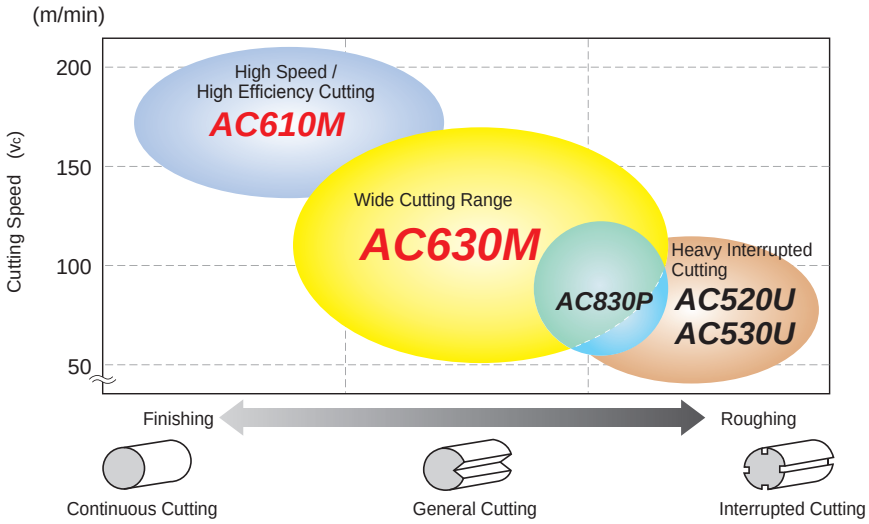
### Negative Type




### Positive Type




## Grades




## M Recommended Cutting Conditions

(Min. - **Optimum** - Max.)

| Work Material | Cutting Process | Chipbreaker | Grade | Depth of Cut (mm) | Feed Rate (mm/rev) | Cutting Speed (m/min) |
|---|---|---|---|---|---|---|
| General / Free-Cutting Stainless steels | Finishing | NSU (NEF) | **AC630M** | **0,5-1,5-2,0** | **0,05-0,15-0,25** | **170-225-300** |
| | Medium | **NEX** (NEG) | **AC630M** | **1,0-2,5-4,0** | **0,1-0,25-0,4** | **140-180-235** |
| | Rough | NMU | **AC530U** | **1,5-3,5-6,0** | **0,2-0,35-0,6** | **120-150-180** |
| Stainless Steel with Low Machinability | Finishing | NSU (NEF) | **AC630M** | **0,5-1,5-2,0** | **0,05-0,15-0,25** | **120-175-230** |
| | Medium | **NEX** (NEG) | **AC630M** | **1,0-2,5-4,0** | **0,1-0,25-0,4** | **100-140-180** |
| | Rough | NMU | **AC520U** | **1,5-3,5-6,0** | **0,2-0,35-0,6** | **80-120-160** |
| Hard-to-cut Stainless Steel | Finishing | NSU (NEF) | **AC630M** | **0,5-1,5-2,0** | **0,05-0,15-0,25** | **90-115-140** |
| | Medium | **NEX** (NEG) | **AC630M** | **1,0-2,5-4,0** | **0,1-0,25-0,4** | **70-90-110** |
| | Rough | NMU | **AC520U** | **1,5-3,5-6,0** | **0,2-0,35-0,6** | **50-75-100** |

(Red text indicates 1st recommendation.)

## Grades

## AC610M / AC630M / AC520U / AC530U

AC610M： High hardness carbide substrate coupled with Super FF Coat. For high efficiency machining with superior wear resistance.

AC630M： High toughness carbide substrate coupled with Super FF Coat. A general purpose grade with sharp cutting edges for superior stability.

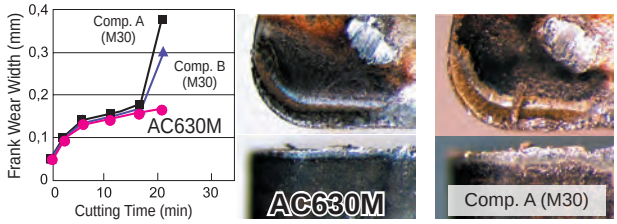
AC520U： Tough carbide grade that utilises the high wear resistant Super ZX Coat for excellent stability

AC530U： Tough grade with long tool life and high efficiency for precision machining of stainless steel and small components. For details, refer to "Small Tools".

### AC630M Cutting Performance

**●The First Choice for Stainless Steel Machining**

5 CrNiMo 1810, Medium Speed Cutting

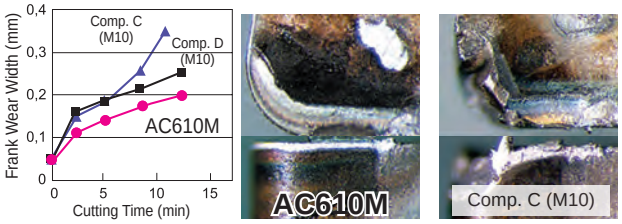



Insert：CNMG 120408 NGU（AC630M）
Cutting Conditions：$v_c$=150m/min, f=0,25mm/rev, $d_{oc}$=1,5mm, Wet

### AC610M Cutting Performance

**●For High Speed, High Efficiency Machining**

5 CrNiMo 1810, High Speed Cutting



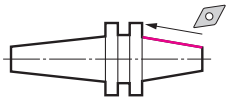

Insert：CNMG 120408 NGU（AC610M）
utting Conditions：$v_c$=200m/min, f=0,25mm/rev, $d_{oc}$=1,5mm, Wet

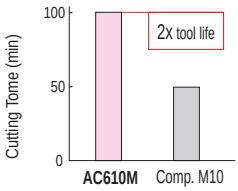
## Application Examples

### AC610M

**X5CrNi1810, Arbour**

AC610M has good wear resistance with 2x tool life of competitor's.

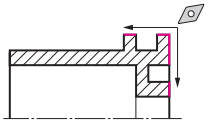


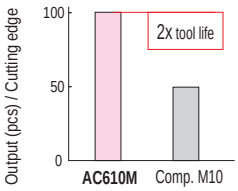



Insert：DNMG 150408 NEX（AC610M）
Cutting Conditions：$v_c$=210m/min, f=0,3mm/rev, $d_{oc}$=2,0mm, Wet

**X510Cr13, Sleeve**

AC610M features superior wear resistance compared to competitor's with 2x tool life.



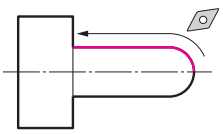


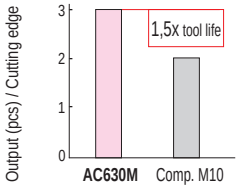

Insert：DNMG 150408 NGU（AC610M）
Cutting Conditions：$v_c$=215m/min, f=0,35mm/rev, $d_{oc}$=0,85mm, Wet

### AC630M

**X5CrNi1810, Machine Component**

AC630M enables stable cutting without breakages with 1,5x the tool life of competitor's grade.

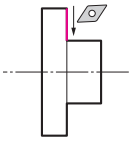


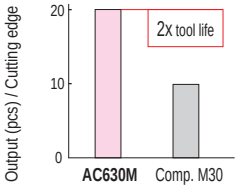



Insert：DNMG 150408 NEX（AC630M）
Cutting Conditions：$v_c$=130m/min, f=0,4mm/rev, $d_{oc}$=0,5mm, Wet

**X2CrNiMo17132, Automotive Component**

AC630M enables stable cutting even in light interrupted cutting with 2x the tool life of competitor's grade.

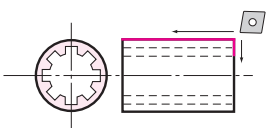


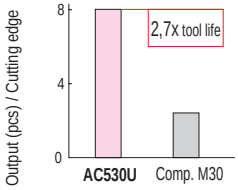



Insert：DNMG 150408 NGU（AC630M）
Cutting Conditions：$v_c$=150m/min, f=0,15mm/rev, $d_{oc}$=1,6mm, Wet

### AC520U

**X5CrNi1810, Machine Component**

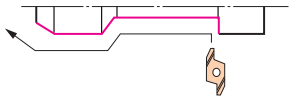


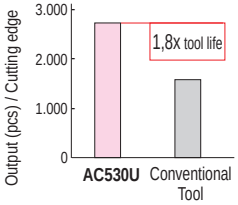



Insert：CNMG 120408 NEX（AC520U）
Cutting Conditions：$v_c$=150m/min, f=0,2mm/rev, $d_{oc}$=2,0mm, Wet

### AC530U

**X12CrS13, Pulley Shaft**

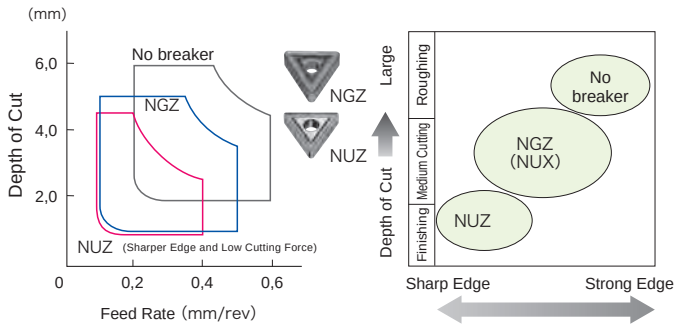




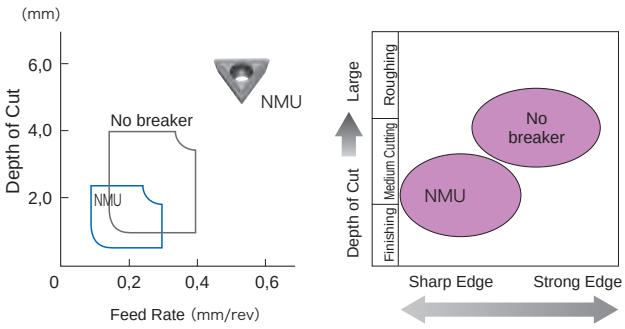

Insert：BTR3515（AC530U）
Cutting Conditions：$v_c$=60～90m/min, f=0,04mm/rev, $d_{oc}$=1,5～2,5mm, Wet

# Chipbreakers

## Negative Type

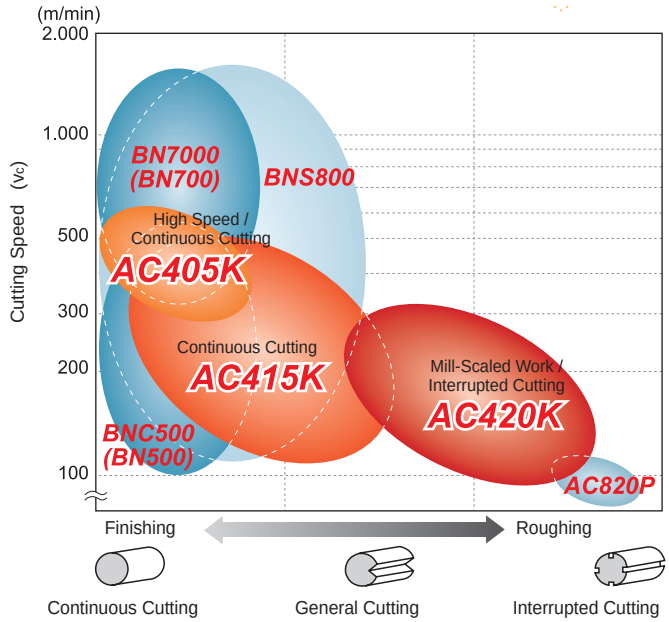



## Positive Type

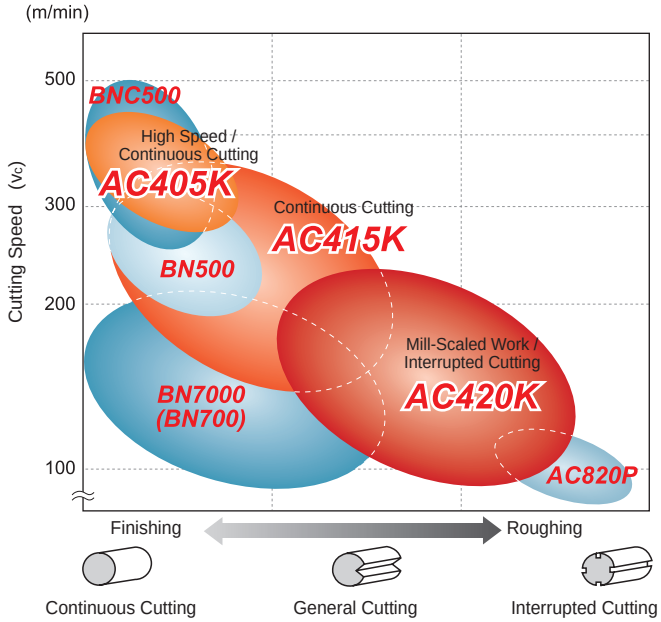



# Grades

## ● GG (Grey Cast Iron)




## ● GGG (Ductile Cast Iron)



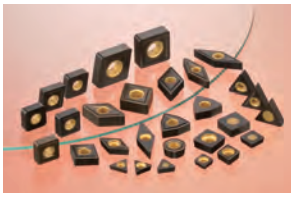

# Recommended Cutting Conditions

(Min. - **Optimum** - Max.)

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

(Red text indicates 1st recommendation.)

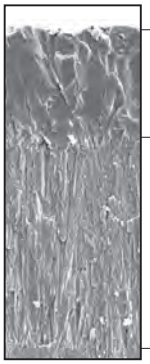
## Grades AC405K / AC415K / AC420K



AC405K: Suitable for high-speed continuous cutting. Excellent resistance to wear and plastic deformation.
AC415K: First recommended grade for cast iron turning. Provides stability and long tool life in a wide range of processes.
AC420K: Superior fracture resistance provides excellent stability in interrupted unstable cutting and when cutting mill-scaled work.

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

● Coating Structure



Micro-grained α Alumina (FF-$Al_2O_3$)
Improved adhesion and peel-off resistance.

Super FF-TiCN
Ultra-fine grained, ultra-hard TiCN coating increases wear resistance 1,5 times.

Coating stress control technology reduces abnormal damage caused by chipping.

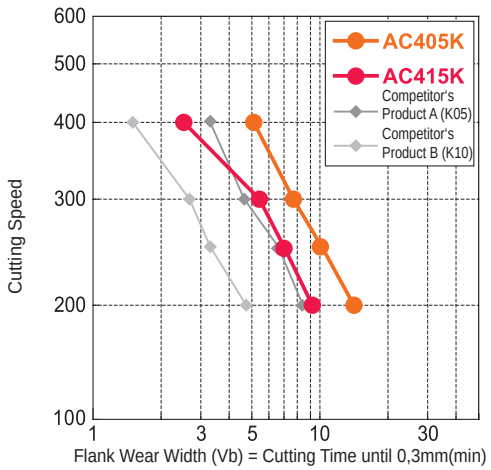


AC400K Series Coating



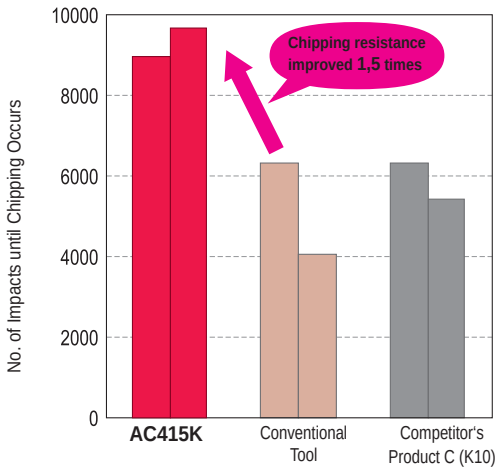

Conventional Coating

### AC405K / AC415K Wear Resistance




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

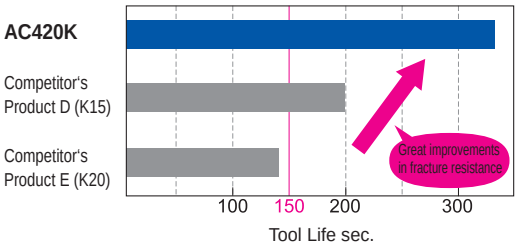
### AC415K Chipping Resistance



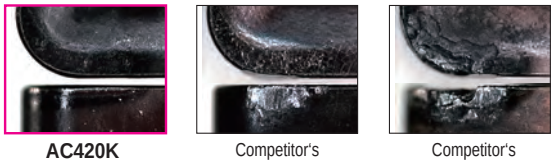

Work Material: GGG-40,3
Insert: CNMG120408
Cutting Conditions: $v_C$=300m/min f=0,25mm/rev $d_{oc}$=1,5mm Wet

### AC420K Fracture Resistance

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




Edge Wear Comparison (After 150s)



AC420K | Competitor's Product D (K15) | Competitor's Product E (K20)

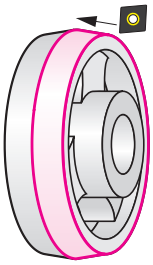
Work Material: GGG-40,3
Toolholder: PCLNR2525-43, Insert: CNMG120408
Cutting Conditions: $v_C$=350m/min f=0,25mm/rev $d_{oc}$=1,5mm Wet

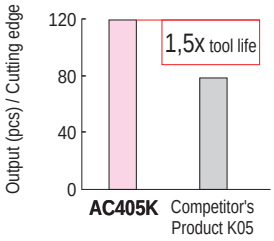
## Application Examples

## AC405K

### GG20, Compressor Component (Pulley)

AC405K achieves 1,5 times longer tool life through improved wear resistance.

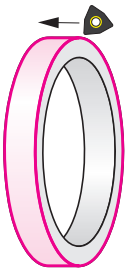


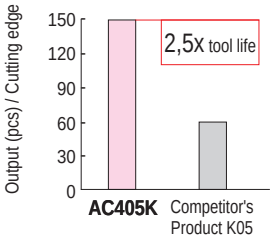



Insert: CNMG120412 NGZ (AC405K)
Cutting Conditions: $v_c$=500m/min, f =0,25mm/rev, $d_{oc}$ = ~ 2,0mm, Dry

### GGG65, Ring

Thanks to reduced chipping and improved wear resistance, AC405K eliminates problems with unstable tool life and achives 2,5 times longer stable tool life.

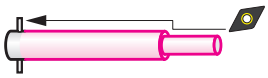


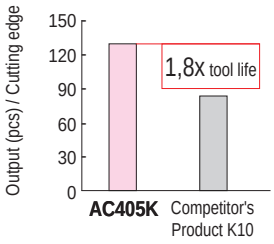



Insert: WNMG080408 NUZ (AC405K)
Cutting Conditions: $v_c$=340m/min, f =0,3mm/rev, $d_{oc}$ =0,2mm, Wet

### GGG70, Input Shaft

Thanks to reduced chipping and improved wear resistance, AC405K achieves 1,8 times longer tool life.

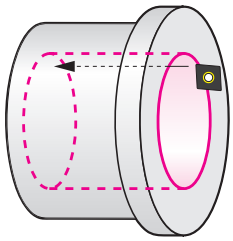


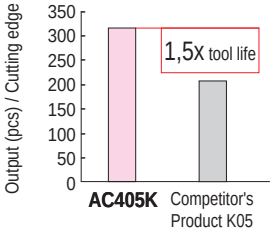



Insert: DNMG150408 NUZ (AC405K)
Cutting Conditions: $v_c$=200m/min, f =0,45mm/rev, $d_{oc}$=0,25 ~ 0.40mm, Wet

### GGG45, Sleeve

Excellent wear resistance achieves 1,5 times longer tool life in continuous hole finishing applications.
The number of tool compensations required has also been halved.



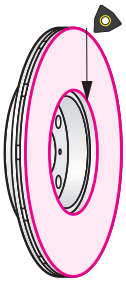


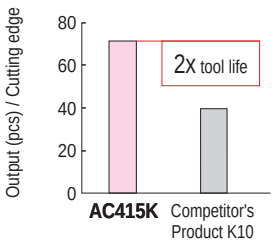

Insert: CNMG120408 NUZ (AC405K)
Cutting Conditions: $v_c$=300m/min, f =0,20mm/rev, $d_{oc}$=0,5mm, Wet

## AC415K

### GG20, Brake Disc

AC415K achieves 1,4 times longer tool life through improved wear resistance.

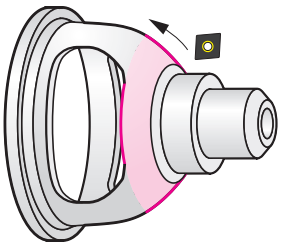


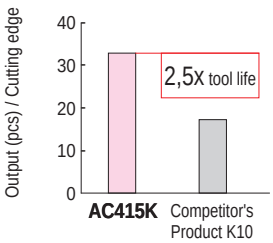



Insert: WNMA080412 (AC415K)
Cutting Conditions: $v_c$=450m/min, f =0,25mm/rev, $d_{oc}$ = ~1,5mm, Dry

### GGG45, Differential Case

Thanks to reduced chipping and improved wear resistance, AC415K eliminates problems with unstable tool life and achieves 1,6 times longer tool life.





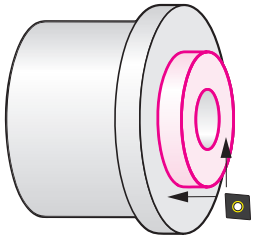

Insert: CNMG120408 NGZ (AC415K)
Cutting Conditions: $v_c$=240m/min, f =0,3mm/rev, $d_{oc}$ =2,0 ~ 3,0mm, Wet

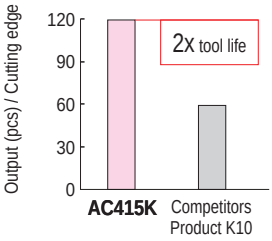
## Application Examples

## AC415K

### GGG50, Hub

AC415K delivers 2 times longer tool life in light interrupted cutting of mill-scaled work thanks to improved chipping and wear resistance.

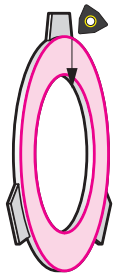


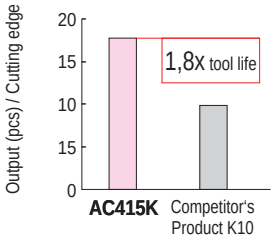



Insert: CNMA120408 (AC415K)
Cutting Conditions: $v_c$=230m/min, f =0,2 ~ 0,3mm/rev, $d_{oc}$=1,5 ~ 2,0mm, Wet

### GG25, Pressure Plate

Reduces occurrence of sudden breakages and achieves 1,8 times longer stable tool life in heavy interrupted cutting.



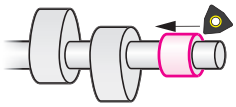


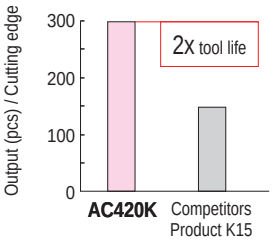

Insert: WNMA080412 (AC415K)
Cutting Conditions: $v_c$=230m/min, f =0,30mm/rev, $d_{oc}$=1,5 ~ 2,5mm, Dry

## AC420K

### GGG70, Cam Shaft

AC420K delivers 2 times longer tool life when cutting hardened steel and mill-scaled work.

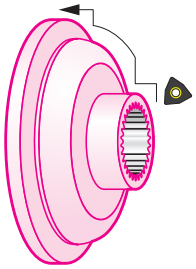


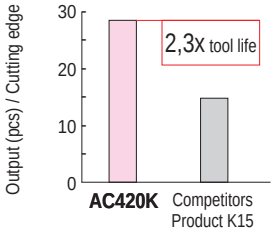



Insert: WNMA080408 (AC420K)
Cutting Conditions: $v_c$=100 ~ 250m/min, f =0,15 ~ 0,30mm/rev, $d_{oc}$=1,0mm, Wet

### GGG45, Drive Sprocket

AC420K delivers 2 times longer stable tool life in unstable machining of mill-scaled work.

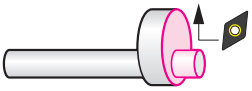


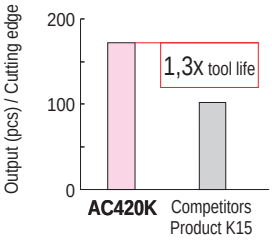



Insert: WNMA080412 (AC420K)
Cutting Conditions: $v_c$=200m/min, f =0,32mm/rev, $d_{oc}$=3,0mm, Wet

### GGG50, Shaft

AC420K delivers 1,3 times longer stable tool life in heavy interrupted cutting.

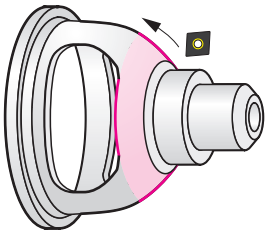


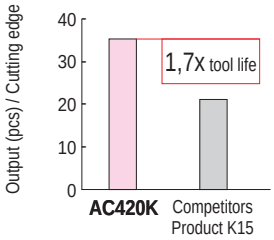



Insert: DNMG150412N-GZ (AC420K)
Cutting Conditions: $v_c$=100 ~ 270m/min, f =0,15 ~ 0,40mm/rev, $d_{oc}$=1,5mm, Wet

### GGG35, Differential Case

Reduces occurrence of sudden breakages and achieves 1,7 times longer stable tool life in heavy interrupted cutting.

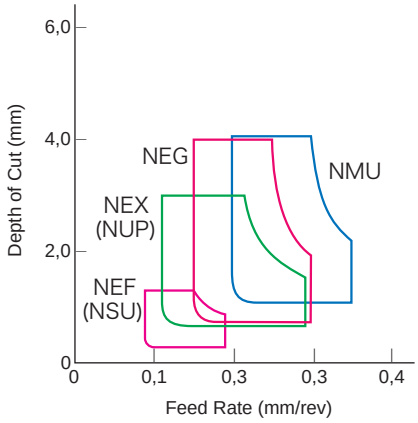





Insert: CNMA120408 (AC420K)
Cutting Conditions: $v_c$=250m/min, f =0,30mm/rev, $d_{oc}$=2,0 ~ 3,0mm, Wet

## Chipbreakers

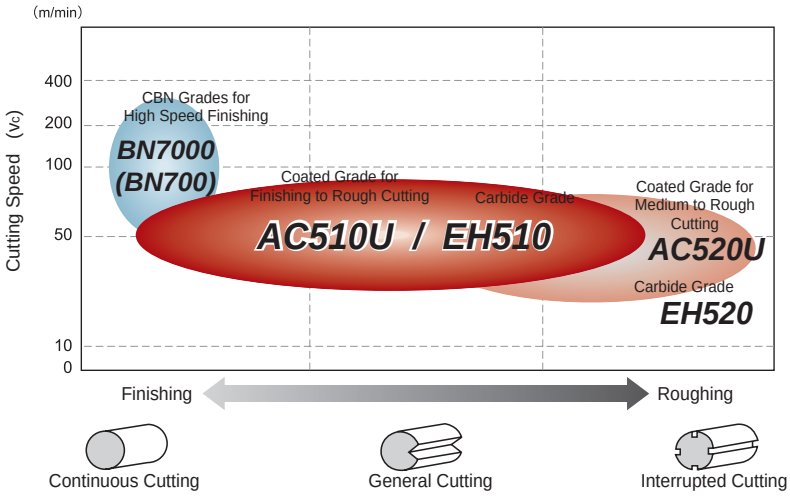
Negative Type







## Grades




## Recommended Cutting Conditions

(Min. - **Optimum** - Max.)

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

(Red text indicates 1st recommendation.)

## Grades

## AC510U / AC520U / EH510 / EH520

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

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

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

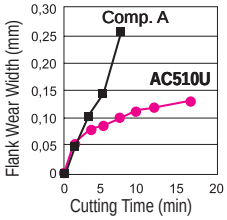
- Carbides with excellent thermal, wear, and fracture resistance for use with exotic alloys. Lineup also includes new chipbreaker design.

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

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

### AC510U Cutting Performance

- Turning of Thermal Resistant (Ni-based) Alloys



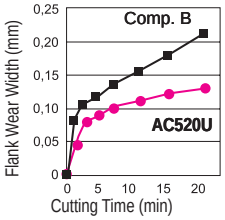




Work Material: Inconel 718 (45HRC)
Insert: CNMG 120408 NEX (AC510U)
Cutting Conditions: $v_c$=80m/min $f$=0,12mm/rev $d_{oc}$=0,8mm Wet

### AC520U Cutting Performance

- Turning of Thermal Resistant (Fe-based) Alloys




Stable turning with no notch wear!

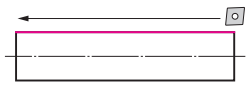


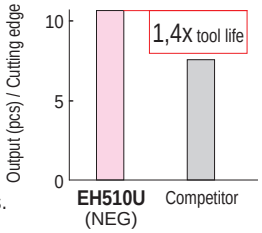

Work Material: Heat resistant ferrous alloy
Insert: CNMG 120408 NMU (AC520U)
Cutting Conditions: $v_c$=40m/min $f$=0,2mm/rev $d_{oc}$=2,0mm Wet

## Application Examples

### AC510U/EH510

**Inconel 718**
**Shaft Component**

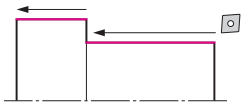


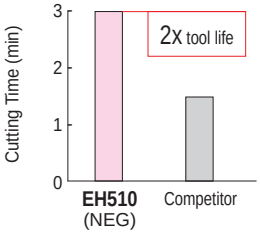



Stable, long tool life with no breakages.
Small chips.

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

**Titanium Ti-6Al-4V**



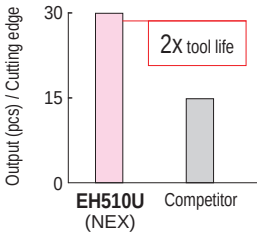



Tool life doubled with reduced crater wear.
Now with drastically improved chip control.

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

**Inconel 718 Pin**

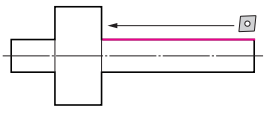





Achieving 1.3x higher efficiency and stable tool life with cutting speeds of 40m/min as compared to 30m/min for conventional grades.

Insert: CNMG 120408 NEX (AC510U)
Cutting Conditions: $v_c$=40m/min $f$=0,25mm/rev $d_{oc}$=2,0mm Wet

**Inconel 718 Shaft Component**



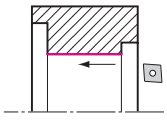


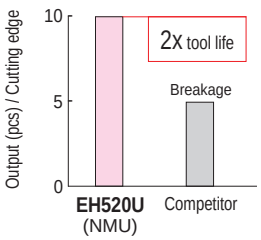

Drastically improved chip control.
Eliminate final polishing process without damaging work.

Insert: CNMG 120408 NEF (AC510U)
Cutting Conditions: $v_c$=45m/min $f$=0,1mm/rev $d_{oc}$=0,25mm Wet

### AC520U

**Inconel 718 Machine Component**

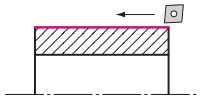


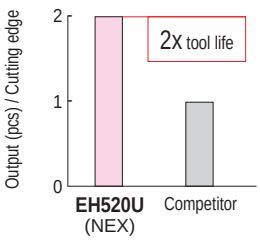



Stable, long tool life with no breakage.

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

**Stellite Machine Component**



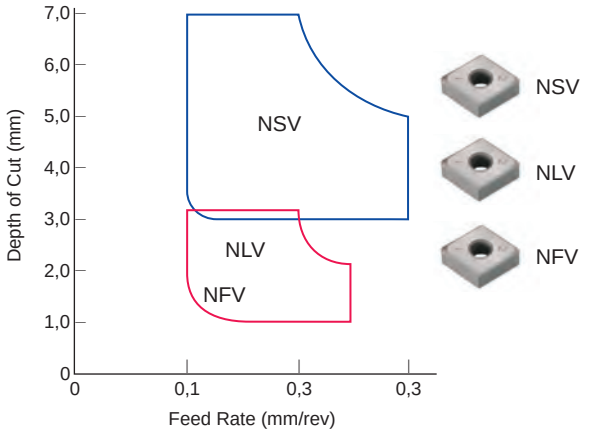



Achieving 1,5x higher efficiency with cutting speeds of 30m/min as compared to 20m/min for conventional grades.

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

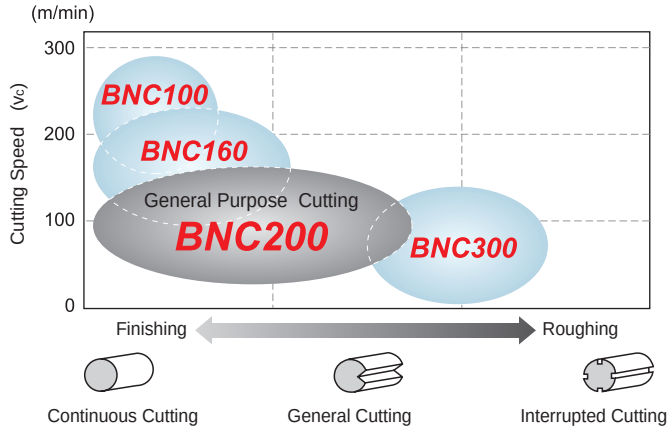
## Chipbreakers

NSV Type Chipbreaker: For chip control during carburized layer removal
NLV Type / NFV Type Chipbreaker: For chip control during finishing of hardened steel

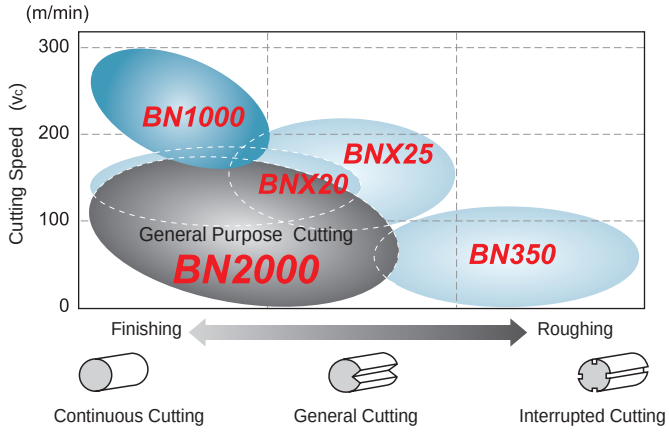



## Grades

● Coated SUMIBORON




● Uncoated SUMIBORON




## H Recommended Cutting Conditions

(Min. - **Optimum** - Max.)

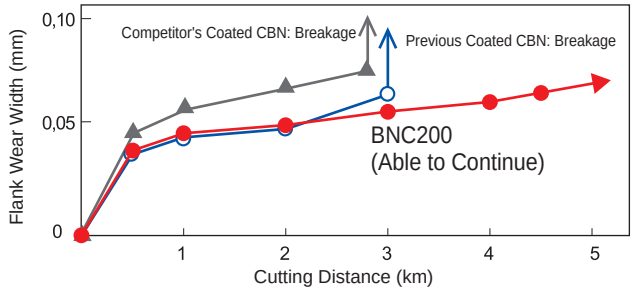
| Cutting Process | Grade | Depth of Cut (mm) | Feed Rate (mm/rev) | Cutting Speed (m/min) |
|---|---|---|---|---|
| Continuous Cutting | **BNC100** | 0,03-**0,20**-0,30 | 0,03-**0,10**-0,20 | 120-**200**-300 |
| | **BN1000** | 0,03-**0,15**-0,20 | 0,03-**0,10**-0,15 | 100-**150**-300 |
| | **BNX10**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

(Red text indicates 1st recommendation.)

## Grades BNC200

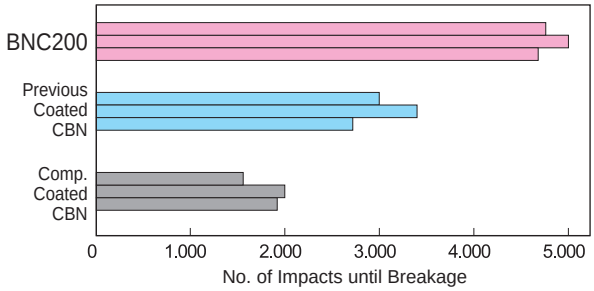
- General purpose grade suitable for typical hardened steel machining applications.
- Provides stable tool life in everything from continuous cutting to light-to-medium interrupted cutting.
- Newly developed high purity ceramic binder delivers improved fracture and wear resistance, and 2 times longer tool life than conventional products.
- LS type for sharp edge and HS type for strong edge feature special cutting edge treatment for a diverse array of machining applications.

### Wear Resistance (Continuous Cutting)




Work Material: 15CrMo5 (58-62HRC), Insert: CNGA 120408 NC-4
Cutting Conditions: $v_c$ =150m/min, f=0,2mm/rev, $d_{oc}$ =0,4mm, Dry

### Fracture Resistance (Light Interrupted Cut)




Work Material: 15CrMo5 (58-62HRC), Insert: CNGA 120408 NC-4
Cutting Conditions: $v_c$ =200m/min, f=0,15mm/rev, $d_{oc}$ =0,3mm, Dry

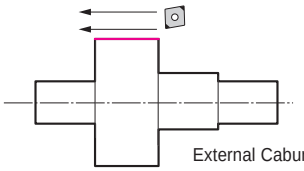
BNC200 adds excellent fracture resistance with wear resistance comparable to the BNX10.

## Application Examples

## BNC200

### 20Cr4 Carburised Steel (Shaft) (30-62HRC)

No constant stoppages or incorrect part dimension problems and the chips are small.
Double the tool life of competitor's CBN.

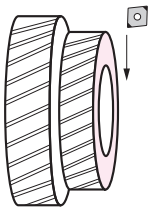


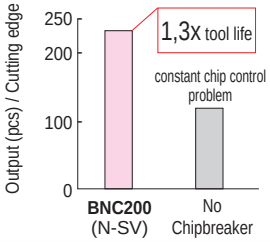

| Break Master NSV Type | BNC200 (No Chipbreaker) | Comp. CBN (With Chipbreaker) |
|---|---|---|
|  |  |  |
| Tool life = 200pcs | Tool life = 200pcs | Tool life = 100pcs |

Insert: CNGG 120408 N-SV NC4 (BNC200)
Cutting Conditions: $v_c$=150m/min $f$=0,15mm/rev $d_{oc}$=0,5mm 2 passes Wet

### 20CrMo5 Carburised Steel (Gear) (30-62HRC)

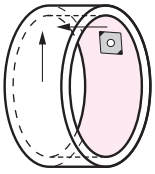
Break Master SV type improves chip control and completes a production cycle without trouble increasing productivity.

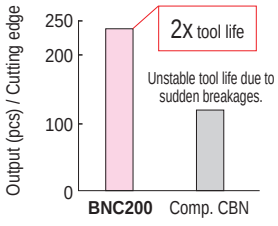



Insert: CNGG 120408 N-SV NC4 (BNC200)
Cutting Conditions: $v_c$=140m/min $f$=0,15mm/rev $d_{oc}$=0,3mm Wet

### Bearing Steel (62HRC)

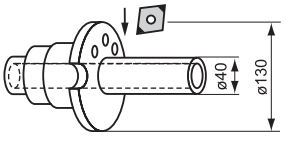


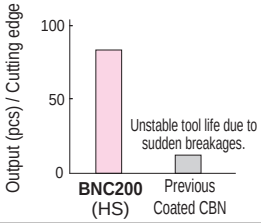



Insert: CNGA 120412 NC-4 (BNC200)
Cutting Conditions: $v_c$=150m/min $f$=0,15mm/rev $d_{oc}$=0,25mm Dry

### Interrupted Facing With Drilled Holes In Hardened Steel

BNC200HS has no sudden breakages, enabling stable machining for the preset tool life, which has been extended by 1,6 times.

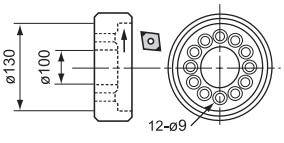


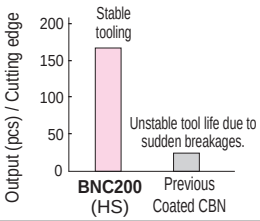




nsert: CNGA 120412 HS-NC-2 (BNC200)
Cutting Conditions: $v_c$=80m/min $f$=0,15mm/rev $d_{oc}$=0,5mm Dry

### Interrupted Facing With Drilled Holes In Hardened Steel

BNC200HS has no sudden breakages, enabling stable machining for the pre-set tool life, and significantly reducing surface roughness defects.



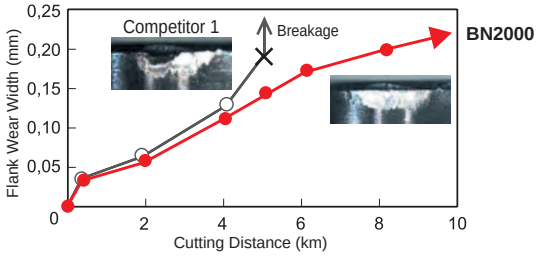




Insert: CNGA 120412 HS-NC-2 (BNC200)
Cutting Conditions: $v_c$=100m/min $f$=0,1mm/rev, $d_{oc}$=0,2mm Dr

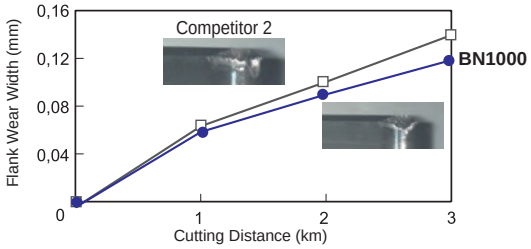
## Grades BN2000 / BN1000

BN2000: General purpose grade suitable for typical hardened steel machining applications.
Provides a high degree of fracture and wear resistance.
BN1000: For high speed machining. BN1000 provides the highest wear resistance of all uncoated SUMIBORON grades.
Features improved fracture resistance while still placing a priority on wear resistance.

● Wear Resistance (Continuous Cutting)

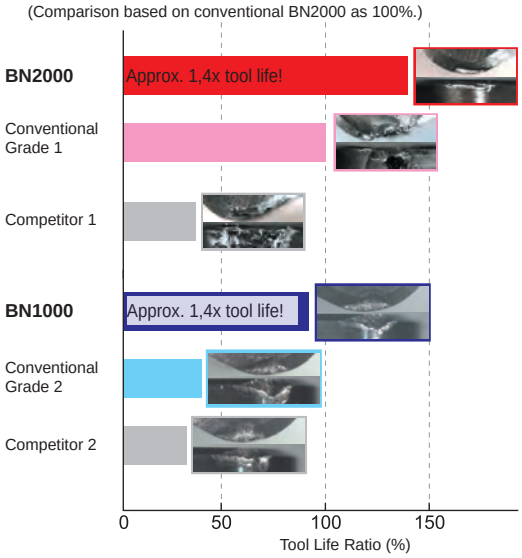



Work Material: 15CrMo5 Round Bar (58-62HRC)
Cutting Conditions: $v_c$=100m/min $f$=0,1mm/rev $a_p$=0,2mm Dry




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

● Chipping Resistance (Interrupted Cutting)



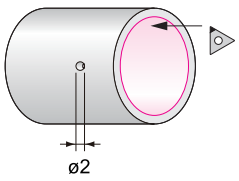

Work Material: 15CrMo5 8V Grooved Material (58-62HRC)
Insert: CNGA120408 NU-2
Cutting Conditions: $v_c$=150m/min $f$=0,1mm/rev $a_p$=0,2mm Dry

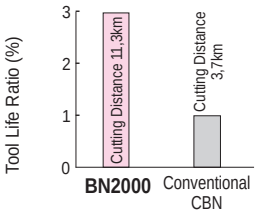
## Application Examples

### BN2000

#### 15CrMo5 Clutch Component

Employs BN2000 for superior fracture resistance compared to conventional grade and longer tool life.

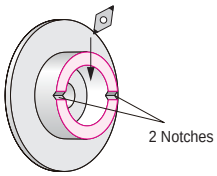


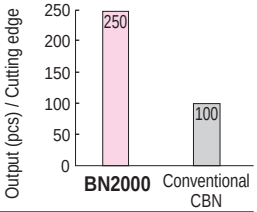




Insert: TPGW 110308 NU (BN2000)
Cutting Conditions: $v_c$=135m/min $f$=0,08mm/rev $d_{oc}$=0,15mm Dry

#### 15CrMo5 CVT Pulley Slide

Whereas conventional products required replacement after 100 workpieces (preset tool change), BN2000 has no breakage after 250 workpieces.

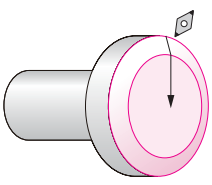


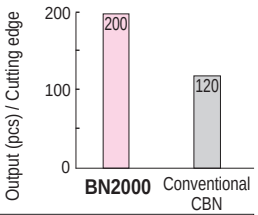




Insert: DNGA 150408 NU-2 (BN2000)
Cutting Conditions: $v_c$=150m/min $f$=0,1mm/rev $d_{oc}$=0,2mm Dry

#### X155CrVMo12-1 Plunger

Long tool life and more stable surface roughness than coated CBN at extremely low cutting speeds.



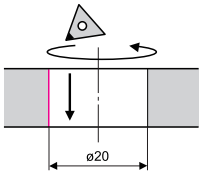


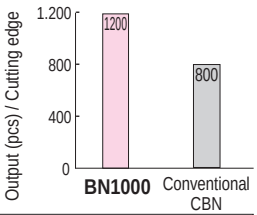

Insert: DNGA 150408 NU-2 (BN2000)
Cutting Conditions: $v_c$= ~ 100m/min $f$=0,03 ~ 0,25mm/rev $d_{oc}$=0,04mm Dry

### BN1000

#### 100Cr6 Internal Boring

BN1000 ensures less friction than conventional grades and achieves long tool life.




Insert: TPGW 110304 NU (BN1000)
Cutting Conditions: $v_c$=120m/min $f$=0,06mm/rev $d_{oc}$=0,2mm Wet

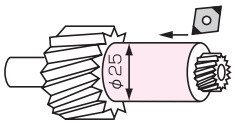
## Application Examples

**BNC100 / BNC160 / BNC300 / BNX10 / BNX20 / BNX25 / BN350**

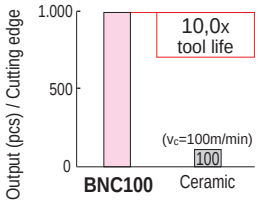
### BNC100

**Shaft Component (Carburised Material 58-62HRC)**

BNC100 provides 1,5x cutting speed and 10x tool life.




Continuous turning of hardened steel

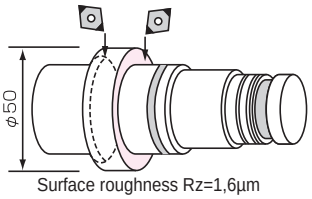



Insert: CNGA 120408 NC-4 (BNC100)
Cutting Conditions: $v_c$=150m/min $f$=0,1mm/rev $d_{oc}$=0,15mm Wet

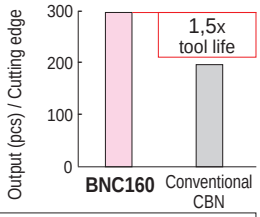
### BNC160

**Shaft Component (Carburised Material 58-62HRC)**

BNC160 has excellent wear resistance while LS type gives best surface roughness stability in machining at Rz = 1,6 µm, and achieves 1,5x tool life.



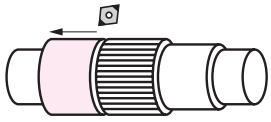

Surface roughness Rz=1,6µm

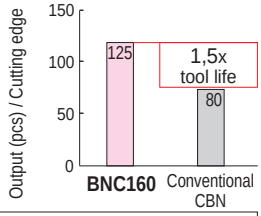



Insert: CNGA 120408LS NC-4 (BNC160)
Cutting Conditions: $v_c$=200m/min $f$=0,05mm/rev $d_{oc}$=0,1mm Dry

### BNC160

**Input Shaft Component (58-60HRC)**



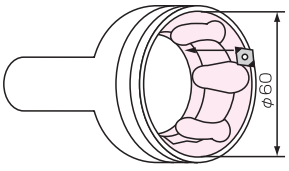



Insert: DNG A150408 NC-4 (BNC160)
Cutting Conditions: $v_c$=180m/min $f$=0,05mm/rev $d_{oc}$=0,15mm Dry

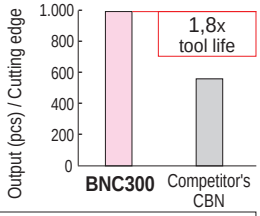
### BNC300

**Input Shaft Component (58-60HRC)**

BNC300HS has no chipping, gives stable performance for 900 workpieces, and now has an extended preset tool life that is 1,8 times longer.




Boring of hardened steel

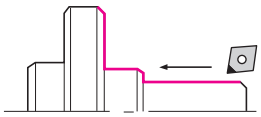


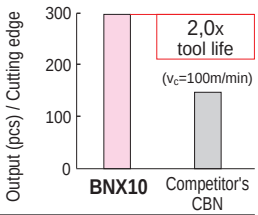

Insert: DNGA 150412HS NC-4 (BNC300)
Cutting Conditions: $v_c$=100m/min $f$=0,12mm/rev $d_{oc}$=0,2mm Dry

### BNX10

**C30 Shaft Component (60HRC)**

Double the efficiency and more than double the tool life of competitor's CBN.



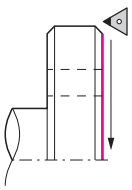


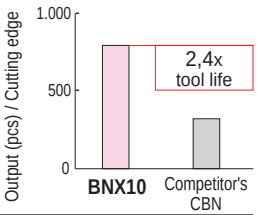

Insert: CNMA 120412 NU (BNX10)
Cutting Conditions: $v_c$=200m/min $f$=0,08mm/rev $d_{oc}$=0,15mm Wet

### BNX20

**15CrMo5 Flange Component (62HRC)**

Better wear resistance and 2,4 times longer tool life than competitor's CBN.



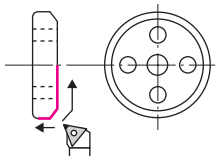


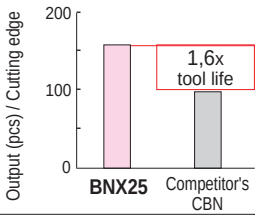

Insert: TNMA160408 NU (BNX20)
Cutting Conditions: $v_c$=150m/min $f$=0,1mm/rev $d_{oc}$=0,12mm Dry

### BNX25

**20CrMo5 Gear Component (60HRC)**

Lower variance and 1,6 times longer tool life than competitor's CBN.



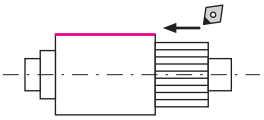


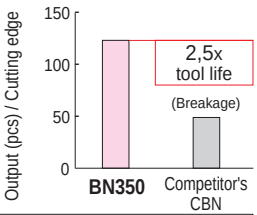

Insert: TNMA 160408 NS (BNX25)
Cutting Conditions: $v_c$=150m/min $f$=0,12mm/rev $d_{oc}$=0,2mm Dry

### BN350

**20Cr4 Gear Shaft Component (58-62HRC)**

Better fracture resistance and 2,5 times longer tool life than competitor's CBN.

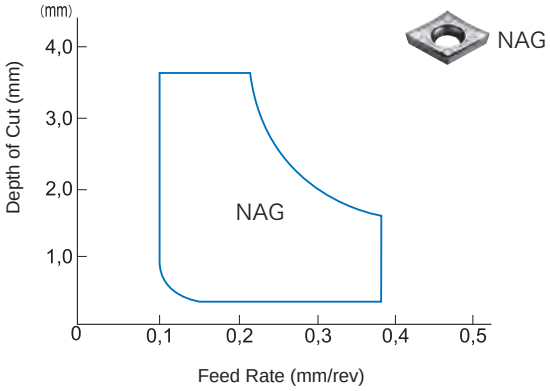




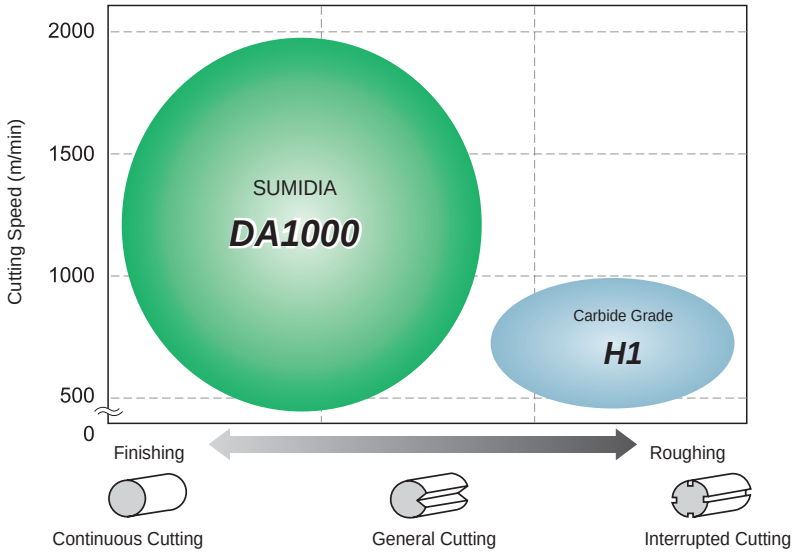

Insert: CNMA120412 NU (BN350)
Cutting Conditions: $v_c$=125m/min $f$=0,15mm/rev $d_{oc}$=0,3mm Dry

## Chipbreakers

**Positive Type**




## Grades




## Recommended Cutting Conditions

(Min. - **Optimum** - Max.)

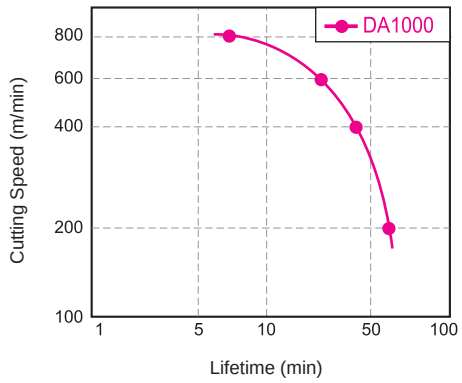
| Cutting Process | Category | Grades | Cutting Conditions | | |
|---|---|---|---|---|---|
| | | | Depth of Cut (mm) | Feed Rate (mm/rev) | Cutting Speed (m/min) |
| Continuous Cutting General Turning Interrupted Cutting | SUMIDIA | **DA1000** | 0,1-**0,5**-3,0 | 0,05-**0,10**-0,20 | ~ 2000 |
| | | **DA2200** | 0,1-**0,5**-3,0 | 0,05-**0,10**-0,20 | ~ 2000 |
| | | DA150 | 0,1-**0,5**-3,0 | 0,05-**0,10**-0,20 | ~ 2000 |
| | | DA90 | 0,1-**0,5**-3,0 | 0,05-**0,10**-0,20 | ~ 2000 |
| | Carbide | **H1** | 0,3-**1,0**-5,0 | 0,1-**0,20**-0,5 | ~ 1000 |

(Red text indicates 1st recommendation.)

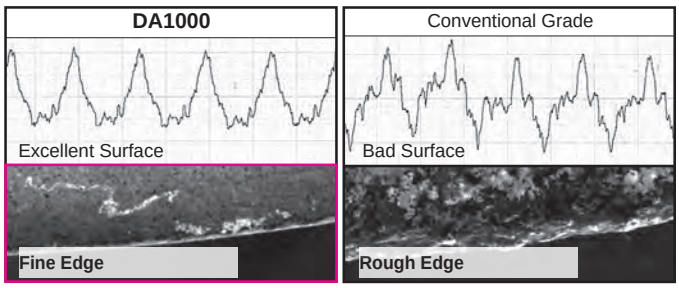
## Grades DA1000

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

### ● DA1000 Wear Resistance

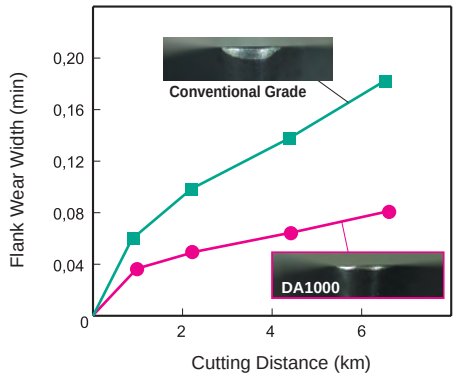



● Comparison of Surface Roughness of Nose Radius Cutting Edge



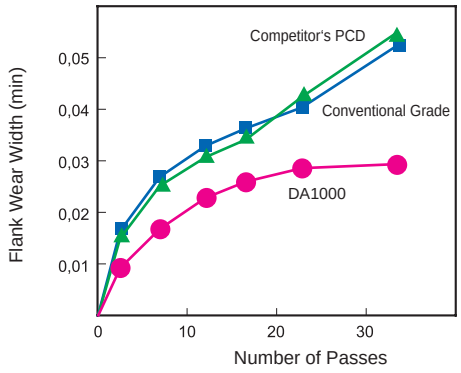

Insert: TPGW 160308
Cutting Conditions: $v_c$=1000m/min f=0,15mm/rev $d_{oc}$=0,2mm Wet

### ● Wear Resistance in Turning Applications




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

### ● Wear Resistance in Milling Applications



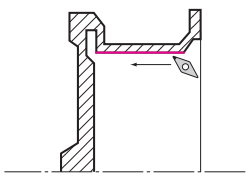

Insert: SNEW1204 ADFR-NF
Cutting Conditions: $v_c$=2000m/min f=0,15mm/rev $d_{oc}$=3,0mm Wet

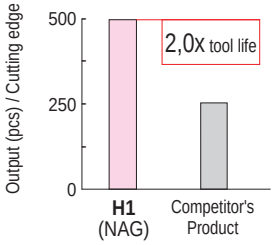
## Application Examples

### H1 + NAG Type Breakers

**ADC12 Aluminium Wheel**

Excellent adhesion resistance.
Longer tool life.



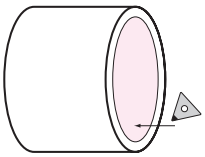


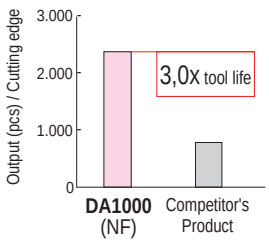

Insert: VCGT160408 NAG (H1)
Cutting Conditions: $v_c$=2000m/min f=0,25mm/rev $d_{oc}$=2,0mm Wet

### *DA1000*

**Copper Alloy Bush**

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



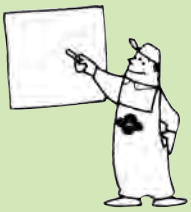


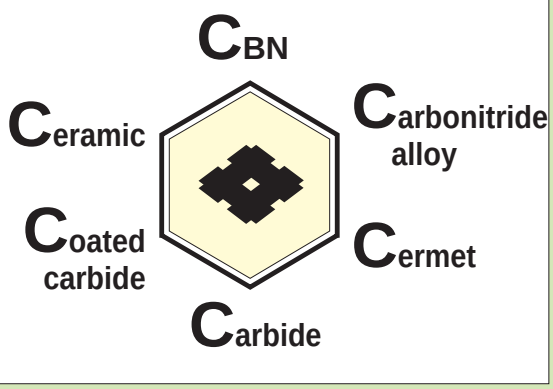

Insert: TPGN160308 NF (DA1000)
Cutting Conditions: $v_c$=300m/min f=0,07mm/rev $d_{oc}$=0,08mm Wet

# Grades

B

B1 ~ B14







| | | |
|---|---|---|
| Coated Grades | **"Super FF / ZX" Series** | B2 |
| | **"ACE-Coat" Series** | B3 |
| Coated and Uncoated | **Cermet** | B4 |
| Uncoated Carbide | **"Igetalloy"** | B5 |
| CBN Grades | **"SUMIBORON"** | B6 - 7 |
| PCD Grades | **"SUMIDIA"** | B8 - 9 |
| Chart | Grades Comparision Chart | B10-12 |
| | Recommended Cutting Conditions | B13 |
| | Properties of Basic Materials | B14 |

# Coated Carbide
# "Super FF / ZX" Series

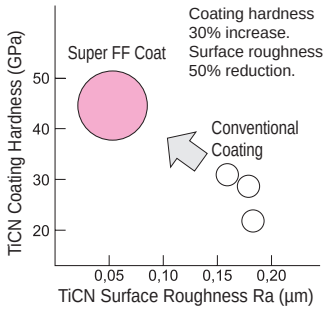
Sumitomo Electric Hardmetal's CVD* ACE Coat Series are high-quality, high-performance indexable grades that combines a proprietary, special ultra-hard carbide substrate with a multi-layered coating that provides excellent wear and heat resistance plus superior adhesion strength. Utilised in high-speed,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

## Characteristics

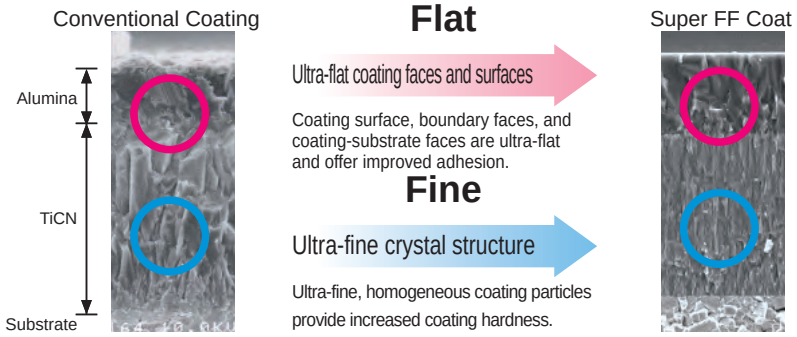
### Super FF Coat (CVD: Chemical Vapour Deposition)

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

● Characteristics of Films




● Photo of Cross Section of Coating




- Smooth coating surface provides excellent adhesion and chipping resistance. Improved coating adhesion strength.
- Harder than conventional coatings with huge improvements in wear resistance.
- High speed, high efficiency machining of more than 1,5 times that of conventional grades is possible.
- Achieving more than double the tool life of conventional grades under conventional cutting conditions.

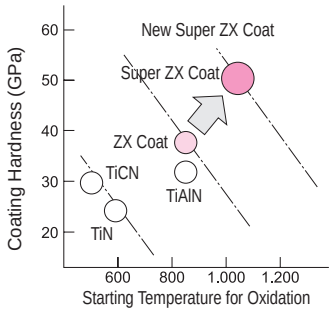
■ Adopted Grades

| | |
|---|---|
| For Steel Turning | AC805P, AC810P, AC820P, AC830P |
| For Cast Iron Turning | AC405K, AC415K, AC420K |
| For Stainless Steel Turning | AC610M, AC630M |
| For Milling | ACP100, ACK200 |

### NEW Super ZX Coat / Super ZX Coat (PVD: Physical Vapour Deposition)

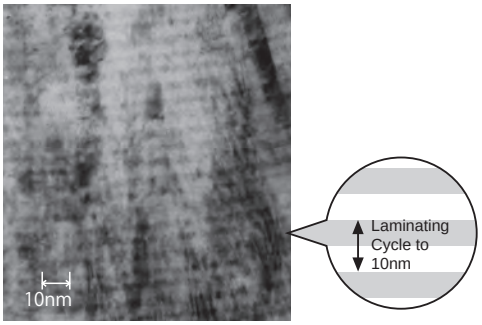
Utilising our proprietary thin layer coating technology and advanced nanotechnology, Sumitomo Electric Hardmetal has developed NEW Super ZX Coat and Super ZX Coat, coatings that consist of approximately 1.000 alternating, nanometre-level-thin (1 nanometre = 1 billionth of a metre) layers.

● Characteristics of Films




- Coating hardness increased by 40% and starting temperature for start of oxidization increased by 200°C compared to conventional grades.
- At least 1,5x improvement in high-speed and high-efficiency cutting compared to conventional grades
- Achieving more than double the tool life of conventional grades under conventional cutting conditions.

● Cross Sectional TEM Photo of Coating

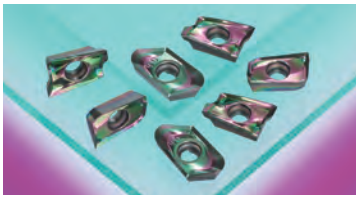



■ Adopted Grades

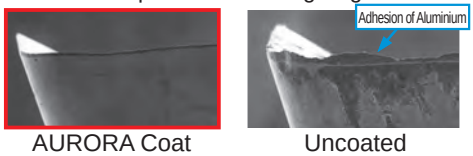
| | |
|---|---|
| (For Turning) | AC510U, AC520U, AC530U, AC503U |
| (For Milling) | ACK300, ACP200, ACP300 |

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

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



● ADC12 Comparison of Cutting Edge Adhesion After Cutting




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

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

■ Adopted Grades

| | |
|---|---|
| (For Milling) | DL1000 |
| (For Endmilling) | DL1000,DL1200 |
| (For Drilling) | DL1300,DL1500 |

## Characteristic Values

### For Turning(CVD)

| Class | Grade | Hardness (HRA) | TRS (GPa) | Coating Type | Coating Thickness (μm) | Characteristics |
|---|---|---|---|---|---|---|
| P Steel | **AC805P** | 91,0 | 2,2 | Super FF Coat | 20 | A new P10 grade with Super FF ultra-thick alumina coating for excellent crater wear resistance under high speed cutting. |
| | **AC810P** | 91,0 | 2,2 | Super FF Coat | 16 | A P10 grade with excellent wear resistance that features stability and longer tool life. Utilises a special carbide substrate with Super FF Coat for high to medium speed cutting. |
| | **AC820P** | 90,1 | 2,2 | Super FF Coat | 14 | A P20 grade that features stability and longer tool life. Employs special carbide substrate and Super FF Coat to improve on P20 wear and fracture resistance. |
| | **AC830P** | 89,4 | 2,6 | Super FF Coat | 8 | Stable long-life grade employs special tough, carbide substrate and Super FF Coat. Improves on P30 grade fracture resistance and approaches P20 grade in terms of wear resistance. |
| | **AC630M** | 89,5 | 2,7 | Super FF Coat | 5 | Superior performance in continuous and light cutting, and other low-speed applications that require sharp edges. |
| M Stainless Steel | **AC610M** | 91,0 | 2,2 | Super FF Coat | 5 | A high efficiency M10 grade featuring improved wear resistance during stainless steel cutting. Employs special, ultra-hard substrate and thin Super FF Coat. |
| | **AC630M** | 89,5 | 2,7 | Super FF Coat | 5 | A general purpose grade featuring improved wear and fracture resistance during stainless steel cutting. Utilises a special tough carbide substrate with a thin Super FF Coat. |
| K Cast Iron | **AC405K** | 92,0 | 2,4 | Super FF Coat | 18 | Employs an ultra-hard substrate and ultra-hard Super FF Coating to provide excellent resistance to wear and plastic deformation. Suitable for high-speed continuous cutting of cast iron. |
| | **AC415K** | 91,1 | 2,5 | Super FF Coat | 18 | Employs a special dedicated ultra-hard substrate that is also suitable for interrupted cutting and ultra-hard Super FF Coating to provide stability and long tool life in a wide range of processes. First recommended grade for cast iron turning. |
| | **AC420K** | 91,1 | 2,5 | Super FF Coat | 12 | A new, extremely versatile grade that can be used for rough, interrupted cutting of ductile and grey cast iron. Employs special, ultra-hard carbide substrate and Super FF Coat to provide stability and long tool life. |

### For Turning(PVD)

| Class | Grade | Hardness (HRA) | TRS (GPa) | Coating Type | Coating Thickness (μm) | Characteristics |
|---|---|---|---|---|---|---|
| P Steel | **T2000Z** | 92,0 | 2,2 | ZX Coat | 3 | ZX coating gives excellent lubricity for higher quality machining. General-purpose coated cermet grade that can maintain high-quality machined surfaces and also gives excellent wear resistance. |
| | **T3000Z** | 91,3 | 2,4 | ZX Coat | 3 | An ultra-reliable coating grade with tough cermet substrate. |
| | **AC530U** | 91,4 | 3,3 | Super ZX Coat | 3 | For interrupted and general steel cutting.<br>Utilizing the new super multi-layered PVD coating of nanometre thick TiAlN and AlCrN layers. coupled with a fine-grained super tough substrate for excellent fracture resistance. |
| | **AC520U** | 91,7 | 3,0 | Super ZX Coat | 3 | Interrupted machining and stainless steel machining.<br>Utilizing the new super multi-layered PVD coating of nanometre thick TiAlN and AlCrN layers. coupled with a super tough substrate for excellent fracture resistance. |
| M Stainless Steel | **AC530U** | 91,4 | 3,3 | Super ZX Coat | 3 | Heavy interrupted machining and stainless steel machining.<br>Utilizing the new super multi-layered PVD coating of nanometre thick TiAlN and AlCrN layers. coupled with a fine-grained super tough substrate for excellent fracture resistance. |
| K Cast Iron | **AC510U** | 92,6 | 2,6 | Super ZX Coat | 3 | General to interrupted machining of cast iron and ductile cast iron.<br>Utilizing the new super multi-layered PVD coating of nanometre thick TiAlN and AlCrN layers. coupled with a fine-grained super tough substrate for excellent fracture resistance. |
| S Exotic Metal | **AC510U** | 92,6 | 2,6 | Super ZX Coat | 3 | Finishing to medium cutting of exotic alloys.<br>Utilizing the new super multi-layered PVD coating of nanometre thick TiAlN and AlCrN layers. Superior wear and heat resistance. and stable. long tool life. |
| | **AC520U** | 91,7 | 3,0 | Super ZX Coat | 3 | Medium to rough cutting of exotic alloys.<br>Utilizing the new super multi-layered PVD coating of nanometre thick TiAlN and AlCrN layers. Superior wear and heat resistance. and stable. long tool life even in interrupted cutting. |
| H Hardened Steel | **AC503U** | 93,2 | 1,7 | Super ZX Coat | 3 | For hardened steel.<br>Utilizing the new super multi-layered PVD coating of nanometre thick TiAlN and AlCrN layers. coupled with an ultra-hard substrate for excellent wear resistance. |

Refer to page H10 for characteristics of milling grades.

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

# Cermet





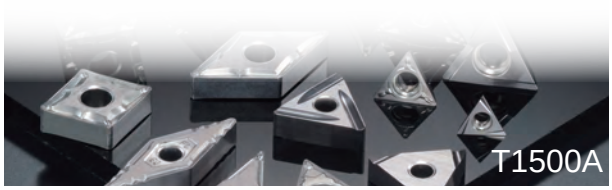
## New grades and significantly expanded lineup of catalogue items meet a wide range of finishing needs.

The general purpose uncoated cermet grade, T1500A, join the lineup alongside general purpose T2000Z and tough T3000Z grades.
Significantly expanded lineup of catalogue items for a wide variety of finishing applications.

## Characteristics

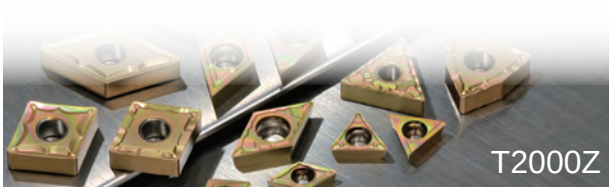
### Uncoated Cermet

**T1500A** General Purpose Grade
General purpose cermet grade that provides both wear and fracture resistance with better quality finished surfaces
- Mixing hard phases of different functionality, grain size, and compositions improves balance of wear and fracture resistance.
- Improved edge treatment technology provides beautiful finished surfaces.




### Coated Cermet

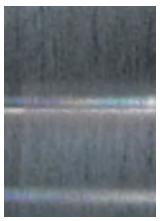
**T2000Z + T3000Z** General Purpose Grades
General purpose coated cermet grades that employs new Brilliant Coat* PVD coating with excellent lubricity
- Excellent wear resistance provides long tool life.
- Reduces adhesion of work material for beautiful finished surfaces.




**Surface Finish Comparison**



**T2000Z**



Conventional Coated Cermet

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

Excellent Wear Resistance | Glossy Finished Surfaces | Reduced Blemishes

## Characteristic Values

For Turning

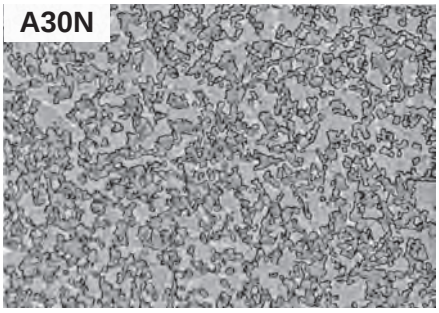
| Class | Grade | Hardness (HRA) | TRS (GPa) | Coating Type | Coating Thickness (μm) | Characteristics |
|---|---|---|---|---|---|---|
| P Steel | T110A | 93,3 | 1,8 | — | — | Uncoated cermet grade with excellent wear resistance that provides good cost efficiency. Demonstrates excellent wear resistance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

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

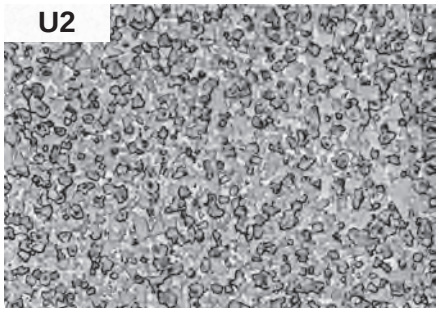
Igetalloy carbides have a solid history and a wide variety of grades to suit many different applications. They are widely used and appreciated for their superior performance.

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

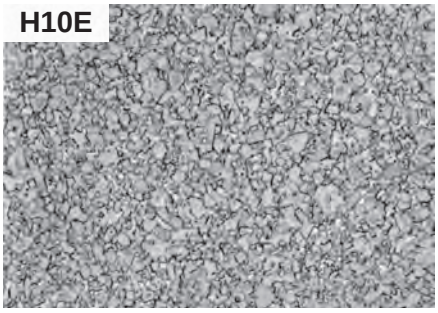
● For Steel




● For Stainless Steel



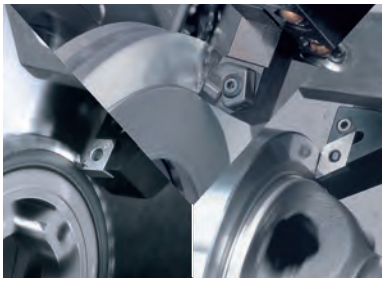

● For Cast Iron




## Characteristic Values

| Application | Grade | Hardness (HRA) | TRS (GPa) | Young Modulus (GPa) | Thermal Conductivity (W/m·°C) | Compressive Strength (GPa) | Linear-Thermal 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 | 4,8 | 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 | — |
| | **EH510** | 92,6 | 2,6 | — | — | — | — |
| | **U2** | 91,5 | 2,2 | — | 88 | — | — |
| | **EH520** | 91,7 | 3,0 | — | — | — | — |
| | **A30** | 91,3 | 2,1 | 520 | — | — | 5,2 |
| | **A30N** | 91,0 | 2,4 | — | — | — | — |
| 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 |
| | **EH510** | 92,6 | 2,6 | — | — | — | — |
| | **H10E** | 92,3 | 2,0 | — | 67 | — | — |
| | **EH20** | 91,3 | 3,5 | 620 | 105 | — | 4,5 |
| | **EH520** | 91,7 | 3,0 | — | — | — | — |
| | **G10E** | 91,1 | 2,2 | 620 | 105 | 5,7 | — |
| N Non-ferrous Metal | **H1** | 92,9 | 2,1 | 650 | 109 | 6,1 | 4,7 |
| S Exotic Metal | **EH510** | 92,6 | 2,6 | — | — | — | — |
| | **EH520** | 91,7 | 3,0 | — | — | — | — |

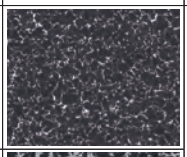
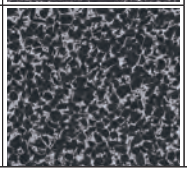
# CBN (Cubic Boron Nitride)
# SUMIBORON



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

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

## Characteristics

| Classifications | Structure | CBN Content | Hardness (GPa) | Grades | Application | Characteristics |
|---|---|---|---|---|---|---|
| Mainly CBN grains fused together |  | High ↕ Low | 44 ↕ 21 | BN700<br>BN7000<br>BN7500<br>BNS800 | Carbide<br>Chilled cast iron<br>Ni-Hard cast iron<br>Heat-resistant alloy, Cast iron<br>Sintered ferrous alloy | High carbon content. Structure consists of strongly fused CBN grains. Suited to cutting cast iron, heat-resistant alloy, ultra-hard alloy, and other hard materials. |
| Mainly CBN grains held together with a binder |  | | | BN500,* BNC500,*<br>BN1000, BN2000,<br>BN350,* BNX10,<br>BNX20, BNX25,<br>BNC100, BNC160,<br>BNC200, BNC300 | Alloy steel<br>Case hardened steel<br>Carbon tool steels<br>Bearing steel, Die steel<br>Ductile cast iron | CBN grains are fused together strongly with a special ceramic binder. Strong CBN binding force gives superior wear resistance and toughness when cutting hardened steel and cast iron. |

*BN500 and BNC500 can also be used with cast iron, while BN350 can also be used with sintered ferrous alloys.

## Grade Range Map

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

## Characteristic Values

| Class | Grade | Binder | Carbon Content (%) | Grain Size (μm) | Hardness HV (GPa) | TRS (GPa) | Series | Characteristics |
|---|---|---|---|---|---|---|---|---|
| H Hardened Steel | **BNC100** | TiN | 40 ~ 45 | 1 | 29 ~ 32 | 1,05 ~ 1,15 | Coated SUMIBORON (Coated) | Highly wear resistant coating makes this grade suited for high speed finishing. |
| | **BNC160** | TiN | 60 ~ 65 | 3 | 31 ~ 33 | 1,10 ~ 1,20 | | Stable, high precision finishing of hardened steel. |
| | **BNC200** | TiN | 65 ~ 70 | 4 | 34 ~ 36 | 1,15 ~ 1,25 | | Tough substrate with high wear resistant coating provide longer tool life. |
| | **BNC300** | TiN | 60 ~ 65 | 1 | 33 ~ 35 | 1,15 ~ 1,25 | | Suited for finishing when there is a combination of continuous and interrupted cutting. |
| | **BNX10** | TiCN | 40 ~ 45 | 3 | 27 ~ 31 | 0,80 ~ 0,90 | SUMIBORON (Uncoated) | Optimum wear resistance. Suited to continuous, high-speed cutting. |
| | **BN1000** | TiCN | 40 ~ 45 | 1 | 27 ~ 31 | 0,90 ~ 1,00 | | Ultimate wear and fracture resistance. Suited to high-speed cutting. |
| | **BNX20** | TiN | 55 ~ 60 | 3 | 31 ~ 33 | 0,95 ~ 1,10 | | Crater resistant grade, suitable for high efficiency cutting under high temperature conditions. |
| | **BNX25** | TiN | 65 ~ 70 | 4 | 29 ~ 31 | 1,00 ~ 1,10 | | Excellent fracture resistance during high speed cutting. Suited to high speed interrupted cutting of hardened steel. |
| | **BN2000** | TiN | 50 ~ 55 | 2 | 31 ~ 34 | 1,05 ~ 1,15 | | A general purpose grade for hardened steel that provides a high degree of fracture and wear resistance. |
| | **BN350** | TiN | 60 ~ 65 | 1 | 33 ~ 35 | 1,20 ~ 1,30 | | High cutting edge strength. suited to heavy interrupted cutting. |
| Sintered Components | **BN7500** | Co Compound | 90 ~ 95 | 1 | 41 ~ 44 | 1,40 ~ 1,50 | | Maintains optimum cutting edge sharpness. Suited for finishing of sintered alloy. |
| | **BN700** | Co Compound | 90 ~ 95 | 2 | 40 ~ 43 | 1,20 ~ 1,30 | | Maintains good wear and fracture resistance in rough cutting of sintered components. |
| | **BN7000** | Co Compound | 90 ~ 95 | 2 | 41 ~ 44 | 1,30 ~ 1,40 | | Improved wear and fracture resistance in rough cutting of sintered components. |
| K Cast Iron | **BN700** | Co Compound | 90 ~ 95 | 2 | 40 ~ 43 | 1,20 ~ 1,30 | | Maintains good wear and fracture resistance in rough cutting of cast iron and exotic alloy. |
| | **BN7000** | Co Compound | 90 ~ 95 | 2 | 41 ~ 44 | 1,30 ~ 1,40 | | Improved wear and fracture resistance in rough cutting of cast iron and exotic alloy. |
| | **BNS800** | Al Alloy | 85 ~ 90 | 8 | 39 ~ 42 | 0,95 ~ 1,10 | | 100% solid CBN structure with good thermal impact resistance. |
| | **BN500** | TiC | 65 ~ 70 | 6 | 32 ~ 34 | 1,00 ~ 1,10 | | Optimized for cast iron cutting. Maintains good wear and fracture resistance. |
| | **BNC500** | TiC | 60 ~ 65 | 4 | 32 ~ 34 | 1,00 ~ 1,10 | Coated SUMIBORON (Coated) | Substrate with excellent wear resistance and coating makes this grade suited for hard-to-cut cast iron. |

# SUMIDIA



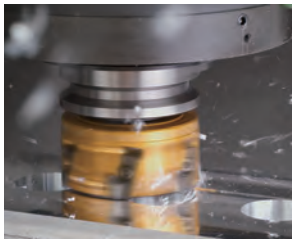


Excellent wear resistance, longer tool life, and high-speed, high-efficiency, high-precision cutting of non-ferrous metals and non-metals.

SUMIDIA is a polycrystalline diamond material made from sintered diamond powder that was first created using our proprietary technology in 1978.

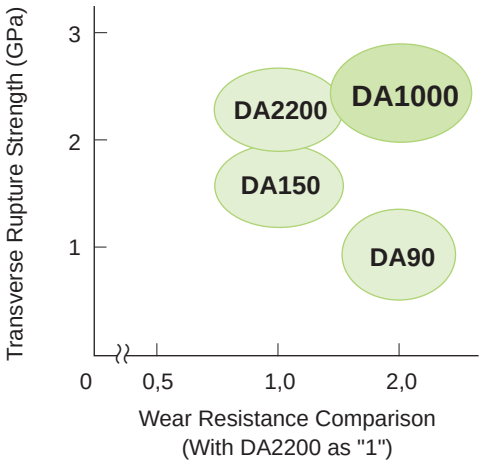
SUMIDIA's superior wear resistance achieves longer tool life, high speed, high efficiency and high precision in non-metal cutting and non-ferrous metal applications including aluminium, copper, magnesium and zinc alloys.



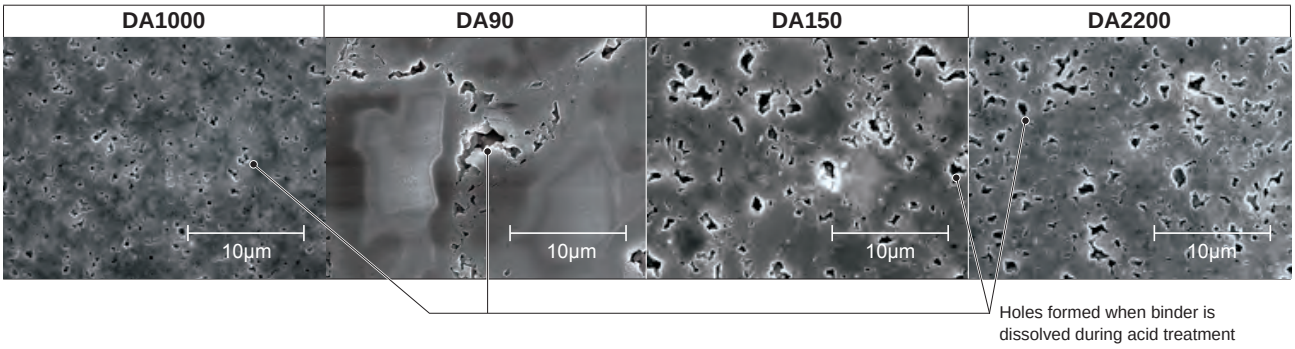


## Characteristics DA1000

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




Polycrystalline Diamond Subjected to Acid Treatment



## Grade Range Map

| Class | Series | Finishing ~ Light Cutting | | Medium Cutting | Rough ~ Heavy Cutting |
|---|---|---|---|---|---|
| | Classification | N01 | N10 | N20 | N30 |
| N Non-ferrous Metal | Coated SUMIBORON | DA90 | DA150 | | |
| | | DA1000 | | | |
| | | | DA2200 | | |

## Characteristic Values

| Class | Grade | Binder | Carbon Content (%) | Grain Size (μm) | Hardness HV (GPa) | TRS (GPa) | Characteristics |
|---|---|---|---|---|---|---|---|
| N Non-ferrous Metal | **DA1000** | Co | 90 ~ 95 | ~ 0,5 | 110 ~ 120 | ≈ 2,60 | High density sintered material made of ultra-fine diamond particles that demonstrates optimum wear and fracture resistance, and edge sharpness. |
| | **DA2200** | Co | 85 ~ 90 | 0,5 | 90 ~ 100 | ≈ 2,45 | Sintered material made of ultra-fine diamond particles that demonstrates optimum wear and fracture resistance, and edge sharpness. |
| | **DA150** | Co | 85 ~ 90 | 5 | 100 ~ 120 | ≈ 1,95 | Sintered material made of fine diamond particles that provides a good balance of workability and wear resistance. |
| | **DA90** | Co | 90 ~ 95 | 50 | 100 ~ 120 | ≈ 1,10 | Sintered material made of coarse diamond particles with high diamond content and excellent wear resistance. |

# Grade Comparision Chart



## ■ Coated Carbide

| Application | Class | Grade | Sumitomo Electric | Mitsubishi | Tungaloy | Kyocera | Hitachi | Sandvik | Kennametal | Dijet | Valenite | SECO Tools Japan | WALTER | ISCAR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Turning | P Steel | P05 | **AC805P AC810P** | UE6105 | T9105 | CA5505 | HG8010 | GC4205 | KCP05 KC9105 | JC110V | VP5515 VP1510 | TP0500 | WPP05 | IC8005 IC428 |
| | | P10 | **AC810P AC820P** | UE6110 | T9115 | CA5515 | HG8010 | GC4215 | KCP10 KC9110 | JC110V JC215V | SV310 SV315 SV515 | TP1500 | WPP10S WPP10 | IC8150 IC9015 |
| | | P20 | **AC820P** | MC6025 UE6020 | T9125 | CA5525 | IP2000 HG8025 GM25 | GC4225 | KCP25 KC9125 | JC215V | SV315 SV325 VP5525 | TP2500 | WPP20S WPP20 | IC8250 IC9015 |
| | M Stainless Steel | P30 | **AC830P AC630M** | UE6035 VP15TF | T9135 | CA5535 | IP3000 GM8035 | GC4235 | KCP30 KC9140 | JC215V JC325V | VP5535 SV325 SV230 | TP3500 | WPP30S WPP30 | IC8350 IC8025 |
| | | P40 | **AC830P AC630M** | UE6035 UH6400 | T9135 | PR660 | IP3000 GM8035 | GC4235 | KC9140 | JC325V JC450V | SV235 V1N VP5535 | TP3500 | WTN53 | IC8350 IC8025 |
| | S Exotic Metal | M10 S10 | **AC610M AC510U** | US905 VP05RT VP10RT US7020 | T9115 AH110 AH905 | PR1305 CA6515 PR905 | IP050S IP100S | GC2015 GC1105 GC1115 | KCM15 KC5510 KCU10 | JC605X JC5003 JC110V | SV310 SV315 VC929 | TP1500 TS2000 | WSM10 | IC807 IC8025 IC907 |
| | | M20 S20 | **AC610M AC520U** | US7020 VP20MF UP20M | T6020 AH120 AH725 | PR1310 CA6525 PR930 PR915 | IP100S HG8025 | GC2025 GC1125 | KCM25 KC5525 KCU25 KC5020 | JC110V JC5015 JC8015 JC525X | VPS525 VC901 SV230 | TP2500 TM2000 TS2500 | WSM20 | IC808 IC8080 IC908 |
| | | M30 | **AC630M AC830P AC530U** | US735 VP15TF VP20MF | AH725 T6030 AH630 | PR1325 CA6525 PR660 PR1125 | GM8035 GX30 | GC2035 | KCM35 KC9240 | JC5015 JC8015 JC525X | VC901 V1N | TP3500 TM4000 | WSM30 | IC8080 IC830 |
| | | M40 | **AC630M AC530U** | US735 VP15TF | SH730 AH645 | PR660 PR1125 | GX30 | GC235 | | | V1N | TM4000 | | IC830 IC928 |
| | K Cast Iron | K05 | **AC405K** | UC5105 UC5115 | T5105 T5115 | CA4505 CA4010 | HG3305 HX3305 | GC3205 | KCK05 | JC105V JC050W | SV405 SV510 | TK1000 TK1001 | WAK10 | IC5005 |
| | | K10 | **AC415K** | UC5105 UC5115 | T5115 T5125 | CA4505 CA4515 CA4115 | HX3305 HG3305 HG3315 HX3315 | GC3210 | KCK15 | JC105V | SV410 SV515 | TK1000 TK1001 | WAK10 WAK20 | IC5010 IC5100 |
| | | K20 | **AC420K** | UC5115 VP15TF UE6110 | T5125 T9125 | CA4515 CA4120 CA4115 | HX3315 HG3315 HG8010 | GC3215 | KCK20 | JC215V | SV415 SV515 | TK2000 TK2001 | WAK20 WAK30 | IC8150 |
| Milling | P Steel | | **ACP100** | FH7020 F7030 | T3130 T3030 | | GF30 GX30 | GC4220 GC4230 GC4240 | KC930M KC935M | JC730U | V1N | T250M T350M MP1500 MP2500 MP3000 | WKP25 WKP35 WAP35 WKP35S | IC4100 IC4050 IC520M |
| | | | **ACP200 ACP300** | VP15TF VP20RT VP30RT | AH120 AH725 AH130 AH140 | PR1230 PR1225 PR830 PR760 PR660 PR630 | JP4005 GX2140 JP4020 CY150 CY250 JX1045 JX1060 | GC1010 GC1025 GC1030 | KC530M KC610M KC715M KC725M KC735M KC792M | JC8015 JC5003 JC5030 JC5015 JC5040 | VC935 | F25M F30M F40M T60M | WXM15 WSP45 WSM35 WXP45 | IC808 IC908 IC910 IC928 IC950 IC328 |
| | M Stainless Steel | | **ACP300** | VP15TF VP20RT VP30RT | AH120 AH725 AH130 AH140 | PR1225 PR830 PR760 PR660 PR630 | JM4060 JP4020 CY150 CY250 JX1045 JX1060 | GC2040 GC1040 S30T S40T GC1025 GC1030 GC2030 GC2035 | KC522M KC635M KC715M KC725M KC520M KC525M | JC8015 JC8050 JC5003 JC5030 JC5015 JC5040 | VC935 | F25M F30M F40M | WSM35 WXM35 | IC808 IC830 IC908 IC928 IC328 |
| | K Cast Iron | | **ACK200** | F5010 F5020 MC5020 | T1115 | PR905 | | GC3220 GC3020 GC3040 K15W K20D K20W | KC915M KC930M KC935M | JC600 JC610 | VN5 | T150M T200M MK1500 MK3000 | WAK15 WKK25 WKP35S | IC5100 IC4100 IC520M IC4050 DT7150 |
| | | | **ACK300** | VP15TF VP20RT | AH110 GH110 AH725 AH120 | PR1210 PR905 | GX2140 JP4020 CY150 CY250 JX1045 | GC1020 GC1025 GC1030 | KC620M KC510M KC515M KC520M KC525M | JC5080 JC5003 JC5015 | VC928 | MK2000 MH1000 | | IC810 IC908 IC910 IC928 IC950 |

## Cermet

| Application | Class | | Sumitomo Electric | Mitsubishi | Tungaloy | Kyocera | Hitachi | Sandvik | Kennametal | Dijet | Valenite | SECO Tools Japan | WALTER | ISCAR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Turning | P Steel | P10 | **T110A** | AP25N★ NX2525 | GT720★ NS520 | TN30 PV30★ TN6010 PV7010★ | CZ25★ | CT5015 | KT125 HTX KT1120 | LN10 CX50 | VC605 | | | IC20N IC520N |
| | | P20 | **T1500A T2000Z★** | AP25N★ NX2525 NX3035 | NS530 GT530★ NS730 GT730★ | TN60 TN6020 PV60★ PV7020★ PV7025★ | CH550 | GC1525★ | KT6215 KT315★ KT175 KT5020★ | CX50 CX75 | VC610 | CM CMP C15M TP1020 | | IC30N IC530N |
| | | P30 | **T3000Z★** | NX3035 MP3025★ | | PV7025★ PV90★ | | | | CX90 CX99 | | | | |
| | K Cast Iron | K10 | **T110A** | AP25N★ NX2525 | GT720★ NS520 | TN30 PV30★ TN6010 PV7005★ PV7010★ | | CT5015 | KT125 HTX | LN10 CX50 | VC605 | | | |
| Milling | P Steel | | **T250A** | NX4545 VP45N★ | NS540 NS740 | TC60M TN100M | MZ1000★ MZ2000★ MZ3000★ | CT530 | KT530M★ | CX90 | VC630 | C15M | | IC30N |

★ denotes coated cermet

## Uncoated Carbide

| Class | Grade | Sumitomo Electric | Mitsubishi | Tungaloy | Kyocera | Hitachi | Sandvik | Kennametal | Dijet | SECO Tools Japan | ISCAR |
|---|---|---|---|---|---|---|---|---|---|---|---|
| P Steel | P10 | **ST10P** | | TX10S | | WS10 | S1P | P10 | SRT | | IC70 |
| | P20 | **ST20E** | UTi20T | TX20 TX25 | | EX35 | SMA | K125M TTM | SRT DX30 | | IC70 |
| | P30 | **A30 A30N** | UTi20T | TX30 UX30 | PW30 | EX35 EX40 | SM30 | GK K600 TTR | SR30 DX30 | | IC54 IC28 |
| | P40 | **ST40E** | | TX40 | | EX45 | S6 | G13 | SR30 DX35 | | IC54 IC28 |
| M Stainless Steel | M10 | **U10E EH510** | | TU10 | | WA10B | H10A | K313 | UMN | 890 | IC20 |
| | M20 | **U2 EH520** | UTi20T | TU20 UX25 | | EX35 | H13A | K68 KMF K125M TTM | DX25 UMS | HX 883 | IC20 |
| | M30 | **A30 A30N** | UTi20T | UX30 | | EX40 EX45 | H10F SM30 | K600 TTR | DX25 UMS | | IC28 |
| K Cast Iron | K01 | **H2 H1** | HTi05T | TH03 KS05F | | WH05 | H1P | K605 | KG03 | | |
| | K10 | **H1 EH10 EH510** | HTi10 | TH10 G1F | KW10 GW15 | WH10 | H1P H10 HM | K313 K110M THM THM-U | KG10 KT9 | 890 | IC20 IC09T |
| | K20 | **G10E EH20 EH520** | UTi20T | G2F G2 KS15F KS20 | GW25 | WH20 | H13A | K715 KMF K600 | KG20 CR1 | 890 883 HX | IC20 IC09T |
| | K30 | **G10E** | UTi20T | G3 | | | | THR | KG30 | 883 | IC28 |
| Fine-grained Carbide | | **F0** | SF10,MF07 MF10 | F,MD1508 MD08F | | NM08 | | | FB05,FB10 FZ05 | | IC07 |
| | | **F1,AFU XF1** | HTi10 MF20 | M,MD10 MD05F,MD07F | FW30 | NM15 | 6UF,8UF PN90,H6FF | | FZ10,FB15 FZ15 | 890 | IC07 |
| | | **AF0,AF1 SF2** | TF15 MF30 | EM10,MD20 MD15 | | BRM20 EF20N | 12UF | | FB20,FZ15 FB15 | 890 883 | IC08 |
| | | **A1 CC** | | UM | | NM25 | N6F H10F | | FZ20 FB20 | 883 | IC08 |

# Grade Comparision Chart



## ■ CBN

| Class | Grade | Sumitomo Electric | Mitsubishi | Tungaloy | Kyocera | Hitachi | Sandvik | Kennametal | Dijet | SECO Tools Japan |
|---|---|---|---|---|---|---|---|---|---|---|
| K Cast Iron | K01 | **BNC500** | MB710 | BX930<br>BX870 | KBN65B<br>KBN60M | | CB50<br>CB7050 | KD120<br>PB100 | JBN795 | |
| | K10 | **BN700**<br>**BN7000**<br>**BN7500** | MB710<br>MB730 | BX470<br>BX480<br>BX950 | KBN65B<br>KBN60M<br>KBN900 | BH200 | CB7925<br>CB7525 | KB1645<br>KB9610 | JBN330 | CBN200,CBN300<br>CBN300P,CBN400C |
| | K20 | **BN700**<br>**BN7000**<br>**BNS800** | MB730<br>MBS140<br>BC5030 | BXC90<br>BX90S | KBN900 | BH250 | | | | CBN200,CBN300<br>CBN300P,CBN400C |
| | K30 | **BNS800** | MBS140<br>BC5030 | BX90S<br>BXC90 | | | | KB9640<br>KB1340 | | CBN500 |
| N Non-ferrous Metal | N01 | **BN700**<br>**BN7000** | | | | | | KD120<br>PB100 | | |
| S Exotic Metal | S01 | **BN700**<br>**BN7000** | MB730 | BX950 | KBN65B | | | | | |
| H Hardened Steel | H01 | **BN1000**<br>**BNC100** | MBC010<br>MB810 | BXM10<br>BX310 | KBN05M<br>KBN10M<br>KBN510 | | CB50<br>CB7050 | PB250 | | CBN10<br>CBN100<br>CBN60K |
| | H10 | **BNC160**<br>**BNC200**<br>**BN2000** | MBC020<br>BC8020<br>MB8025 | BXM10<br>BX330<br>BX530 | KBN05M<br>KBN25M<br>KBN525 | BH200 | CB7015<br>CB20 | KB1645<br>KD050<br>KD120<br>KB9610 | JBN300 | CBN10,CBN150<br>CBN100,CBN60K<br>CBN160C |
| | H20 | **BNC200**<br>**BNX20** | BC8020<br>MB8025<br>MB825 | BXM20<br>BX360 | KBN30M<br>KBN35M<br>KBN900 | BH250 | CB7025<br>CB7035 | KB5625<br>KB1615 | JBN245 | CBN150,CBN160C |
| | H30 | **BNC300**<br>**BN350**<br>**BNX25** | MB835<br>BC8020 | BXM20<br>BXC50<br>BX380 | | | | KB9640 | | |

## ■ PCD

| Class | Grade | Sumitomo Electric | Mitsubishi | Tungaloy | Kyocera | Sandvik | Kennametal | Dijet | SECO Tools Japan |
|---|---|---|---|---|---|---|---|---|---|
| N Non-ferrous Metal | N01 | **DA90**<br>**DA1000** | MD205 | DX180<br>DX160 | KPD001 | CD10 | PD100<br>KD1405<br>KD1400 | JDA30<br>JDA735 | |
| | N10 | **DA150**<br>**DA1000**<br>**DA2200** | MD205<br>MD220 | DX140 | KPD001<br>KPD010<br>KPD230 | | KD100<br>KD1410<br>KDF310<br>KD1415 | JDA40<br>JDA745 | PCD10 |
| | N20 | **DA1000**<br>**DA2200** | MD220<br>MD230 | DX120 | KPD230 | | KD1425 | JDA10<br>JDA715 | PCD20 |
| | N30 | **DA1000**<br>**DA2200** | MD230 | DX110 | | | | | PCD30 |

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 Grades

| ISO | Material | Hardness Brinell (HB) | Coated Carbide AC410K | AC420K | AC810P | AC820P | AC830P | AC530U |
|---|---|---|---|---|---|---|---|---|
| | | | Feed Rate f (mm/rev) | | | | | |
| | | | 0,2 - **0,4** - 0,6 | 0,2 - **0,4** - 0,6 | 0,2 - **0,4** - 0,6 | 0,2 - **0,4** - 0,6 | 0,2 - **0,4** - 0,6 | 0,2 - **0,4** - 0,6 |
| | | | Cutting Speed $v_c$ (m/min) | | | | | |
| P Steel | unalloyed steel, <0,15%C, annealed | 125 | | | 380 | 320 | 270 | 230 |
| | „ , <0,45%C, annealed | 190 | | | 330 | 270 | 230 | 200 |
| | „ , <0,45%C, tempered | 250 | | | 280 | 210 | 205 | 180 |
| | low alloyed steel,annealed | 180 | | | 300 | 250 | 210 | 200 |
| | „ ,tempered | 275 | | | 260 | 200 | 160 | 120 |
| | „ ,tempered | 300 | | | 220 | 160 | 120 | – |
| | „ ,tempered | 350 | | | 200 | 120 | 90 | – |
| | high alloyed and tool steel, annealed | 200 | | | 220 | 170 | 150 | – |
| | „ , tempered | 325 | | | 130 | 90 | 70 | – |
| M Stainless Steel | stainless steel, ferritic/martensitic, annealed | 200 | | | | | | 160 |
| | martensitic, tempered | 240 | | | | | | 120 |
| | austenitic, plunged | 180 | | | | | | 140 |
| K Cast Iron | lamellar cast iron, pearlitic | 180 | 350 | 300 | | | | 160 |
| | „ , pearlitic(martensitic) | 260 | 275 | 230 | | | | 120 |
| | nodular cast iron, ferritic | 160 | 310 | 250 | | | | 160 |
| | nodular cast iron, perlitic | 250 | 240 | 180 | | | | 100 |
| | malleable cast iron, ferritic | 130 | 310 | 250 | | | | 180 |
| | malleable cast iron, perlitic | 230 | 240 | 190 | | | | 120 |
| 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 Grades

| ISO | Material | Hardness Brinell (HB) | Coated Carbide AC610M | AC630M | AC510U | AC520U | Coated Cermet T2000Z | T3000Z |
|---|---|---|---|---|---|---|---|---|
| | | | Feed Rate f (mm/rev) | | | | | |
| | | | 0,2 - **0,4** - 0,6 | 0,2 - **0,4** - 0,6 | 0,2 - **0,4** - 0,6 | 0,2 - **0,4** - 0,6 | 0,2 - **0,4** - 0,6 | 0,2 - **0,4** - 0,6 |
| | | | 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 | | |

# Grade Properties Chart



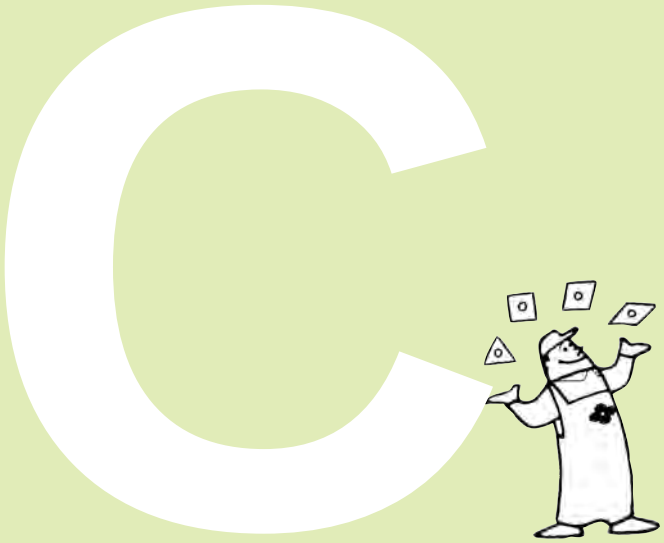
## Properties of Basic Materials

| 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 | **$Al_2O_3$** | 3,98 | 29 | 410 | 29 | 8,5 | 2.050 |
| Silicon Nitride | **$Si_3N_4$** | 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 | – |

# Indexable Inserts for Turning

## Negative / Positive Inserts

**C1 ~ C54**






ISO — **Inserts Identification Table** ..... C2 - 3
Chipbreaker for Exotic Alloys — **NEG / NEF** New ..... C4 - 5
Chipbreaker for Steel Turning — **(M) NSI** New ..... C6
Comparison Chart — **Chipbreaker** ..... C7
Selection — **Chipbreaker Application Table** ..... C8 - 11

Negative Inserts
**C / 80° Diamond Type (With Hole)** ..... C12-16
**D / 55° Diamond Type (With Hole)** ..... C17-20
**S / Square Type (With Hole)** ..... C21-25
**T / Triangle Type (With Hole)** ..... C26-30
**T-REX Insert** ..... C30
**V / 35° Diamond Type (With Hole)** ..... C31-32
**W / Polygon Type (With Hole)** ..... C33-36

Positive Inserts
**C / 80° Diamond Type (With Hole)** ..... C37-39
**D / 55° Diamond Type (With Hole)** ..... C40-41
**R / Round Type (With Hole)** ..... C42
**S / Square Type (With Hole)** ..... C43-44
**S / Square Type (Without Hole)** ..... C45
**T / Triangle Type (With Hole)** ..... C46-49
**T / Triangle Type (Without Hole)** ..... C50
**V / 35° Diamond Type (With Hole)** ..... C51-53
**W / Polygon Type (With Hole)** ..... C54


**Stock marking chart**

- ● : 1-st recommended stock item
- ● : Euro stock item
- ○ : Japan stock item (Delivery on request)
- ▲ : To be replaced by new item (Please confirm stock availability)
- □ : Made to order
- — : We cannot produce

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

# Inserts Identification Table



**C N M G**

① **Insert Shape** — Chart 1

② **Relief Angle** — Chart 2

③ **Tolerance** — Chart 3

④ **Insert Type** — Chart 4

## Chart 1: Insert Shape

| Symbol | Insert Shape | | Angle |
|---|---|---|---|
| C | | Diamond | 80° |
| D | | | 55° |
| E | | | 75° |
| F | | | 50° |
| V | | | 35° |
| R | | Round | — |
| S | | Square | 90° |
| T | | Triangle | 60° |
| W | | Trigon | 80° |
| A | | Parallelogram | 85° |
| B | | | 82° |
| K | | | 55° |
| H | | Hexagonal | 120° |
| O | | Octogonal | 135° |
| P | | Pentagonal | 108° |
| L | | Rectangular | 90° |
| M | | Rhombic | 86° |

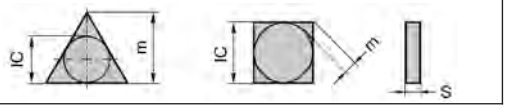
## Chart 2: Relief Angle

| 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 - GE**

⑤ **Insert Size** — Chart 5

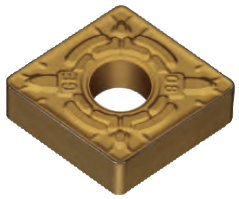
⑥ **Thickness** — Chart 6

⑦ **Corner Radius** — Chart 7

⑧ **Feed Direction** — Chart 8

⑨ **Chip Breaker** — Chart 9

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



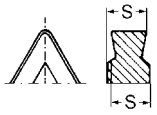


### Chart 5: Cutting Edge Length (mm)

| 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 | V | 09 | 9,7 | 5,56 | | 08 | 8,7 | 12,70 |
| | 19 | 19,3 | 19,05 | | 11 | 11,1 | 6,35 | | 10 | 10,9 | 15,875 |
| S | 06 | 6,35 | 6,35 | | 16 | 16,6 | 9,525 | R | 08 | 8,0 | 8,0 |
| | S7 | 7,14 | 7,14 | T | 06 | 6,9 | 3,97 | | 10 | 10,0 | 10,0 |
| | 07 | 7,94 | 7,94 | | 08 | 8,2 | 4,76 | | 12 | 12,0 | 12,0 |
| | 09 | 9,525 | 9,525 | | 09 | 9,6 | 5,56 | | 12 | 12,7 | 12,70 |
| | 12 | 12,7 | 12,70 | | 11 | 11,0 | 6,35 | | 15 | 15,875 | 15,875 |
| | 15 | 15,875 | 15,875 | | 16 | 16,5 | 9,525 | | 16 | 16,0 | 16,0 |
| | 19 | 19,05 | 19,05 | | 22 | 22,0 | 12,70 | | 19 | 19,05 | 19,05 |
| | 25 | 25,4 | 25,40 | | 27 | 27,5 | 15,875 | | 25 | 25,0 | 25,0 |
| | 31 | 31,75 | 31,75 | | 33 | 33,0 | 19,05 | | 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, FL, FC FK, FP | | FT, FX, FZ FY, FW |
| S○ L○ | Light Cut | SE, SEW, SC, SF, SK, SP, SS, SU LU, LUW | | SD, SDW |
| G○ U○ | General | **GE**, GU, GUW UG, UP US, UX | GZ UZ | UM |
| M○ | Rough | MP, MU, ME, MX | MC | MM |
| H○ | Heavy | HG, HP, HU, HW | | |

| Other specials | |
|---|---|
| Wide Chipbreaker | W |
| For Countersink | C |
| For Round insert | RD, RP |
| For Super Alloy | EF, EG, EX |
| For Aluminium | AG, AW |
| For Hardened Steel | FV, LV |
| For Carburized Layer Removal | SV |

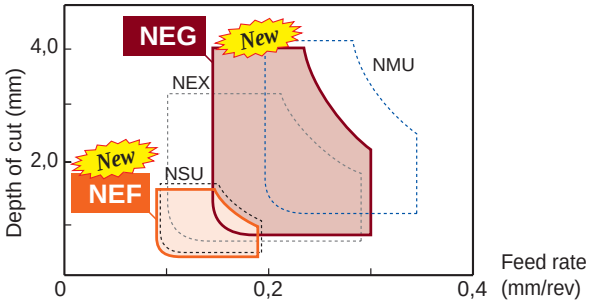
# NEG Type / NEF Type



## General Features

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

## Application Range




## NEG Chipbreaker for Roughing

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

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

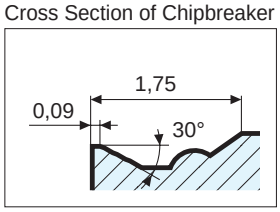
The cutting edge maintains the strength slowing the progress of crater wear.



New

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

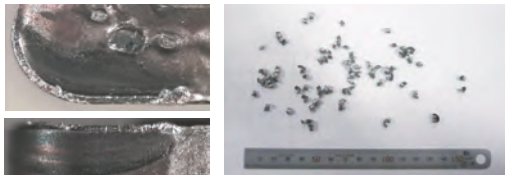
Cross Section of Chipbreaker




## Cutting Performance – NEG Type

### Heat Resistant Alloy

Chipbreaker type: NEG (AC510U)



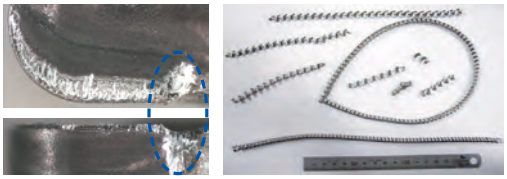
Suppresses the chipping of peripheral cutting edge and notch wear. Excellent chip management.

Work Material: Inconel 718

Insert: CNMG120412

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

Conventional tool (S10)



Notch wear / poor chip control

### Titanium Alloy

Chipbreaker type: NEG (AC510U)



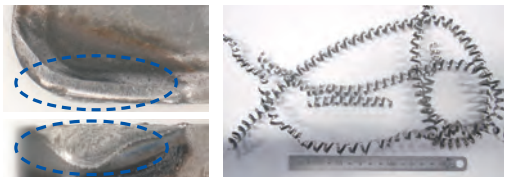
Suppresses crater wear and flank wear. Excellent chip management.

Work Material: Ti-6Al-4V

Insert: CNMG120412

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

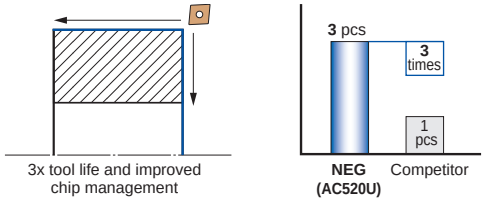
Conventional tool (S10)



Crater wear / flank wear / poor chip control

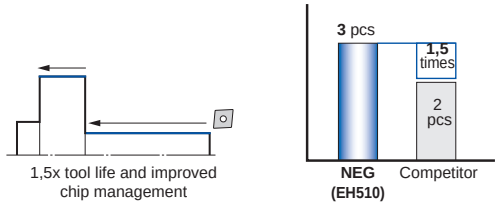
## Application Example – NEG Type

Inconel 718, machine component



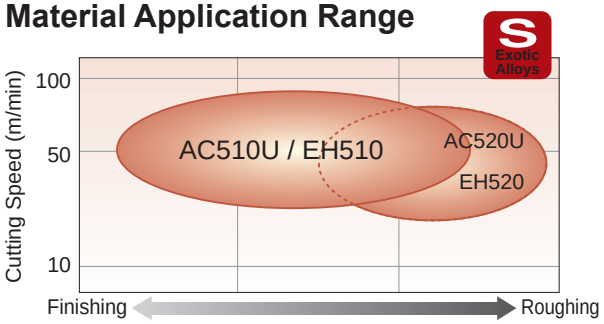

Insert: CNMG120408 NEG (AC520U)
Cutting Data: $v_c$=50m/min, $d_{oc}$=1,5mm, f=0,3mm/rev, wet

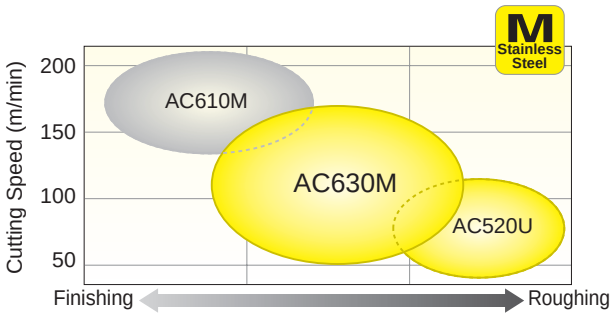
Pure Titanium (Ti grade 3), machine component




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

## Material Application Range



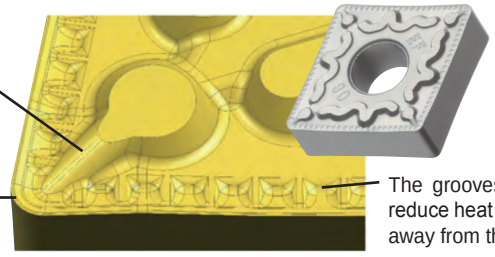




## NEF Chipbreaker for Finishing

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

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

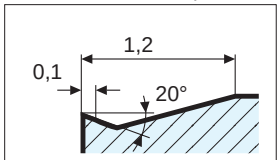
Sharp edge with 20° rake angle reduces wear.



New

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

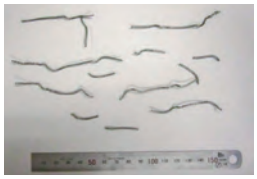
Cross Section of Chipbreaker




## Cutting Performance – NEF Type

### Heat Resistant Alloy

Chipbreaker type: NEF (AC510U)



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

Work Material: Inconel 718

Insert: CNMG120408

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

Conventional tool (S10)



Competitor's product (S10)



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

### Titanium Alloy

Chipbreaker type: NEF (AC510U)



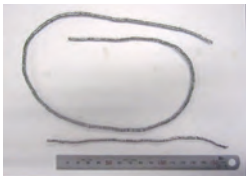
Improvements in chip control and chip removal management based on small curled chips.

Work Material: Ti-6Al-4V

Insert: CNMG120408

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

Conventional tool (S10)



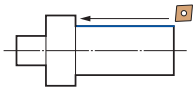
Competitor's product (S10)



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

## Application Example – NEF Type

Inconel 718, shaft component



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



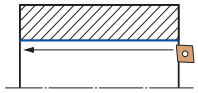
NEF (AC510U)



Conventional tool

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

Duplex stainless steel cover



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



NEF (AC510U)



Conventional tool

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

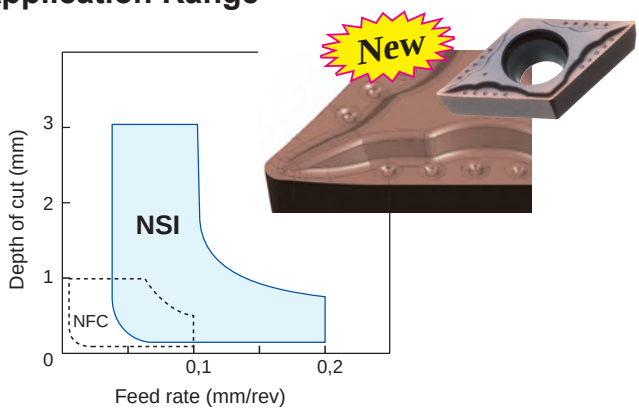
# (M) NSI Type

Nose radius with minus tolerance (**M**)

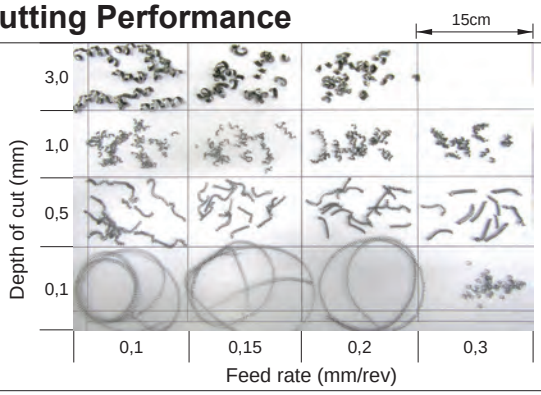
Example: DCGT 11T304**M** NSI



## Application Range



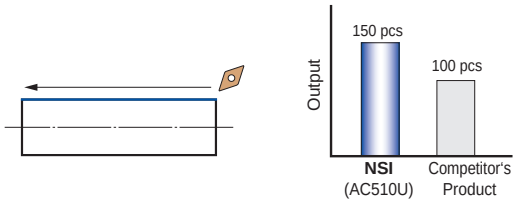

## Cutting Performance




Work material: X5CrNiMo17122
Insert: DCGT11T304M NSI, Cutting conditions: $v_c$=100m/min

## Application Examples

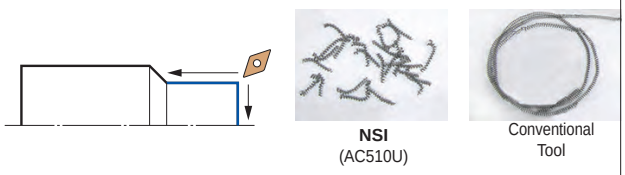
Inconel 718, machine component external turning




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

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

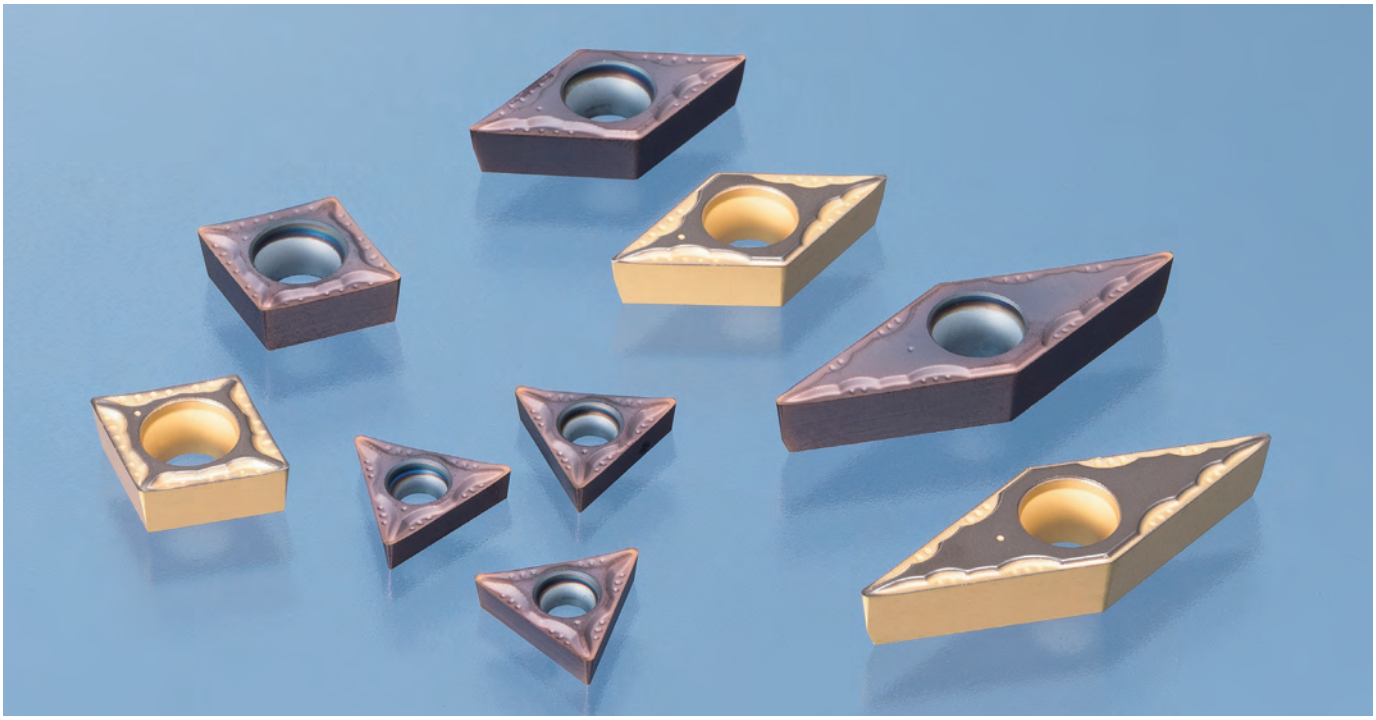
X5CrNi1810, Shaft component external turning & facing




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

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

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



# Chipbreaker Comparison



## ■ Negative Type

| Class | Application | Sumitomo Electric | Mitsubishi | Tungaloy | Kyocera | Hitachi | Sandvik | Kennametal | SECO Tools apan | WALTER | ISCAR |
|---|---|---|---|---|---|---|---|---|---|---|---|
| P Steel | Fine Finishing | **FA** | FH | TF | GP | | QF | FF | FF1 | | SF |
| | | **FL** | FS,FY | NS,ZF | XP,XF | FE | | | | | |
| | Finishing | **LU** | SA,SY | NM | XQ,CQ | BE | LC | FN | | NF3 | |
| | | **SU** | SH | TS,TSF,11 | HQ | CE,B,BH | XF,MF | | MF2 | | NF,TF |
| | Wiper Edge | **LUW** | | AFW | WP | | WL,WP | | | | |
| | | **SEW** | SW | ASW | WQ | | WF,WMX | FW | W-MF2 | NF | WF |
| | Finishing to Light Cut | **SE, SX** | LP | AS,ZM,27 | CJ,XS | AB,CT | PF,KF | LF | MF5 | MP3,NS6 | |
| | Medium Cut | **GU**（UG） | MA,MV | TM,37 | HS,PS | AH | XM,QM | P,MG | M3 | | GN |
| | | **rund** | MH,MP | DM,CM | CS,GS,PT | AE,AY | PM,SM,KM | MN | | NM4,NM6 | |
| | Wiper Edge | **GUW** | MW | | | | WM | MW | W-M3 | NM | WG |
| | Roughing | **MU, ME** | GH | TH | HT,GT,PH | RE,AR | MG-PR,XMR,KR | RP | M5,MR7 | NM7,NM9 | NR |
| | | **MX** | HAS,MT | CH | | | | RN | | | |
| | Heavy Cut | **HG** | HA,HZ,HX,HBS | THS,TU,57 | PX,HX | TE,UE | MM-PR,QR | RM,MR | R4,R5,R6 | NR6,NRF | NM,HR |
| | | **HP** | HH,HXD | 65 | | | HR,SR | RH | R7 | NR8 | |
| | | **HU,HW** | HV,HDS | | | H | | | | | |
| | | **HF** | HCS | TUS | | HX,HE | MR | | RR9 | NRR | |
| M Stainless Steel | Finishing | **SU** | SH | SS | MQ,GU | SE,MP | MF | FP,FS,LF | MF2 | NF4 | |
| | Light to Medium Cut | **EX** | MS | SF,SA | SU,MS,MU | PV | 23 | MS | MF1,M1 | | TF,VL |
| | | **GU** | | SM | HU | DE | MM | MP | MF3,M3 | NM4 | PP |
| | Roughing | **HM** | ES,1M,2M | S | ST | | | | | NR4 | |
| | | **MU** | GH | SH | TK | | MR | | M5,MR3 | | |
| S Exotic Metal | Finishing | **EF** New | FJ | | | | SF | | | NFT | |
| | Medium Cut | **EG** New **EX** | MJ,MS | HMM,SA | | | SM | | | NMT | |
| | Roughing | **MU** | GJ | | | | SMR | | | NRT | |
| K Cast Iron | | **UZ** | | CM,CF | Standard | V,VA | KF | UN | M5 | NM5 | GN |
| | | **GZ**（UX） | GH,Standard | Standard,CH,33 | ZS,GC | Y,RE | KM,KR | UM | MR7 | | |

## ■ Positive Type

| Class | Application | Sumitomo Electric | Mitsubishi | Tungaloy | Kyocera | Hitachi | Sandvik | Kennametal | SECO Tools apan | WALTER | ISCAR |
|---|---|---|---|---|---|---|---|---|---|---|---|
| P Steel<br>M Stainless Steel | Finishing | **FC** | FJ,AM | 01 | CF,GF | | UM | | GT-F1 | PF5 | |
| | | **LU**（FP, FK） | FV,SQ | PSF,PF,23 | GP,XP | JQ,MP | PF,UF,MF,KF | 11,UF | FF1 | PF4 | PF |
| | Wiper Edge | **LUW** | SW | | | | WF | FW | W-F1 | PF | WF |
| | | **SDW** | | | | | WK | | | | |
| | Finishing to Light Cut | **SI** | SMG | JS | CK | | | | | | |
| K Cast Iron | Light Cut | **SU**（SK, SF） | SV,MQ | PSS,PS,24 | HQ,XQ,GK | JE | PM,UM,MM,PM | LF | F1 | PS5 | SM,14 |
| | | **SC** | | | MF,GQ | | | | | | |
| | Medium Cut | **MU** | MV | PM | | | PR,UR,MR,KR | MF | F2 | PM5 | 17,19 |
| N Non-ferrous Metal | | **AG, AW** | AZ | AL,PP | AH,A3 | | AL | HP | AL | PM2 | AS,AF |

# Chipbreaker Application

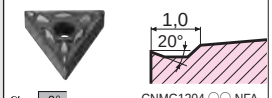
## Negative Inserts

### ● Finishing ~ Medium Cut

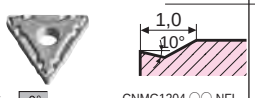
Work Material: P Steel, M Stainless Steel, K Cast Iron, N Non-Ferrous Metal, S Exotic Metal, H Hardened Steel

(Legend): Breaker Code, Rake angle, Euro stock

**Fine Finishing**

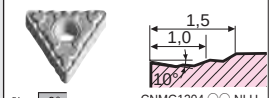
**N-FA** — P M K N S H


α = 0° — CNMG1204 ○○ NFA — C D R S T V W

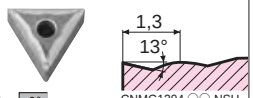
**N-FL** — P M K N S H


α = 0° — CNMG1204 ○○ NFL — C D R S T V W

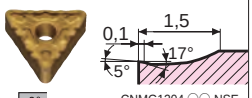
**Finishing**

**N-LU** — P M K N S H


α = 0° — CNMG1204 ○○ NLU — C D R S T V W

**N-SU** — P M K N S H


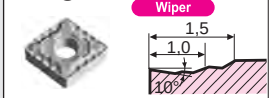
α = 0° — CNMG1204 ○○ NSU — C D R S T V W

**N-SE** — P M K N S H


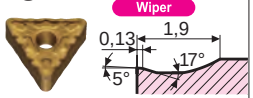
α = 0° — CNMG1204 ○○ NSE — C D R S T V W

**N-EF** — P M K N S H — New


α = 0° — CNMG1204 ○○ NEF — C D R S T V W

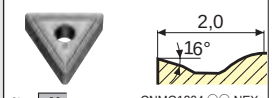
**NLU-W** — P M K N S H — Wiper


α = 0° — CNMG1204 ○○ NLU-W — C D R S T V W

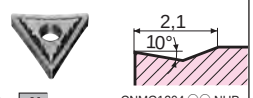
**NSE-W** — P M K N S H — Wiper


α = 0° — CNMG1204 ○○ NSE-W — C D R S T V W

**Light ~ Medium Cut**

**N-EX** — P M K N S H


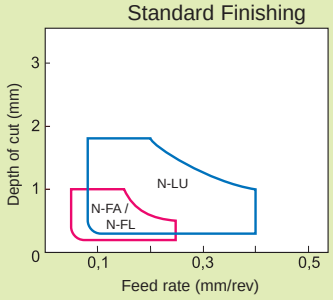
α = 0° — CNMG1204 ○○ NEX — C D R S T V W

**N-UP** — P M K N S H


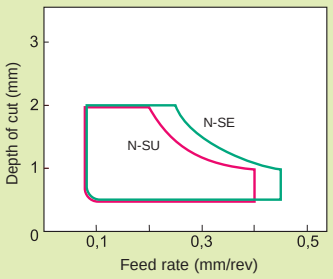
α = 0° — CNMG1204 ○○ NUP — C D R S T V W

## Chipbreaker Application Range (IC ≤ ø12,7mm)

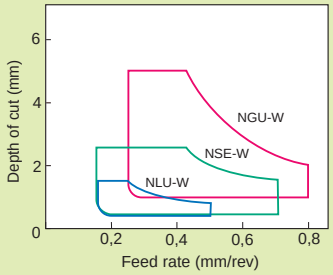
● Fine Finishing to Standard Finishing




● Finishing to Light Cutting




● Wiper Edge

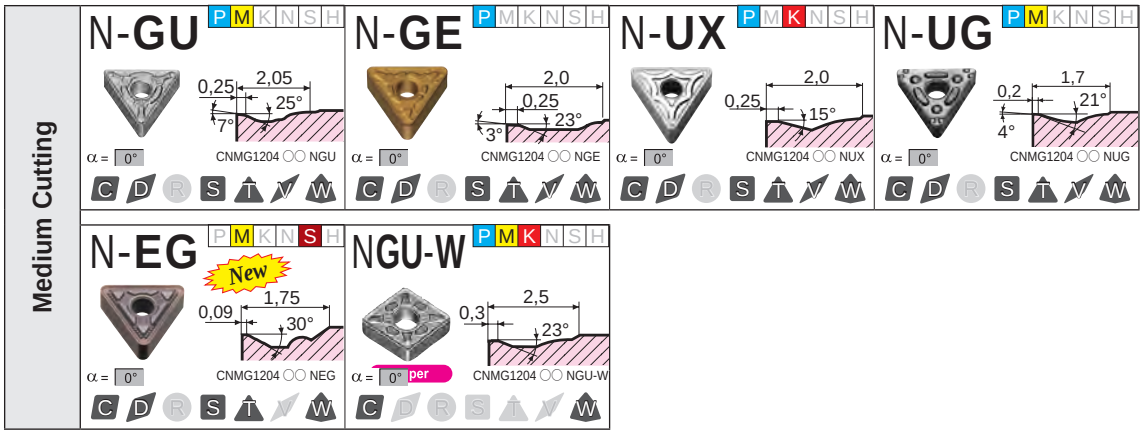


## Negative Inserts

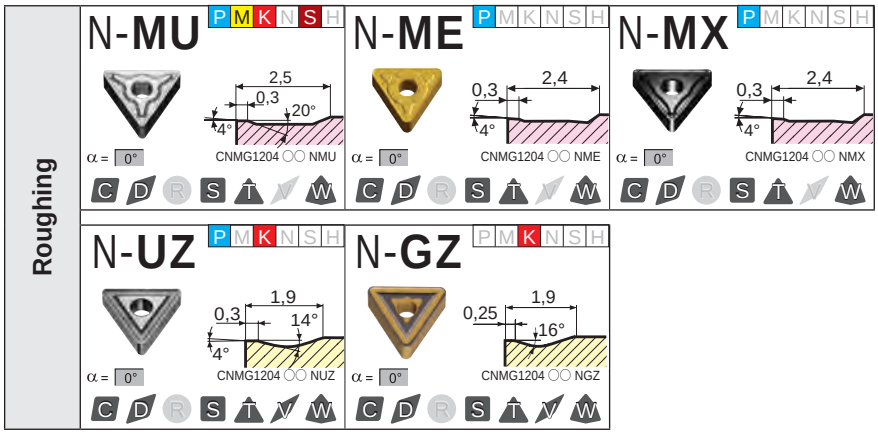
### ● Medium ~ Roughing

Bumpy chipbreaker
Standard chipbreaker
Handed chipbreaker
Sumiboron/Sumidia Break Master

**Medium Cutting**



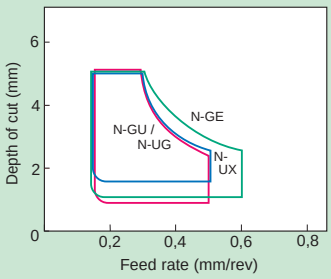

**Roughing**



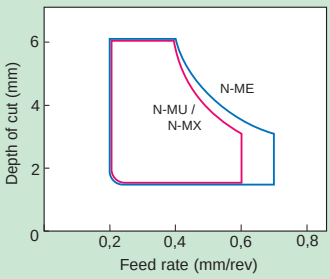

Heavy Roughing • • • ☞ C10

## Chipbreaker Application Range ( IC ≤ ø12,7mm)

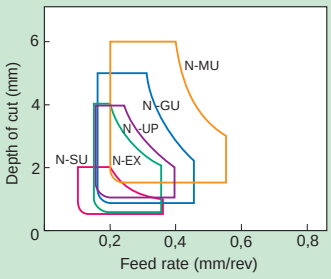
### ● Medium Cut



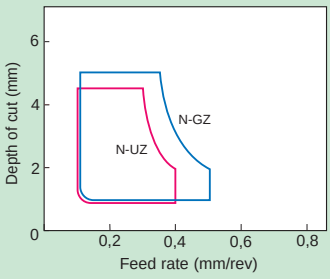

### ● Roughing



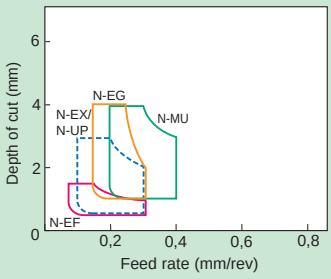

### ● Stainless Steel




### ● Cast Iron




### ● Exotic Metal



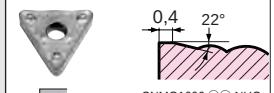
# Chipbreaker Application

## Negative Inserts

Bumpy chipbreaker
Standard chipbreaker
Handed chipbreaker
Sumiboron/Sumidia Break Master

### Heavy Roughing

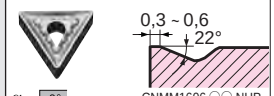
**N-HG** P M K N S H



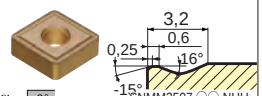

**N-MP** P M K N S H



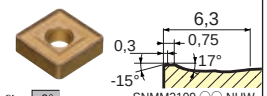

**N-HP** P M K N S H




**N-HU** P M K N S H



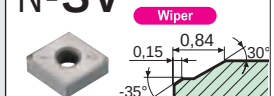

**N-HW** P M K N S H




## SUMIBORON

### Carburized Layer Removal

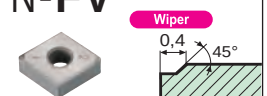
**N-SV** P M K N S H




**N-LV** P M K N S H




**N-FV** P M K N S H



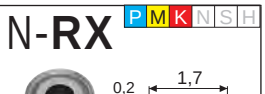

## Positive Inserts

### Round

**N-RP** P M K N S H




**N-RX** P M K N S H




## SUMIDIA

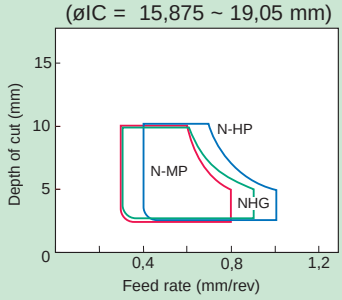
### Non-Ferrous Metal

**L/R-DM** P M K N S H

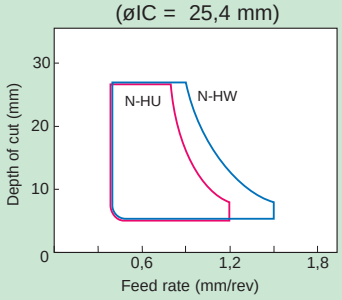



## Chipbreaker Application Range

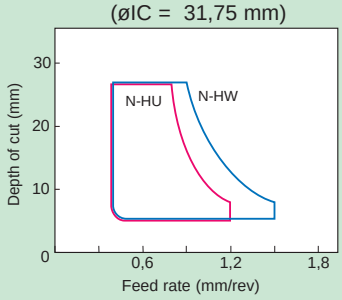
● Heavy Roughing
(øIC = 15,875 ~ 19,05 mm)



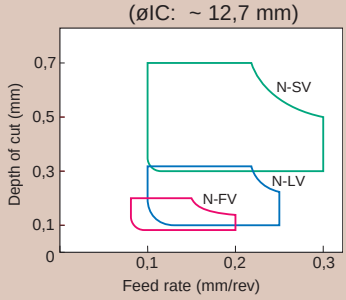

● Heavy Roughing
(øIC = 25,4 mm)



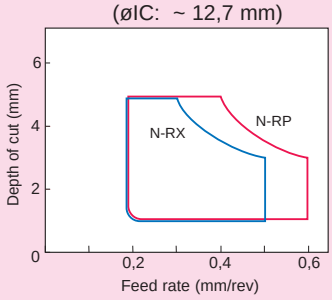

● Heavy Roughing
(øIC = 31,75 mm)




● SUMIBORON
(øIC: ~ 12,7 mm)




● Round Inserts
(øIC: ~ 12,7 mm)



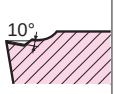
## Positive Inserts



### ● M Class

**Finishing ~ Light Cut**

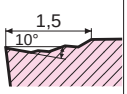
**N-FP** — P M K N S H


α = 5° 7° — CCMT 09T3 ○○ NFP

C D R S T V W

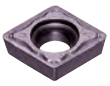
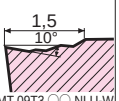
**N-LU** — P M K N S H


α = 5° 7° 1_ — CCMT 09T3 ○○ NLU

C D R S T V W

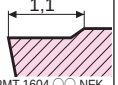
**NLU-W** — P M K N S H


α = 7° 11° — CCMT 09T3 ○○ NLU-W

C D R S T V W

**N-FK** — P M K N S H

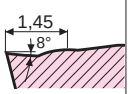




α = 11° — TPMT 1604 ○○ NFK

C D R S T V W

**Light ~ Medium Cut**

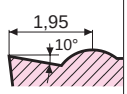
**N-SU** — P M K N S H


α = 7° 11° — TPMT 1103 ○○ NSU

C D R S T V W

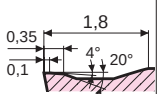
**N-US** — P M K N S H


α = 11° — CPMH 0903 ○○ NUS

C D R S T V W

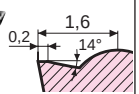
**N-MU** — P M K N S H


α = 7° 11° — TPMT 1604 ○○ NMU

C D R S T V W

**N-SF** — P M K N S H

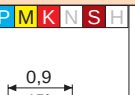

α = 11° — TPMT 1604 ○○ NSF

C D R S T V W

### ● G Class Handed Chipbreaker

**Finishing ~ Light Cut**

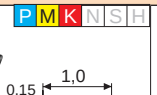
**L/R-FX** — P M K N S H


α = 5° 7° 11° — TPGT 1103 ○○ L/R-FX

C D R S T V W

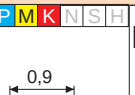
**L/R-W** — P M K N S H


α = 5° 11° — TPGR 1103 ○○ L/R-W

C D R S T V W

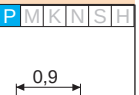
**L/R-SD** — P M K N S H


α = 7° 11° — TPGT 1103 ○○ L/R-SD

C D R S T V W

**L/R-SDW** — P M K N S H

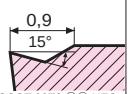

α = 11° — TPGT 1103 ○○ L/R-SDW

C D R S T V W

### ● G Class Bumpy Chipbreaker

**Finishing ~ Light Cut**

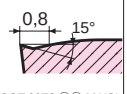
**N-FC** — P M K N S H


α = 7° 11° — CCGT 09T3 ○○ NFC

C D R S T V W

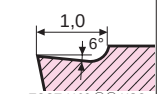
**N-SI** — P M K N S H


α = 7° — CCGT 09T3 ○○ *M* NSI

C D R S T V W

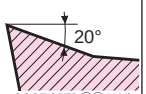
**N-SC** — P M K N S H


α = 7° — TCGT 1103 ○○ NSC

C D R S T V W

**N-AG** — P M K N S H

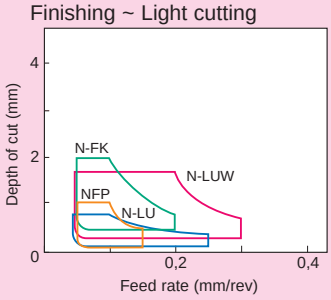




α = 7° — CCGT 09T3 ○○ NAG

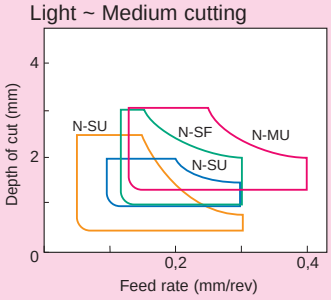
C D R S T V W

## Chipbreaker Application Range

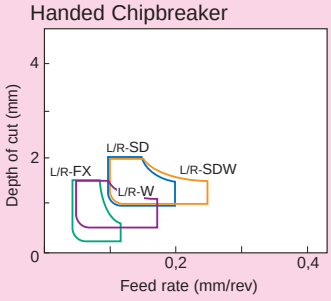
● M Class
Finishing ~ Light cutting



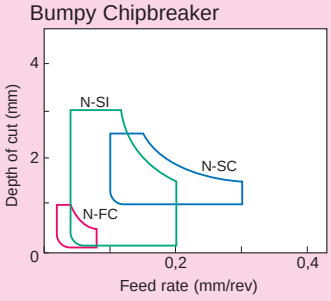

● M Class
Light ~ Medium cutting



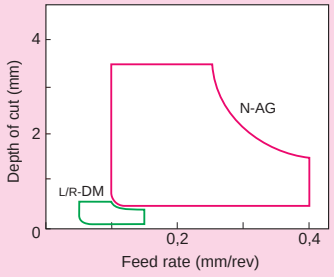

● G Class
Handed Chipbreaker



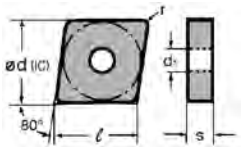

● G Class
Bumpy Chipbreaker




● For Alumimium Alloys



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




| Dimensions (mm) | | | | |
|---|---|---|---|---|
| CNMG | ℓ | ød (IC) | s | $d_1$ |
| 0903.. | 9,7 | 9,525 | 3,18 | 3,81 |
| 09T3.. | | | 3,97 | |
| 0904.. | | | 4,76 | |
| 12 | 12,9 | 12,7 | 4,76 | 5,16 |

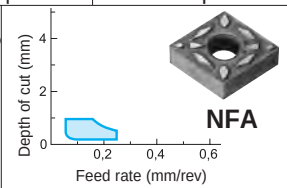
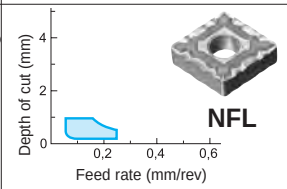
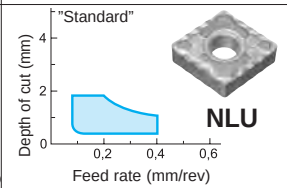
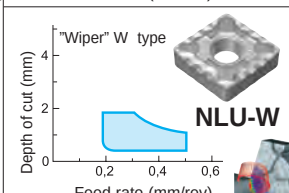
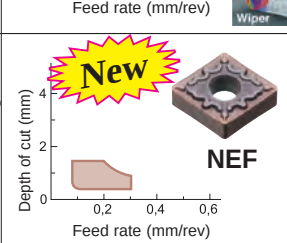
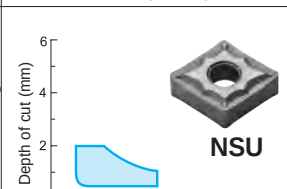
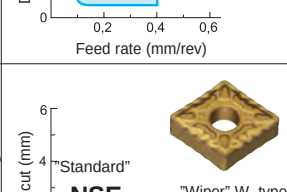

➪ D10, D16


➪ E8

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

# CNMG ●●●●●● ■-■■

● M-Class Double Sided Bumpy Chipbreaker

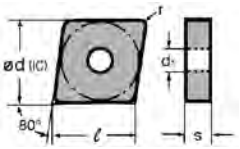
| Application | Shape | ISO Cat. No. | r | Carbide: Coated P: AC805P | AC810P | AC820P | AC830P | Coated M/PM: AC2000 | AC3000 | AC610M | AC630M | Coated K: AC405K | AC410K | AC415K | AC420K | AC700G | AC900G | ZX-Coated KS: AC510U | ZX-Coated MS: AC520U | ZX-Coated PM: AC530U | Cermet P: T2000Z | T3000Z | Uncoated P: T110A | T1200A | T1500A | Carbide K: G10E | Carbide S: EH510 | EH520 | Carbide H: H1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Fine Finishing |  NFA | CNMG 120402 NFA | 0,2 | | | | | | | | | | | | | | | | | | ● | | | ▲ | ● | | | | |
| | | CNMG 120404 NFA | 0,4 | | | | | | | | | | | | | | | | | | ● | | | ▲ | ● | | | | |
| | | CNMG 120408 NFA | 0,8 | | | | | | | | | | | | | | | | | | ● | | | ▲ | ● | | | | |
| Fine Finishing |  NFL | CNMG 120404 NFL | 0,4 | | | ○ | | ▲ | | | | | | | | | | | ○ | | ● | ● | | | | | | | |
| | | CNMG 120408 NFL | 0,8 | | | ○ | | ▲ | | | | | | | | | | | | | ● | ● | | | | | | | |
| Finishing |  NLU | CNMG 090304 NLU | 0,4 | | ● | ● | | | | | | | | | | | | | | | | | | | | | | | |
| | | CNMG 090308 NLU | 0,8 | | ○ | ● | | | | | | | | | | | | | | | | | | | | | | | |
| | | CNMG 120404 NLU | 0,4 | | ● | ● | | ▲ | | | | | | | | ▲ | ▲ | | | | ● | | | | | | | | |
| | | CNMG 120408 NLU | 0,8 | | ● | ● | | ▲ | | | | | | | | ▲ | ▲ | | | | ● | | | | | | | | |
| | | CNMG 120412 NLU | 1,2 | | ● | ● | | ▲ | | | | | | | | ▲ | ▲ | | | | ● | | | | | | | | |
| Finishing |  NLU-W | CNMG 120404 NLU-W | 0,4 | | ● | ● | | | | ● | ● | ● | ▲ | ● | | ▲ | ▲ | | | | ● | | | | | | | | |
| | | CNMG 120408 NLU-W | 0,8 | | ● | ● | | | | ● | ● | ● | ▲ | ● | | ▲ | ▲ | | | | ● | | | | | | | | |
| | | CNMG 120412 NLU-W | 1,2 | | ● | ● | | | | | | ● | ▲ | ● | | ▲ | ▲ | | | | | | | | | | | | |
| Finishing |  NEF | CNMG 120404 NEF | 0,4 | | | | | | | | ● | | | | | | | ● | ● | | | | | | | | ● | ● | |
| | | CNMG 120408 NEF | 0,8 | | | | | | | | ● | | | | | | | ● | ● | | | | | | | | ● | ● | |
| Finishing |  NSU | CNMG 090304 NSU | 0,4 | | ● | ● | | | | ● | ● | | | | | ▲ | | | | | | | | | | | | | |
| | | CNMG 090308 NSU | 0,8 | | ● | ● | | | | ● | ● | | | | | ▲ | | | | | | | | | | | | | |
| | | CNMG 120402 NSU | 0,2 | | | | | | | | | | | | | | | | ○ | | | | | | | | | | |
| | | CNMG 120404 NSU | 0,4 | | ● | ● | ○ | ▲ | | ● | ● | | | | | ▲ | ▲ | ● | ● | | ● | | | ▲ | ● | | | | |
| | | CNMG 120408 NSU | 0,8 | | ● | ● | ○ | ▲ | | ● | ● | | | | | ▲ | ▲ | ● | ● | | ● | | | ▲ | ● | | | | |
| | | CNMG 120412 NSU | 1,2 | | ● | ● | ○ | ▲ | | ● | ● | | | | | ▲ | ▲ | ● | ● | | ● | | | ▲ | ● | | | | |
| Finishing |  NSE / NSE-W | CNMG 120404 NSE | 0,4 | | ● | ● | ○ | | | | | | | | | | | | | | | | | | | | | | |
| | | CNMG 120408 NSE | 0,8 | ● | ● | ● | ○ | | | | | | | | | | | | | | | | | | | | | | |
| | | CNMG 120412 NSE | 1,2 | ● | ● | ● | ○ | | | | | | | | | | | | | | | | | | | | | | |
| | | CNMG 120404 NSE-W | 0,4 | | ● | ● | | | | | | | | | | | | | | | | | | | | | | | |
| | | CNMG 120408 NSE-W | 0,8 | ● | ● | ● | | | | | | | | | | | | | | | | | | | | | | | |
| | | CNMG 120412 NSE-W | 1,2 | ● | ● | ● | | | | | | | | | | | | | | | | | | | | | | | |

● = Euro stock ● = 1-st recommended item
○ = Stock item in Japan
▲ = To be replaced by new item

Packing unit and ordering example; 10 pcs. CNMG 120402 NFA, T2000Z

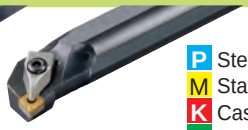
# C DIAMOND TYPE
INSERTS FOR TURNING

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




| Dimensions (mm) | | | | |
|---|---|---|---|---|
| CN_ _ | ℓ | ød (IC) | s | $d_1$ |
| 0903.. | 9,7 | 9,525 | 3,18 | 3,81 |
| 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 |

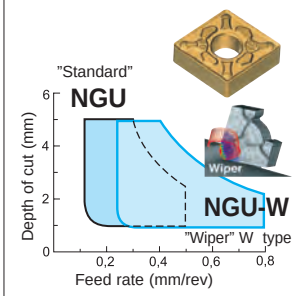
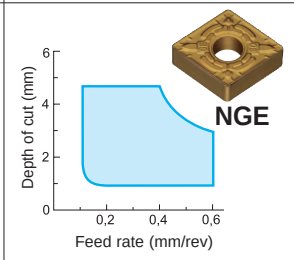
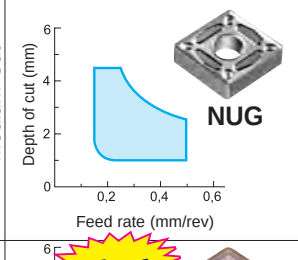
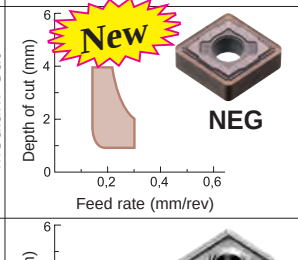
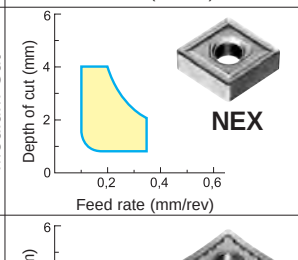
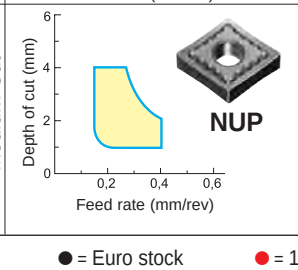

⇨ D10, D16


⇨ E8

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

## CNMG ●●●●●● ■-■■

● M-Class Double Sided Bumpy Chipbreaker

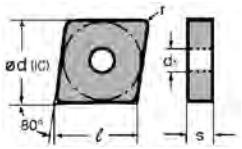
| Application | Shape | ISO Cat. No. | r | Carbide Coated P | Carbide Coated P | Carbide Coated P | Carbide Coated P | Carbide Coated M | Carbide Coated P/M | Carbide Coated P | Carbide Coated K | Carbide Coated K | Carbide Coated K | Carbide Coated K | Carbide Coated K | Carbide ZX-Coated K/S | Carbide ZX-Coated M/S | Carbide ZX-Coated P/M | Cermet Uncoated P | Cermet Uncoated P | Cermet Uncoated P | Cermet Uncoated P | Carbide Uncoated K | Carbide Uncoated S | Carbide Uncoated S | Carbide Uncoated H |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | AC805P | AC810P | **AC820P** | AC830P | AC2000 | AC3000 | AC610M | AC630M | **AC405K** | AC410K | **AC415K** | AC420K | AC700G | AC900G | AC510U | AC520U | AC530U | **T2000Z** | T3000Z | T110A | T1200A | T1500A | G10E | EH510 | EH520 | H1 |
| Medium Cut |   | CNMG 090304 NGU | 0,4 | | | ● | ○ | | | | | | | | | | | | | | | | | | | | | |
| | | CNMG 090308 NGU | 0,8 | | | ● | ○ | | | | | | | | | | | | | | | | | | | | | |
| | | CNMG 120404 NGU | 0,4 | | ● | ● | ● | ▲ | | ● | ● | | | | | ▲ | ▲ | | ○ | | | | | | | | | |
| | | CNMG 120408 NGU | 0,8 | ● | ● | ● | ● | ▲ | ▲ | ● | ● | | | | | ▲ | ▲ | | ○ | | | | | | | | | |
| | | CNMG 120412 NGU | 1,2 | ● | ● | ● | ● | ▲ | ▲ | ● | ● | | | | | ▲ | ▲ | | ○ | | | | | | | | | |
| | | CNMG 120416 NGU | 1,6 | | | ● | ● | | | | | | | | | | | | | | | | | | | | | |
| | | CNMG 160608 NGU | 0,8 | | ● | ● | ● | ▲ | ▲ | ● | ● | | | | | ▲ | ▲ | | | | | | | | | | | |
| | | CNMG 160612 NGU | 1,2 | | ● | ● | ● | ▲ | ▲ | ● | ● | | | | | ▲ | ▲ | | | | | | | | | | | |
| | | CNMG 160616 NGU | 1,6 | | ● | ● | ● | ▲ | ▲ | ● | ● | | | | | ▲ | ▲ | | | | | | | | | | | |
| | | CNMG 120408 NGU-W | 0,8 | ● | ● | ● | | ▲ | | ● | ● | ● | ▲ | ● | | ▲ | ▲ | | | | | | | | | | | |
| | | CNMG 120412 NGU-W | 1,2 | ● | ● | ● | | ▲ | | ● | ● | ● | ▲ | ● | | ▲ | ▲ | | | | | | | | | | | |
| Medium Cut |   | CNMG 120404 NGE | 0,4 | | ● | ● | ● | | | | | | | | | | | | | | | | | | | | | |
| | | CNMG 120408 NGE | 0,8 | ● | ● | ● | ● | | | | | | | | | | | | | | | | | | | | | |
| | | CNMG 120412 NGE | 1,2 | ● | ● | ● | ● | | | | | | | | | | | | | | | | | | | | | |
| | | CNMG 120416 NGE | 1,6 | ● | ● | | | | | | | | | | | | | | | | | | | | | | | |
| | | CNMG 160612 NGE | 1,2 | | ● | ● | ● | | | | | | | | | | | | | | | | | | | | | |
| | | CNMG 160616 NGE | 1,6 | | ● | ● | ● | | | | | | | | | | | | | | | | | | | | | |
| | | CNMG 190612 NGE | 1,2 | | ● | | | | | | | | | | | | | | | | | | | | | | | |
| | | CNMG 190616 NGE | 1,6 | | ● | | | | | | | | | | | | | | | | | | | | | | | |
| Medium Cut |   | CNMG 120404 NUG | 0,4 | | | | | ▲ | ▲ | | | | | | | | | | | | | | | | | | | |
| | | CNMG 120408 NUG | 0,8 | | | | | ▲ | ▲ | | | | | | | | | | | | | | | | | | | |
| | | CNMG 120412 NUG | 1,2 | | | | | ▲ | ▲ | | | | | | | | | | | | | | | | | | | |
| | | CNMG 120416 NUG | 1,6 | | | | | ▲ | ▲ | | | | | | | | | | | | | | | | | | | |
| | | CNMG 160612 NUG | 1,2 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | CNMG 160616 NUG | 1,6 | | | | | ▲ | | | | | | | | | | | | | | | | | | | | |
| | | CNMG 160624 NUG | 2,4 | | | | | ▲ | | | | | | | | | | | | | | | | | | | | |
| | | CNMG 190608 NUG | 0,8 | | | | | ▲ | | | | | | | | | | | | | | | | | | | | |
| Medium Cut |   | CNMG 120404 NEG | 0,4 | | | | | | | | ● | | | | | | | ● | ● | | | | | | | ● | ● | |
| | | CNMG 120408 NEG | 0,8 | | | | | | | | ● | | | | | | | ● | ● | | | | | | | ● | ● | |
| | | CNMG 120412 NEG | 1,2 | | | | | | | | ● | | | | | | | ● | ● | | | | | | | ● | ● | |
| Medium Cut |   | CNMG 120404 NEX | 0,4 | | | | | | | ● | ● | | | | | | | ● | ● | | | | | | | | | |
| | | CNMG 120408 NEX | 0,8 | | | | | | | ● | ● | | | | | | | ● | ● | | | | | | | | | |
| | | CNMG 120412 NEX | 1,2 | | | | | | | ● | ● | | | | | | | ● | ● | | | | | | | | | |
| | | CNMG 160612 NEX | 1,2 | | | | | | | | | | | | | | | ● | ● | | | | | | | | | |
| | | CNMG 190612 NEX | 1,2 | | | | | | | | | | | | | | | ● | ● | | | | | | | | | |
| Medium Cut |   | CNMG 120404 NUP | 0,4 | | | ● | ● | ▲ | ▲ | ● | ● | | | | | | | ● | ● | | | | | | | | | |
| | | CNMG 120408 NUP | 0,8 | | | ● | ● | ▲ | ▲ | ● | ● | | | | | | | ● | ● | | | | | | | | | |
| | | CNMG 120412 NUP | 1,2 | | | ● | ● | ▲ | ▲ | ● | ● | | | | | | | ● | ● | | | | | | | | | |
| | | CNMG 160612 NUP | 1,2 | | | | ● | ▲ | ▲ | | ● | | | | | | | | | | | | | | | | | |
| | | CNMG 190612 NUP | 1,2 | | | ● | ● | ▲ | ▲ | | ● | | | | | | | | | | | | | | | | | |

● = Euro stock ● = 1-st recommended item
○ = Stock item in Japan
▲ = To be replaced by new item

Packing unit and ordering example; 10 pcs. CNMG 120404 NGU, AC820P

# CNMG neg. Inserts for Roughing

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




| Dimensions (mm) | | | | |
|---|---|---|---|---|
| CNMG | 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 |
| | | | | |


⇨ D10, D16


⇨ E8

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

## CNMG ●●●●●● ■-■■

● M-Class Double Sided Bumpy Chipbreaker

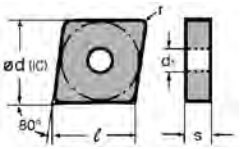
| Application | Shape | ISO Cat. No. | r | Carbide Coated P AC805P | AC810P | AC820P | AC830P | Carbide Coated M/P AC2000 | AC3000 | AC610M | AC630M | Carbide Coated K AC405K | AC410K | AC415K | AC420K | AC700G | AC900G | Carbide ZX-Coated K/S AC510U | AC520U | AC530U | Cermet ZX-Coated M/S T2000Z | T3000Z | Carbide Uncoated P T110A | T1200A | T1500A | Carbide Uncoated K G10E | Carbide Uncoated S EH510 | EH520 | Carbide Uncoated H H1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Roughing | NMU | CNMG 120408 NMU | 0,8 | ● | ● | ● | ● | ▲ | ▲ | ● | ● | | | | | ▲ | ▲ | ● | ● | | | | | | | | | | |
| | | CNMG 120412 NMU | 1,2 | ● | ● | ● | ● | ▲ | ▲ | ● | ● | | | | | ▲ | ▲ | ● | ● | | | | | | | | | | |
| | | CNMG 120416 NMU | 1,6 | ● | ● | ● | ● | ▲ | ▲ | | | | | | | ▲ | ▲ | ● | ● | | | | | | | | | | |
| | | CNMG 160608 NMU | 0,8 | | ● | ● | ● | ▲ | ▲ | ● | ● | | | | | ▲ | ▲ | | | | | | | | | | | | |
| | | CNMG 160612 NMU | 1,2 | | ● | ● | ● | ▲ | ▲ | ● | ● | | | | | ▲ | ▲ | ● | ● | | | | | | | | | | |
| | | CNMG 160616 NMU | 1,6 | | ● | ● | ● | ▲ | ▲ | ● | ● | | | | | ▲ | ▲ | ● | ● | | | | | | | | | | |
| | | CNMG 190608 NMU | 0,8 | | | | ● | | | | | | | | | | | | | | | | | | | | | | |
| | | CNMG 190612 NMU | 1,2 | | ○ | ● | ● | ▲ | ▲ | ● | ● | | | | | | | ● | ● | | | | | | | | | | |
| | | CNMG 190616 NMU | 1,6 | | ○ | ● | ● | ▲ | ▲ | ● | ● | | | | | | | ● | ● | | | | | | | | | | |
| Roughing | NME | CNMG 120408 NME | 0,8 | | ● | ● | ● | | | | | | | | | | | | | | | | | | | | | | |
| | | CNMG 120412 NME | 1,2 | | ● | ● | ● | | | | | | | | | | | | | | | | | | | | | | |
| | | CNMG 160612 NME | 1,2 | | ● | ● | ● | | | | | | | | | | | | | | | | | | | | | | |
| | | CNMG 160616 NME | 1,6 | | ● | ● | ● | | | | | | | | | | | | | | | | | | | | | | |
| | | CNMG 190616 NME | 1,6 | | ● | ● | ● | | | | | | | | | | | | | | | | | | | | | | |
| Roughing | NUX | CNMG 120404 NUX | 0,4 | | | ● | ● | ▲ | ▲ | | | | ▲ | | | | | | | | | | | | | | | | |
| | | CNMG 120408 NUX | 0,8 | | ● | ● | ● | ▲ | ▲ | | | | ▲ | | | ▲ | ▲ | | | | | | | | | | | | |
| | | CNMG 120412 NUX | 1,2 | | ● | ● | ● | ▲ | ▲ | | | | ▲ | | | ▲ | ▲ | | | | | | | | | | | | |
| | | CNMG 120416 NUX | 1,6 | | ● | ● | ● | ▲ | | | | | ▲ | | | ▲ | ▲ | | | | | | | | | | | | |
| | | CNMG 160608 NUX | 0,8 | | ● | ● | ● | | | | | | ▲ | | | ▲ | ▲ | | | | | | | | | | | | |
| | | CNMG 160612 NUX | 1,2 | | ● | ● | ● | ▲ | | | | | ▲ | | ● | ▲ | ▲ | | | | | | | | | | | | |
| | | CNMG 160616 NUX | 1,6 | | ● | ● | ● | ▲ | | | | | ▲ | | ● | ▲ | ▲ | | | | | | | | | | | | |
| | | CNMG 190608 NUX | 0,8 | | | | ● | | | | | | | | | | | | | | | | | | | | | | |
| | | CNMG 190612 NUX | 1,2 | | | ● | ● | | | | | | | | | | | | | | | | | | | | | | |
| | | CNMG 190616 NUX | 1,6 | | | ● | ● | | | | | | | | | | | | | | | | | | | | | | |
| Roughing | NMX | CNMG 120408 NMX | 0,8 | | | ● | ● | ▲ | ▲ | | | | | | | | | | | | | | | | | | | | |
| | | CNMG 120412 NMX | 1,2 | | | ● | ● | ▲ | ▲ | | | | | | | | | | | | | | | | | | | | |
| | | CNMG 120416 NMX | 1,6 | | | ● | ● | ▲ | ▲ | | | | | | | | | | | | | | | | | | | | |
| | | CNMG 160608 NMX | 0,8 | | | ● | | | | | | | | | | | | | | | | | | | | | | | |
| | | CNMG 160612 NMX | 1,2 | | | ● | ● | ▲ | ▲ | | | | | | | | | | | | | | | | | | | | |
| | | CNMG 160616 NMX | 1,6 | | | ● | ● | ▲ | ▲ | | | | | | | | | | | | | | | | | | | | |
| | | CNMG 190612 NMX | 1,2 | | | ● | ● | ▲ | | | | | | | | | | | | | | | | | | | | | |
| | | CNMG 190616 NMX | 1,6 | | | ● | ● | ▲ | | | | | | | | | | | | | | | | | | | | | |
| Roughing | NGZ | CNMG 120404 NGZ | 0,4 | | | | | | | | | | ● | | ● | | | | | | | | | | | | | | |
| | | CNMG 120408 NGZ | 0,8 | | | | | | | | | | ● | | ● | ● | | | | | | | | | | | | | |
| | | CNMG 120412 NGZ | 1,2 | | | | | | | | | | ● | | ● | ● | | | | | | | | | | | | | |
| | | CNMG 120416 NGZ | 1,6 | | | | | | | | | | ● | | ● | ● | | | | | | | | | | | | | |
| | | CNMG 160612 NGZ | 1,2 | | | | | | | | | | ● | | ● | | | | | | | | | | | | | | |
| | | CNMG 160616 NGZ | 1,6 | | | | | | | | | | ● | | ● | | | | | | | | | | | | | | |
| | | CNMG 190612 NGZ | 1,2 | | | | | | | | | | ● | | ● | | | | | | | | | | | | | | |
| | | CNMG 190616 NGZ | 1,6 | | | | | | | | | | ● | | ● | | | | | | | | | | | | | | |
| Roughing | NUZ | CNMG 120404 NUZ | 0,4 | | | | | | | | | | ● | ▲ | ● | | | | | | | | | | | | | | |
| | | CNMG 120408 NUZ | 0,8 | | | | | | | | | | ● | ▲ | ● | ● | ▲ | ▲ | | | | | | | | | | | |
| | | CNMG 120412 NUZ | 1,2 | | | | | | | | | | ● | ▲ | ● | ● | ▲ | ▲ | | | | | | | | | | | |
| | | CNMG 120416 NUZ | 1,6 | | | | | | | | | | ● | ▲ | ● | ● | ▲ | ▲ | | | | | | | | | | | |
| | | CNMG 160608 NUZ | 0,8 | | | | | | | | | | | ▲ | | | | | | | | | | | | | | | |
| | | CNMG 160612 NUZ | 1,2 | | | | | | | | | | ● | ▲ | ● | ● | ▲ | ▲ | | | | | | | | | | | |
| | | CNMG 160616 NUZ | 1,6 | | | | | | | | | | ● | ▲ | ● | ● | ▲ | ▲ | | | | | | | | | | | |
| | | CNMG 190612 NUZ | 1,2 | | | | | | | | | | ● | ▲ | ● | ● | | | | | | | | | | | | | |
| | | CNMG 190616 NUZ | 1,6 | | | | | | | | | | ● | ▲ | ● | ● | | | | | | | | | | | | | |

● = Euro stock ● = 1-st recommended item
○ = Stock item in Japan
▲ = To be replaced by new item

Packing unit and ordering example; 10 pcs. CNMG 120408 NMU, AC805P

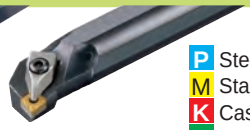
# C DIAMOND TYPE
INSERTS FOR TURNING

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




| Dimensions (mm) | | | | |
|---|---|---|---|---|
| CNMM | 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 |
| 2507.. | 25,8 | 25,4 | 7,94 | 9,2 |
| 2509.. | 25,8 | 25,4 | 9,52 | 9,2 |

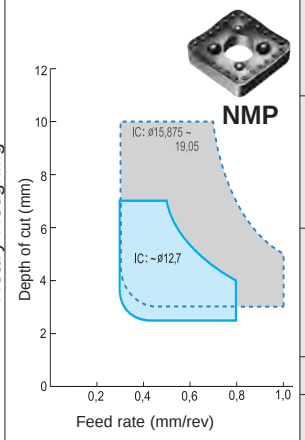
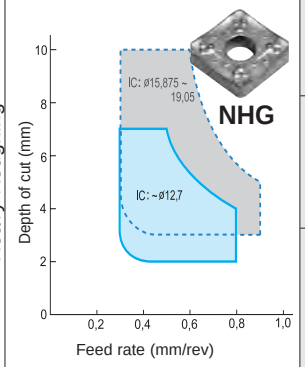
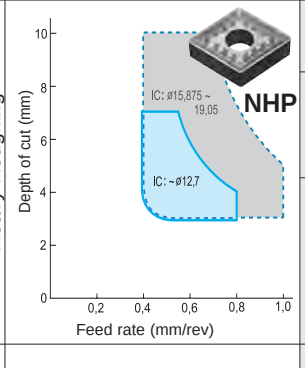
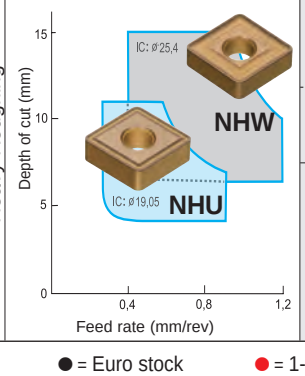

⇨ D10, D16


⇨ E8

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

## CNMM ●●●●●● ■-■■

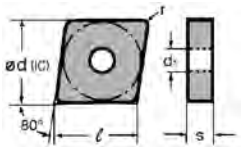
● M-Class One Sided Bumpy Chipbreaker

| Application | Shape | ISO Cat. No. | r | Carbide Coated P | Carbide Coated P/M | Carbide Coated M | Carbide Coated K | Carbide ZX-Coated K/S | Carbide ZX-Coated M/S | Carbide ZX-Coated P/M | Cermet Uncoated P | Carbide Uncoated K | Carbide Uncoated S | Carbide Uncoated H |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | AC805P | AC810P | AC820P | AC830P | AC2000 | AC3000 | AC610M | AC630M | AC405K | AC410K | AC415K | AC420K | AC700G | AC900G | AC510U | AC520U | AC530U | T2000Z | T3000Z | T110A | T1200A | T1500A | G10E | EH510 | EH520 | H1 |
| Heavy Roughing |  NMP | CNMM 120408 NMP | 0,8 | | ● | ● | ● | ▲ | ▲ | | ● | | | | | | | ❍ | | | | | | | | | | |
| | | CNMM 120412 NMP | 1,2 | | ● | ● | ● | ▲ | ▲ | | ● | | | | | | | ❍ | | | | | | | | | | |
| | | CNMM 120416 NMP | 1,6 | | ❍ | ● | ● | ▲ | ▲ | | ● | | | | | | | ❍ | | | | | | | | | | |
| | | CNMM 160608 NMP | 0,8 | | | ● | ● | ▲ | ▲ | | ● | | | | | | | ❍ | | | | | | | | | | |
| | | CNMM 160612 NMP | 1,2 | | ● | ● | ● | ▲ | ▲ | | ● | | | | | | | ❍ | | | | | | | | | | |
| | | CNMM 160616 NMP | 1,6 | | ● | ● | ● | ▲ | ▲ | | ● | | | | | | | ❍ | | | | | | | | | | |
| | | CNMM 160624 NMP | 2,4 | | | ● | | ▲ | | | | | | | | | | | | | | | | | | | | |
| | | CNMM 190608 NMP | 0,8 | | | ● | ● | | | | | | | | | | | ❍ | | | | | | | | | | |
| | | CNMM 190612 NMP | 1,2 | | ❍ | ● | ● | ▲ | ▲ | | ● | | | | | | | ❍ | | | | | | | | | | |
| | | CNMM 190616 NMP | 1,6 | | ❍ | ● | ● | ▲ | ▲ | | ● | | | | | | | ❍ | | | | | | | | | | |
| | | CNMM 190624 NMP | 2,4 | | ❍ | ● | ● | ▲ | ▲ | | | | | | | | | | | | | | | | | | | |
| | | CNMM 250724 NMP | 2,4 | | | ❍ | | | | | | | | | | | | | | | | | | | | | | |
| | | CNMM 250924 NMP | 2,4 | | | ❍ | | | | | | | | | | | | | | | | | | | | | | |
| Heavy Roughing |  NHG | CNMM 120408 NHG | 0,8 | | ● | ● | ● | ▲ | ▲ | ● | ● | | | | | ▲ | ▲ | | | | | | | | | | | |
| | | CNMM 120412 NHG | 1,2 | | ● | ● | ● | ▲ | ▲ | ● | ● | | | | | ▲ | ▲ | | | | | | | | | | | |
| | | CNMM 120416 NHG | 1,6 | | | | | ▲ | | ● | ● | | | | | | | | | | | | | | | | | |
| | | CNMM 160608 NHG | 0,8 | | ● | | | ▲ | ▲ | ● | ● | | | | | ▲ | ▲ | | | | | | | | | | | |
| | | CNMM 160612 NHG | 1,2 | | ● | ● | ● | ▲ | ▲ | ● | ● | | | | | ▲ | ▲ | | | | | | | | | | | |
| | | CNMM 160616 NHG | 1,6 | | ● | ● | ● | ▲ | ▲ | ● | ● | | | | | ▲ | ▲ | | | | | | | | | | | |
| | | CNMM 160624 NHG | 2,4 | | | | | ▲ | | | | | | | | | ▲ | | | | | | | | | | | |
| | | CNMM 190612 NHG | 1,2 | | ● | ● | ● | ▲ | ▲ | ● | ● | | | | | ▲ | ▲ | | | | | | | | | | | |
| | | CNMM 190616 NHG | 1,6 | | ● | ● | ● | ▲ | ▲ | ● | ● | | | | | ▲ | ▲ | | | | | | | | | | | |
| | | CNMM 190624 NHG | 2,4 | | ❍ | ● | ● | ▲ | ▲ | | | | | | | | ▲ | | | | | | | | | | | |
| Heavy Roughing |  NHP | CNMM 120408 NHP | 0,8 | | | ● | ● | ▲ | ▲ | | | | | | | | | | | | | | | | | | | |
| | | CNMM 120412 NHP | 1,2 | | | ● | ● | | | | | | | | | | | | | | | | | | | | | |
| | | CNMM 160608 NHP | 0,8 | | | | ● | | ▲ | | | | | | | | | | | | | | | | | | | |
| | | CNMM 160612 NHP | 1,2 | | | | ● | | ▲ | | | | | | | | | | | | | | | | | | | |
| | | CNMM 160616 NHP | 1,6 | | | | ● | | ▲ | | | | | | | | | | | | | | | | | | | |
| | | CNMM 190608 NHP | 0,8 | | | | ● | | | | | | | | | | | | | | | | | | | | | |
| | | CNMM 190612 NHP | 1,2 | | | ● | ● | | ▲ | | | | | | | | | | | | | | | | | | | |
| | | CNMM 190616 NHP | 1,6 | | | ● | ● | | ▲ | | | | | | | | | | | | | | | | | | | |
| | | CNMM 190624 NHP | 2,4 | | | ● | ● | | ▲ | | | | | | | | | | | | | | | | | | | |
| Heavy Roughing |  NHW NHU | CNMM 190616 NHU | 1,6 | | ● | | | | | | ● | | | | | ▲ | ▲ | | | | | | | | | | | |
| | | CNMM 250924 NHU | 2,4 | | ● | | | | | | ● | | | | | ▲ | ▲ | | | | | | | | | | | |
| | | CNMM 250924 NHW | 2,4 | | | | | | | | ● | | | | | | | | | | | | | | | | | |

● = Euro stock ● = 1-st recommended item
❍ = Stock item in Japan
▲ = To be replaced by new item

Packing unit and ordering example; 10 pcs. CNMM 120408 NMP, AC810P

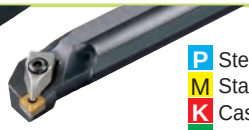
80° Diamond Type | 0° Relief | With Insert Hole




| Dimensions (mm) | | | | |
|---|---|---|---|---|
| CN__ | 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 |



⇨ D10, D16

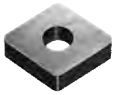


⇨ E8

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

# CNMA / CNMX

● Flat and One Side Handed Inserts

| Application | Shape | ISO Cat. No. | r | AC805P | AC810P | AC820P | AC830P | AC2000 | AC3000 | AC610M | AC630M | AC405K | AC410K | AC415K | AC420K | AC700G | AC900G | AC510U | AC520U | AC530U | T2000Z | T3000Z | T110A | T1200A | T1500A | G10E | EH510 | EH520 | H1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carbide | | | | | | | | | | | | | | | | | Cermet | | | | | Carbide | | | |
| | | | | Coated | | | | | | | | | | | | | | ZX-Coated | | | | | Uncoated | | | | | | |
| | | | | P | | | | | | M | P/M | K | | | | | | K/S | M/S | P/M | | | P | | | K | S | | H |
| Roughing |  | CNMA 120404 | 0,4 | | | | | | | | | ● | ▲ | ● | ● | ▲ | ▲ | | | | | | | | | ● | | | |
| | | CNMA 120408 | 0,8 | | | | | | | | | ● | ▲ | ● | ● | ▲ | ▲ | | | | | | | | | ● | | | |
| | | CNMA 120412 | 1,2 | | | | | | | | | ● | ▲ | ● | ● | ▲ | ▲ | | | | | | | | | | | | |
| | | CNMA 120416 | 1,6 | | | | | | | | | ● | ▲ | ● | ● | ▲ | ▲ | | | | | | | | | | | | |
| | | CNMA 160608 | 0,8 | | | | | | | | | | ▲ | | | | | | | | | | | | | | | | |
| | | CNMA 160612 | 1,2 | | | | | | | | | ● | ▲ | ● | ● | ▲ | ▲ | | | | | | | | | | | | |
| | | CNMA 160616 | 1,6 | | | | | | | | | ● | ▲ | ● | ● | ▲ | ▲ | | | | | | | | | | | | |
| | | CNMA 190612 | 1,2 | | | | | | | | | ● | ▲ | ● | ● | ▲ | | | | | | | | | | | | | |
| | | CNMA 190616 | 1,6 | | | | | | | | | ● | ▲ | ● | ● | ▲ | | | | | | | | | | | | | |
| Heavy Roughing |  | CNMX 120408 L | 0,8 | | | ● | | ▲ | | | | | | | | | | | | | | | | | | | | | |
| |  | CNMX 120408 R | 0,8 | | | ● | | ▲ | | | | | | | | | | | | | | | | | | | | | |

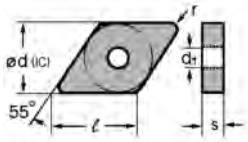
● = Euro stock ● = 1-st recommended item
○ = Stock item in Japan
▲ = To be replaced by new item

Packing unit and ordering example; 10 pcs. CNGA 120408, AC405K

Neg. Inserts
C
D
K
R
S
T
V
W

# D DIAMOND TYPE
INSERTS FOR TURNING

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




| Dimensions (mm) | | | | |
|---|---|---|---|---|
| DNMG | 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 |



⇨ D11, D17 ⇨ E9

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

## DNMG ●●●●●● ■-■■

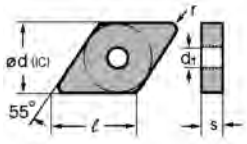
● M-Class Double Sided Bumpy Chipbreaker

| Application | Shape | ISO Cat. No. | r | Carbide Coated P | Carbide Coated P/M | Carbide Coated M | Carbide Coated K | Carbide ZX-Coated K/S | Carbide ZX-Coated M/S | Carbide ZX-Coated P/M | Cermet Uncoated P | Carbide Uncoated K | Carbide Uncoated S | Carbide Uncoated H |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | AC805P | AC810P | AC820P | AC830P | AC2000 | AC3000 | AC610M | AC630M | AC405K | AC410K | AC415K | AC420K | AC700G | AC900G | AC510U | AC520U | AC530U | T2000Z | T3000Z | T110A | T1200A | T1500A | G10E | EH510 | EH520 | H1 |
| Fine Finishing | NFA | **DNMG 150604 NFA** | 0,4 | | | | | | | | | | | | | | | | | | ● | | | ▲ | ● | | | | |
| | | **DNMG 150608 NFA** | 0,8 | | | | | | | | | | | | | | | | | | ● | | | ▲ | ● | | | | |
| Fine Finishing | NFL | DNMG 150404 NFL | 0,4 | | | ❍ | | | | | ❍ | | | | | | | | | | | | | | | | | | |
| | | DNMG 150408 NFL | 0,8 | | | ❍ | | | | | ❍ | | | | | | | | | | | | | | | | | | |
| | | **DNMG 150604 NFL** | 0,4 | | | ❍ | | ▲ | | | | | | | | | | | | | ● | ● | | | | | | | |
| | | **DNMG 150608 NFL** | 0,8 | | | ❍ | | | | | | | | | | | | | | | ● | ● | | | | | | | |
| Finishing | NLU | **DNMG 110404 NLU** | 0,4 | | ● | ● | | ▲ | | | ❍ | | | | ▲ | ▲ | | | | ● | | | | | | | | |
| | | **DNMG 110408 NLU** | 0,8 | | ● | ● | | ▲ | | | ❍ | | | | ▲ | ▲ | | | | ● | | | | | | | | |
| | | DNMG 150402 NLU | 0,2 | | | | | | | | ❍ | | | | | | | | | | | | | | | | | | |
| | | DNMG 150404 NLU | 0,4 | | ❍ | ❍ | | | | | ❍ | | | | | | | | | ❍ | | | | | | | | | |
| | | DNMG 150408 NLU | 0,8 | | ❍ | ❍ | | | | | ❍ | | | | | | | | | ❍ | | | | | | | | | |
| | | DNMG 150412 NLU | 1,2 | | ❍ | ❍ | | | | | ❍ | | | | | | | | | ❍ | | | | | | | | | |
| | | **DNMG 150604 NLU** | 0,4 | | ● | ● | | ▲ | | | | | | | ▲ | ▲ | | | | ● | | | | | | | | |
| | | **DNMG 150608 NLU** | 0,8 | | ● | ● | | | | | | | | | ▲ | ▲ | | | | ● | | | | | | | | |
| | | **DNMG 150612 NLU** | 1,2 | | ● | ● | | ▲ | | | | | | | ▲ | ▲ | | | | ● | | | | | | | | |
| Finishing | NEF | **DNMG 150404 NEF** | 0,4 | | | | | | | | ❍ | | | | | | | ❍ | ❍ | | | | | | | | ❍ | ❍ | |
| | | **DNMG 150408 NEF** | 0,8 | | | | | | | | ❍ | | | | | | | ❍ | ❍ | | | | | | | | ❍ | ❍ | |
| | | **DNMG 150604 NEF** | 0,4 | | | | | | | | ● | | | | | | | ● | ● | | | | | | | | ● | ● | |
| | | **DNMG 150608 NEF** | 0,8 | | | | | | | | ● | | | | | | | ● | ● | | | | | | | | ● | ● | |
| Finishing | NSU | **DNMG 110404 NSU** | 0,4 | | ● | ● | | ▲ | | ● | ● | | | | ▲ | ▲ | ● | ● | | | | | | | | | | | |
| | | **DNMG 110408 NSU** | 0,8 | | ● | ● | | ▲ | | ● | ● | | | | ▲ | ▲ | ● | ● | | | | | | | | | | | |
| | | DNMG 150402 NSU | 0,2 | | | | | | | | ❍ | | | | | | | | ❍ | ❍ | | | | | | | | | |
| | | DNMG 150404 NSU | 0,4 | | ❍ | ❍ | ❍ | | | | ❍ | | | | | | | ❍ | ❍ | ❍ | | | | | | | | | |
| | | DNMG 150408 NSU | 0,8 | | ❍ | ❍ | ❍ | | | | ❍ | | | | | | | ❍ | ❍ | ❍ | | | | | | | | | |
| | | DNMG 150412 NSU | 1,2 | | ❍ | ❍ | | | | | ❍ | | | | | | | | | | | | | | | | | | |
| | | **DNMG 150604 NSU** | 0,4 | | ● | ● | ❍ | ▲ | ▲ | ● | ● | | | | ▲ | ▲ | ● | ● | | | ● | | | ▲ | ● | | | | |
| | | **DNMG 150608 NSU** | 0,8 | | ● | ● | ❍ | ▲ | ▲ | ● | ● | | | | ▲ | ▲ | ● | ● | | | ● | | | ▲ | ● | | | | |
| | | **DNMG 150612 NSU** | 1,2 | | ● | ● | ❍ | ▲ | ▲ | | | | | | ▲ | ▲ | | ● | | | ● | | | ▲ | ● | | | | |
| Finishing | NSE | **DNMG 110408 NSE** | 0,8 | ● | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | DNMG 150404 NSE | 0,4 | | ❍ | ❍ | ❍ | | | | | | | | | | | | | | | | | | | | | | |
| | | DNMG 150408 NSE | 0,8 | | ❍ | ❍ | ❍ | | | | | | | | | | | | | | | | | | | | | | |
| | | DNMG 150412 NSE | 1,2 | | ❍ | ❍ | ❍ | | | | | | | | | | | | | | | | | | | | | | |
| | | **DNMG 150604 NSE** | 0,4 | ● | ● | ● | | | | | | | | | | | | | | | | | | | | | | | |
| | | **DNMG 150608 NSE** | 0,8 | ● | ● | ● | | | | | | | | | | | | | | | | | | | | | | | |
| | | **DNMG 150612 NSE** | 1,2 | ● | ● | ● | | | | | | | | | | | | | | | | | | | | | | | |

● = Euro stock ● = 1-st recommended item
❍ = Stock item in Japan
▲ = To be replaced by new item

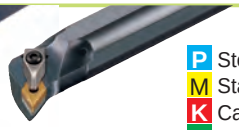
Packing unit and ordering example; 10 pcs. DNMG 150604 NFA, T2000Z

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




| Dimensions (mm) | | | | |
|---|---|---|---|---|
| DNMG | 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 |
| | | | | |


⇨ D11, D17


⇨ E9

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

## DNMG ●●●●●● ■-■■

● M-Class Double Sided Bumpy Chipbreaker

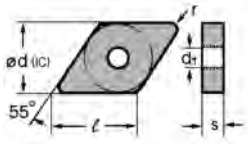
| Application | Shape | ISO Cat. No. | r | Carbide Coated P AC805P | AC810P | AC820P | AC830P | AC2000 | AC3000 | Carbide Coated M/PM AC610M | AC630M | Carbide Coated K AC405K | AC410K | AC415K | AC420K | AC700G | AC900G | Carbide ZX-Coated KS AC510U | MS AC520U | PM AC530U | Cermet T2000Z | T3000Z | Carbide Uncoated P T110A | T1200A | T1500A | K G10E | S EH510 | EH520 | H H1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Medium Cut | NGU | **DNMG 110404 NGU** | 0,4 | ● | ● | ○ | ▲ | | ● | ● | | | | | | ▲ | ▲ | | | | | | | | | | | | |
| | | **DNMG 110408 NGU** | 0,8 | ● | ● | ○ | ▲ | | ● | ● | | | | | | ▲ | ▲ | | | | | | | | | | | | |
| | | **DNMG 110412 NGU** | 1,2 | | ● | ● | ▲ | | ● | ● | | | | | | ▲ | ▲ | | | | | | | | | | | | |
| | | DNMG 150404 NGU | 0,4 | | ○ | ○ | ○ | | | ○ | ○ | | | | | | | | ○ | ○ | | | | | | | | | |
| | | DNMG 150408 NGU | 0,8 | | ○ | ○ | ○ | | | ○ | ○ | | | | | | | | ○ | ○ | | | | | | | | | |
| | | DNMG 150412 NGU | 1,2 | | ○ | ○ | ○ | | | ○ | ○ | | | | | | | | ○ | ○ | | | | | | | | | |
| | | **DNMG 150604 NGU** | 0,4 | | ● | ● | ● | ▲ | | ● | ● | | | | | ▲ | ▲ | | | | | | | | | | | | |
| | | **DNMG 150608 NGU** | 0,8 | ● | ● | ● | ● | ▲ | | ● | ● | | | | | ▲ | ▲ | | | | | | | | | | | | |
| | | **DNMG 150612 NGU** | 1,2 | ● | ● | ● | ● | ▲ | | ● | ● | | | | | ▲ | ▲ | | | | | | | | | | | | |
| Medium Cut | NGE | DNMG 150404 NGE | 0,4 | | ○ | ○ | ○ | | | | | | | | | | | | | | | | | | | | | | |
| | | DNMG 150408 NGE | 0,8 | | ○ | ○ | ○ | | | | | | | | | | | | | | | | | | | | | | |
| | | DNMG 150412 NGE | 1,2 | | ○ | ○ | ○ | | | | | | | | | | | | | | | | | | | | | | |
| | | **DNMG 150604 NGE** | 0,4 | | ● | ● | ● | | | | | | | | | | | | | | | | | | | | | | |
| | | **DNMG 150608 NGE** | 0,8 | ● | ● | ● | ● | | | | | | | | | | | | | | | | | | | | | | |
| | | **DNMG 150612 NGE** | 1,2 | ● | ● | ● | ● | | | | | | | | | | | | | | | | | | | | | | |
| | | **DNMG 150616 NGE** | 1,6 | ● | ● | ● | ○ | | | | | | | | | | | | | | | | | | | | | | |
| Medium Cut | NUG | **DNMG 110404 NUG** | 0,4 | | | | | ▲ | | | | | | | | | | | | | | | | | | | | | |
| | | **DNMG 110408 NUG** | 0,8 | | | | | ▲ | | | | | | | | | | | | | | | | | | | | | |
| | | **DNMG 150604 NUG** | 0,4 | | | | | ▲ | | | | | | | | | | | | | | | | | | | | | |
| | | **DNMG 150608 NUG** | 0,8 | | | | | ▲ | | | | | | | | | | | | | | | | | | | | | |
| | | **DNMG 150612 NUG** | 1,2 | | | | | ▲ | | | | | | | | | | | | | | | | | | | | | |
| | | **DNMG 150616 NUG** | 1,6 | | | | | ▲ | | | | | | | | | | | | | | | | | | | | | |
| Medium Cut | NEG | DNMG 150408 NEG | 0,8 | | | | | | | | ○ | | | | | | | | ○ | ○ | | | | | | | ○ | ○ | |
| | | DNMG 150412 NEG | 1,2 | | | | | | | | ○ | | | | | | | | ○ | ○ | | | | | | | ○ | ○ | |
| | | **DNMG 150608 NEG** | 0,8 | | | | | | | | ● | | | | | | | | ● | ● | | | | | | | ● | ● | |
| | | **DNMG 150612 NEG** | 1,2 | | | | | | | | ● | | | | | | | | ● | ● | | | | | | | ● | ● | |
| Medium Cut | NEX | **DNMG 110404 NEX** | 0,4 | | | | | | | ● | ● | | | | | | | | ● | ● | | | | | | | | | |
| | | **DNMG 110408 NEX** | 0,8 | | | | | | | ● | ● | | | | | | | | ● | ● | | | | | | | | | |
| | | **DNMG 150604 NEX** | 0,4 | | | | | | | ● | ● | | | | | | | | ● | ● | | | | | | | | | |
| | | **DNMG 150608 NEX** | 0,8 | | | | | | | ● | ● | | | | | | | | ● | ● | | | | | | | | | |
| | | **DNMG 150612 NEX** | 1,2 | | | | | | | ● | ● | | | | | | | | ● | ● | | | | | | | | | |
| Medium Cut | NUP | DNMG 150404 NUP | 0,4 | | | ○ | ○ | | | ○ | ○ | | | | | | | | ○ | ○ | | | | | | | | | |
| | | DNMG 150408 NUP | 0,8 | | | ○ | ○ | | | ○ | ○ | | | | | | | | ○ | ○ | | | | | | | | | |
| | | DNMG 150412 NUP | 1,2 | | | ○ | ○ | | | ○ | ○ | | | | | | | | ○ | ○ | | | | | | | | | |
| | | **DNMG 150604 NUP** | 0,4 | | | ● | ● | ▲ | ▲ | ● | ● | | | | | | | | ● | ● | | | | | | | | | |
| | | **DNMG 150608 NUP** | 0,8 | | | ● | ● | ▲ | ▲ | ● | ● | | | | | | | | ● | ● | | | | | | | | | |
| | | **DNMG 150612 NUP** | 1,2 | | | | ● | | | ● | | | | | | | | | ● | ● | | | | | | | | | |

● = Euro stock ● = 1-st recommended item
○ = Stock item in Japan
▲ = To be replaced by new item

Packing unit and ordering example; 10 pcs. DNMG 110404 NGU, AC810P

# D DIAMOND TYPE
INSERTS FOR TURNING

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




| Dimensions (mm) | | | | |
|---|---|---|---|---|
| DNMG | 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 |

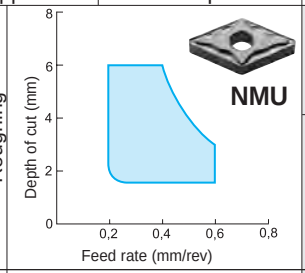
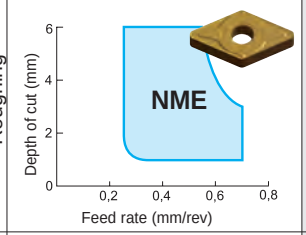
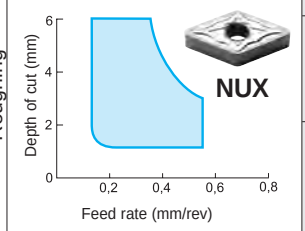
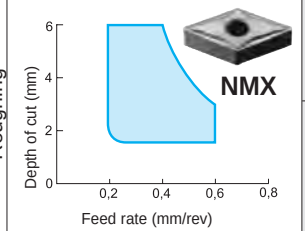
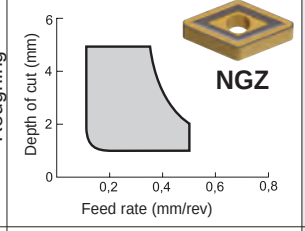
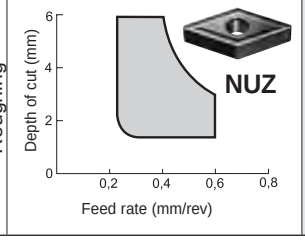


⇨ D11, D17 ⇨ E9

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

## DNMG ●●●●●● ■-■■

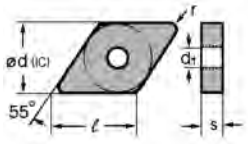
● M-Class Double Sided Bumpy Chipbreaker

| | | | | Carbide | | | | | | | | | | | | | | Cermet | | Carbide | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Coated | | | | | | | | | | | ZX-Coated | | | Uncoated | | | | |
| | | | | P | | | | M | P/M | K | | | | | K/S | M/S | P/M | P | | K | S | H |
| Application | Shape | ISO Cat. No. | r | AC805P | AC810P | **AC820P** | AC830P | AC2000 | AC3000 | AC610M | AC630M | **AC405K** | AC410K | **AC415K** | AC420K | AC700G | AC900G | AC510U | AC520U | AC530U | **T2000Z** | T3000Z | T110A | T1200A | T1500A | G10E | EH510 | EH520 | H1 |
| Roughing |  NMU | DNMG 150408 NMU | 0,8 | | ○ | ○ | ○ | | | ○ | ○ | | | | | | | ○ | ○ | | | | | | | | | | |
| | | DNMG 150412 NMU | 1,2 | | ○ | ○ | ○ | | | | ○ | | | | | | | ○ | ○ | | | | | | | | | | |
| | | DNMG 150416 NMU | 1,6 | | ○ | ○ | ○ | | | | | | | | | | | | ○ | | | | | | | | | | |
| | | **DNMG 150608 NMU** | 0,8 | | ● | ● | ● | ▲ | ▲ | ● | ● | | | | | ▲ | ▲ | | | | | | | | | | | | |
| | | **DNMG 150612 NMU** | 1,2 | | ● | ● | ● | ▲ | ▲ | ● | ● | | | | | ▲ | ▲ | | | | | | | | | | | | |
| | | **DNMG 150616 NMU** | 1,6 | | ● | ● | | ▲ | | ● | ● | | | | | ▲ | ▲ | | | | | | | | | | | | |
| Roughing |  NME | **DNMG 150608 NME** | 0,8 | ● | ● | ● | ● | | | | | | | | | | | | | | | | | | | | | | |
| | | **DNMG 150612 NME** | 1,2 | ● | ● | ● | ● | | | | | | | | | | | | | | | | | | | | | | |
| | | **DNMG 150616 NME** | 1,6 | ● | ● | ● | ● | | | | | | | | | | | | | | | | | | | | | | |
| Roughing |  NUX | **DNMG 110408 NUX** | 0,8 | | | | ○ | ▲ | ▲ | | | | | | | | | | | | | | | | | | | | |
| | | DNMG 150404 NUX | 0,4 | | ○ | ○ | ○ | | | | | | | | | | | | | | | | | | | | | | |
| | | DNMG 150408 NUX | 0,8 | | ○ | ○ | ○ | | | | | | | | | | | | | | | | | | | | | | |
| | | DNMG 150412 NUX | 1,2 | | ○ | ○ | ○ | | | | | | | | | | | | | | | | | | | | | | |
| | | **DNMG 150604 NUX** | 0,4 | | | ● | ● | ▲ | | | | | ▲ | | | | | | | | | | | | | | | | |
| | | **DNMG 150608 NUX** | 0,8 | | ○ | ● | ● | ▲ | | | | | ▲ | | | | | | | | | | | | | | | | |
| | | **DNMG 150612 NUX** | 1,2 | | ○ | ● | ● | ▲ | | | | | ▲ | | | | | | | | | | | | | | | | |
| | | **DNMG 150616 NUX** | 1,6 | | | ● | | ▲ | | | | | ▲ | | | | | | | | | | | | | | | | |
| Roughing |  NMX | DNMG 150408 NMX | 0,8 | | | ○ | ○ | | | | | | | | | | | | | | | | | | | | | | |
| | | DNMG 150412 NMX | 1,2 | | | ○ | ○ | | | | | | | | | | | | | | | | | | | | | | |
| | | **DNMG 150608 NMX** | 0,8 | | | ● | | | | | | | | | | | | | | | | | | | | | | | |
| | | **DNMG 150612 NMX** | 1,2 | | | ● | | | | | | | | | | | | | | | | | | | | | | | |
| Roughing |  NGZ | **DNMG 150604 NGZ** | 0,4 | | | | | | | | | | | ● | | | | | | | | | | | | | | | |
| | | **DNMG 150608 NGZ** | 0,8 | | | | | | | | | ● | | ● | ● | | | | | | | | | | | | | | |
| | | **DNMG 150612 NGZ** | 1,2 | | | | | | | | | ● | | ● | ● | | | | | | | | | | | | | | |
| Roughing |  NUZ | **DNMG 150608 NUZ** | 0,8 | | | | | | | | | ● | ▲ | ● | ● | ▲ | | | | | | | | | | | | | |
| | | **DNMG 150612 NUZ** | 1,2 | | | | | | | | | ● | ▲ | ● | ● | ▲ | | | | | | | | | | | | | |

● = Euro stock ● = 1-st recommended item
○ = Stock item in Japan
▲ = To be replaced by new item

Packing unit and ordering example; 10 pcs. DNMG 150608 NMU, AC810P

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




| Dimensions (mm) | | | | |
|---|---|---|---|---|
| DN__ | ℓ | ød (IC) | s | $d_1$ |
| | | | | |
| 1504-- | 15,5 | 12,7 | 4,76 | 5,16 |
| 1506-- | 15,5 | 12,7 | 6,35 | 5,16 |
| | | | | |

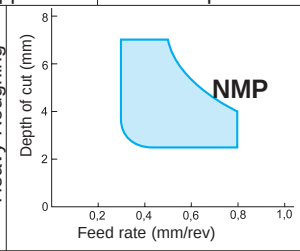
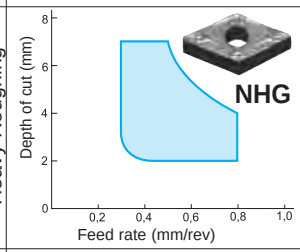
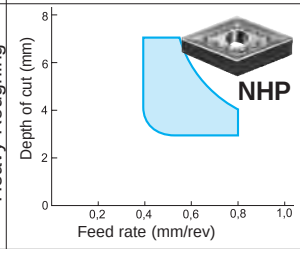


⇨ D11, D17 ⇨ E9

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

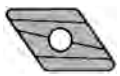
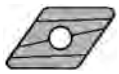
## DNMM ●●●●●● ■-■■

● M-Class One Sided Bumpy Chipbreaker

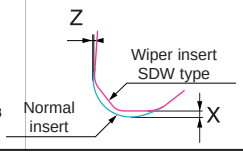
| Application | Shape | ISO Cat. No. | r | AC805P | AC810P | AC820P | AC830P | AC2000 | AC3000 | AC610M | AC630M | AC405K | AC410K | AC415K | AC420K | AC700G | AC900G | AC510U | AC520U | AC530U | T2000Z | T3000Z | T110A | T1200A | T1500A | G10E | EH510 | EH520 | H1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carbide Coated P | | | | | | M | P/M | | | K | | | | Carbide ZX-Coated K/S | M/S | P/M | Cermet Uncoated P | | | | | Carbide K | S | H |
| Heavy Roughing |  NMP | DNMM 150404 NMP | 0,4 | | | ○ | ○ | | | | | | | | | | | | | | | | | | | | | | |
| | | DNMM 150408 NMP | 0,8 | | ○ | ○ | ○ | | | | | | | | | | | | | | | | | | | | | | |
| | | DNMM 150412 NMP | 1,2 | | ○ | ○ | ○ | | | | | | | | | | | | | | | | | | | | | | |
| | | **DNMM 150604 NMP** | 0,4 | | | ● | ● | ▲ | ▲ | | | | | | | | | | | | | | | | | | | | |
| | | **DNMM 150608 NMP** | 0,8 | | ● | ● | ● | ▲ | ▲ | | ● | | | | | | | | | | | | | | | | | | |
| | | **DNMM 150612 NMP** | 1,2 | | ● | ● | ● | ▲ | ▲ | | ● | | | | | | | | | | | | | | | | | | |
| | | **DNMM 150616 NMP** | 1,6 | | ○ | ● | ● | ▲ | ▲ | | ● | | | | | | | | | | | | | | | | | | |
| Heavy Roughing |  NHG | **DNMM 150604 NHG** | 0,4 | | ● | ● | | ▲ | | | | | | | | ▲ | ▲ | | | | | | | | | | | | |
| | | **DNMM 150608 NHG** | 0,8 | | ● | ● | ● | ▲ | ▲ | ○ | ● | | | | | ▲ | ▲ | | | | | | | | | | | | |
| | | **DNMM 150612 NHG** | 1,2 | | ● | ● | ● | ▲ | ▲ | ○ | ● | | | | | ▲ | ▲ | | | | | | | | | | | | |
| | | **DNMM 150616 NHG** | 1,6 | | ● | ● | ● | ▲ | ▲ | ○ | ● | | | | | ▲ | ▲ | | | | | | | | | | | | |
| Heavy Roughing |  NHP | DNMM 150404 NHP | 0,4 | | | | ○ | | | | | | | | | | | | | | | | | | | | | | |
| | | DNMM 150408 NHP | 0,8 | | | | ○ | | | | | | | | | | | | | | | | | | | | | | |
| | | DNMM 150412 NHP | 1,2 | | | | ○ | | | | | | | | | | | | | | | | | | | | | | |
| | | **DNMM 150608 NHP** | 0,8 | | | ● | ● | | | | | | | | | | | | | | | | | | | | | | |
| | | **DNMM 150612 NHP** | 1,2 | | | ● | ● | | | | | | | | | | | | | | | | | | | | | | |

## DNMA / DNMX ●●●●●●

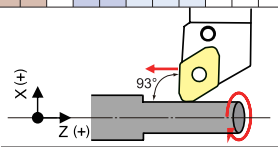
● Flat Inserts and One Side Handed Inserts
& M-Class Double Sided Bumpy Chipbreaker

| Application | Shape | ISO Cat. No. | r | AC805P | AC810P | AC820P | AC830P | AC2000 | AC3000 | AC610M | AC630M | AC405K | AC410K | AC415K | AC420K | AC700G | AC900G | AC510U | AC520U | AC530U | T2000Z | T3000Z | T110A | T1200A | T1500A | G10E | EH510 | EH520 | H1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carbide Coated P | | | | | | M | P/M | | | K | | | | Carbide ZX-Coated K/S | M/S | P/M | Cermet Uncoated P | | | | | Carbide K | S | H |
| Roughing |  | **DNMA 150608** | 0,8 | | | | | | | | | ● | ▲ | ● | ● | | | | | | | | | | | | | | |
| | | **DNMA 150612** | 1,2 | | | | | | | | | ● | ▲ | ● | ● | | | | | | | | | | | | | | |
| |  | **DNMX 150608 L** | 0,8 | | | ● | | ▲ | | | | | | | | | | | | | | | | | | | | | |
| |  | **DNMX 150608 R** | 0,8 | | | ● | | | | | | | | | | | | | | | | | | | | | | | |
| Finishing |  NSE-W | **DNMX 150604 NSE-W** | 0,4 | | ● | ● | | | | | | | | | | | | | | | | | | | | | | | |
| | | **DNMX 150608 NSE-W** | 0,8 | | ● | ● | | | | | | | | | | | | | | | | | | | | | | | |
| | | **DNMX 150612 NSE-W** | 1,2 | | ● | ● | | | | | | | | | | | | | | | | | | | | | | | |




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



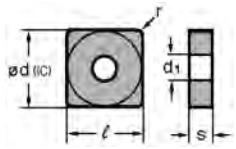

| r | Compensation (mm) X (Diam. change) | | Z |
|---|---|---|---|
| 0,4 | -0,14 | (Ø: -0,28) | -0,02 |
| 0,8 | -0,14 | (Ø: -0,28) | -0,02 |
| 1,2 | -0,1 | (Ø: -0,2) | -0,03 |

● = Euro stock ● = 1-st recommended item
○ = Stock item in Japan
▲ = To be replaced by new item

Packing unit and ordering example; 10 pcs. DNMM 160404 NMP, AC820P

# S SQUARE TYPE
INSERTS FOR TURNING

## 90° Square Type
0° Relief
With Insert Hole




| Dimensions (mm) | | | | |
|---|---|---|---|---|
| SNMG | 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 |
| | | | | |

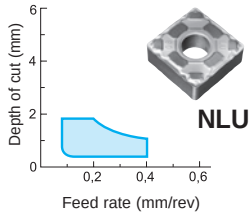
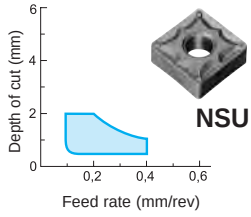
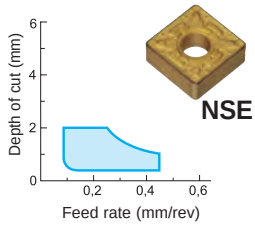

⇨ D12, D18~19


⇨ E10

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

## SNMG ●●●●●● ■-■■

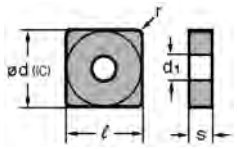
● M-Class Double Sided Bumpy Chipbreaker

| Application | Shape | ISO Cat. No. | r | Carbide Coated P AC805P | Carbide Coated P AC810P | Carbide Coated P **AC820P** | Carbide Coated P AC830P | Carbide Coated P AC2000 | Carbide Coated P AC3000 | Carbide Coated M AC610M | Carbide Coated P/M AC630M | Carbide Coated K **AC405K** | Carbide Coated K AC410K | Carbide Coated K **AC415K** | Carbide Coated K AC420K | Carbide Coated K AC700G | Carbide Coated K AC900G | ZX-Coated K/S AC510U | ZX-Coated M/S AC520U | ZX-Coated P/M AC530U | Cermet P **T2000Z** | Cermet P T3000Z | Uncoated P T110A | Uncoated P T1200A | Uncoated P T1500A | Carbide K G10E | Carbide S EH510 | Carbide S EH520 | Carbide H H1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Finishing |  NLU | **SNMG 120408 NLU** | 0,8 | | ❍ | ● | | | | | ❍ | | | | | | | | | | | | | | | | | | |
| | | **SNMG 120412 NLU** | 1,2 | | ❍ | ● | | | | | ❍ | | | | | | | | | | | | | | | | | | |
| Finishing |  NSU | **SNMG 120408 NSU** | 0,8 | | ● | ● | ❍ | | | | ❍ | | | | | ▲ | | ● | ● | | | | | | | | | | |
| | | **SNMG 120412 NSU** | 1,2 | | | | | | | | | | | | | | | ● | ● | | | | | | | | | | |
| Finishing |  NSE | **SNMG 120408 NSE** | 0,8 | | ● | ● | ❍ | | | | | | | | | | | | | | | | | | | | | | |
| | | **SNMG 120412 NSE** | 1,2 | | ● | ● | ❍ | | | | | | | | | | | | | | | | | | | | | | |

● = Euro stock ● = 1-st recommended item
❍ = Stock item in Japan
▲ = To be replaced by new item

Packing unit and ordering example; 10 pcs. SNMG 120408 NLU, AC810P

90° Square Type | 0° Relief | With Insert Hole




| Dimensions (mm) | | | | |
|---|---|---|---|---|
| SNMG | ℓ | ød (IC) | s | $d_1$ |
| | | | | |
| 09 | 9,525 | 9,525 | 3,18 | 3,81 |
| 12 | 12,7 | 12,7 | 4,76 | 5,16 |
| | | | | |


⇨ D12, D18~19


⇨ E10

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

## SNMG ●●●●●● ■-■■

● M-Class Double Sided Bumpy Chipbreaker

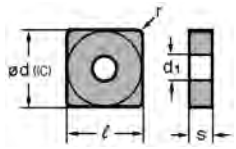
| Application | Shape | ISO Cat. No. | r | Carbide: Coated P: AC805P | AC810P | AC820P | AC830P | Coated M/PM: AC2000 | AC3000 | AC610M | AC630M | Coated K: AC405K | AC410K | AC415K | AC420K | AC700G | AC900G | ZX-Coated KS/MS/PM: AC510U | AC520U | AC530U | Cermet P: T2000Z | T3000Z | Uncoated P: T110A | T1200A | T1500A | Carbide K: G10E | Carbide S: EH510 | EH520 | Carbide H: H1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Medium Cut | NGU | SNMG 090304 NGU | 0,4 | | | ○ | | | | | | | | | | | | | | | | | | | | | | | |
| | | SNMG 090308 NGU | 0,8 | | | ○ | ○ | | | | | | | | | | | | | | | | | | | | | | |
| | | SNMG 120404 NGU | 0,4 | | ● | ● | ● | ▲ | | ○ | ○ | | | | | ▲ | ▲ | | ○ | | | | | | | | | | |
| | | SNMG 120408 NGU | 0,8 | | ● | ● | ● | ▲ | | ● | ● | | | | | ▲ | ▲ | | ○ | | | | | | | | | | |
| | | SNMG 120412 NGU | 1,2 | | ● | ● | ● | ▲ | | ● | ● | | | | | ▲ | ▲ | | ○ | | | | | | | | | | |
| | | SNMG 120416 NGU | 1,6 | | | ● | ● | | | ● | ● | | | | | | ▲ | | | | | | | | | | | | |
| | | SNMG 150612 NGU | 1,2 | | | ○ | ○ | | | | | | | | | | | | | | | | | | | | | | |
| Medium Cut | NGE | SNMG 120408 NGE | 0,8 | | ● | ● | ● | | | | | | | | | | | | | | | | | | | | | | |
| | | SNMG 120412 NGE | 1,2 | | ● | ● | ● | | | | | | | | | | | | | | | | | | | | | | |
| | | SNMG 120416 NGE | 1,6 | | ● | ● | ● | | | | | | | | | | | | | | | | | | | | | | |
| Medium Cut | NUG | SNMG 120408 NUG | 0,8 | | | | | ▲ | ▲ | | | | | | | | | | | | | | | | | | | | |
| | | SNMG 120412 NUG | 1,2 | | | | | ▲ | ▲ | | | | | | | | | | | | | | | | | | | | |
| | | SNMG 120416 NUG | 1,6 | | | | | ▲ | ▲ | | | | | | | | | | | | | | | | | | | | |
| Medium Cut | NEG | SNMG 120408 NEG | 0,8 | | | | | | | | ● | | | | | | | | ● | ● | | | | | | | ● | ● | |
| | | SNMG 120412 NEG | 1,2 | | | | | | | | ● | | | | | | | | ● | ● | | | | | | | ● | ● | |
| Medium Cut | NEX | SNMG 120404 NEX | 0,4 | | | | | | | | | | | | | | | | ● | | | | | | | | | | |
| | | SNMG 120408 NEX | 0,8 | | | | | | | ● | ● | | | | | | | | ● | ● | | | | | | | | | |
| | | SNMG 120412 NEX | 1,2 | | | | | | | ● | ● | | | | | | | | ● | ● | | | | | | | | | |
| | | SNMG 150608 NEX | 0,8 | | | | | | | | | | | | | | | | ○ | ○ | | | | | | | | | |
| | | SNMG 150612 NEX | 1,2 | | | | | | | | | | | | | | | | ● | ● | | | | | | | | | |
| | | SNMG 190612 NEX | 1,2 | | | | | | | | | | | | | | | | ● | ● | | | | | | | | | |
| | | SNMG 190616 NEX | 1,6 | | | | | | | | | | | | | | | | ● | ● | | | | | | | | | |
| Medium Cut | NUP | SNMG 120404 NUP | 0,4 | | | ● | ● | | ▲ | | ● | | | | | | | | ● | ● | | | | | | | | | |
| | | SNMG 120408 NUP | 0,8 | | | ● | ● | | ▲ | | ● | | | | | | | | ● | ● | | | | | | | | | |
| | | SNMG 120412 NUP | 1,2 | | | ● | ● | | ▲ | | ● | | | | | | | | ● | ● | | | | | | | | | |
| Roughing | NUX | SNMG 120408 NUX | 0,8 | | ● | ● | ● | ▲ | | | | | ▲ | | | | ▲ | | | | | | | | | | | | |
| | | SNMG 120412 NUX | 1,2 | | ● | ● | ● | ▲ | | | | | ▲ | | | | ▲ | | | | | | | | | | | | |
| | | SNMG 120416 NUX | 1,6 | | ● | ● | ● | ▲ | | | | | ▲ | | | | ▲ | | | | | | | | | | | | |
| | | SNMG 150612 NUX | 1,2 | | | | | | | | | | ▲ | | | | | | | | | | | | | | | | |
| | | SNMG 190612 NUX | 1,2 | | ○ | ● | ● | | | | | | ▲ | | | | | | | | | | | | | | | | |
| | | SNMG 190616 NUX | 1,6 | | ○ | ● | ● | | | | | | ▲ | | | | | | | | | | | | | | | | |

● = Euro stock ● = 1-st recommended item
○ = Stock item in Japan
▲ = To be replaced by new item

Packing unit and ordering example; 10 pcs. SNMG 120408 NSU, AC810P

# S SQUARE TYPE
INSERTS FOR TURNING

## 90° Square Type
0° Relief
With Insert Hole




| Dimensions (mm) | | | | |
|---|---|---|---|---|
| SNMG | 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 |
| | | | | |

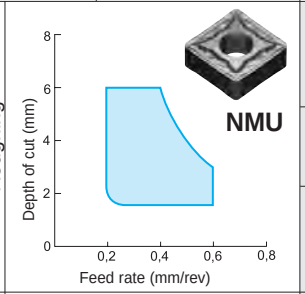
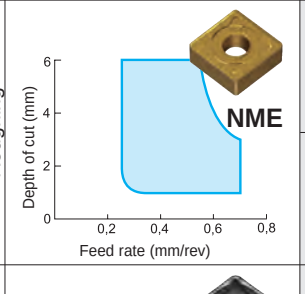
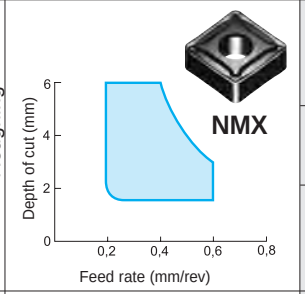
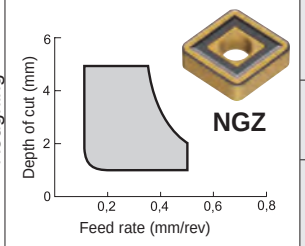
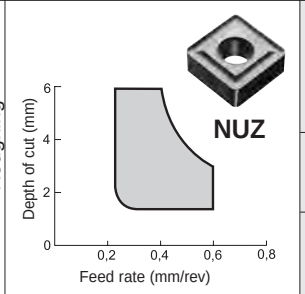

⇨ D12, D18~19


⇨ E10

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

## SNMG ●●●●●● ■-■■

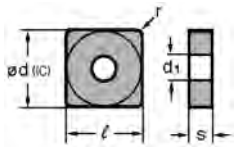
● M-Class Double Sided Bumpy Chipbreaker

| Application | Shape | ISO Cat. No. | r | Carbide Coated P | Carbide Coated P | Carbide Coated P/M | Carbide Coated M | Carbide Coated P/M | Carbide Coated K | Carbide Coated K | Carbide Coated K | Carbide Coated K | Carbide Coated K | Carbide Coated K | Carbide ZX-Coated K/S | Carbide ZX-Coated M/S | Carbide ZX-Coated P/M | Cermet Uncoated P | Cermet Uncoated P | Cermet Uncoated P | Cermet Uncoated P | Cermet Uncoated P | Carbide Uncoated K | Carbide Uncoated S | Carbide Uncoated S | Carbide Uncoated H |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | AC805P | AC810P | AC820P | AC830P | AC2000 | AC3000 | AC610M | AC630M | AC405K | AC410K | AC415K | AC420K | AC700G | AC900G | AC510U | AC520U | AC530U | T2000Z | T3000Z | T110A | T1200A | T1500A | G10E | EH510 | EH520 | H1 |
| Roughing |  NMU | SNMG 120408 NMU | 0,8 | | ● | ● | ● | ▲ | ▲ | ● | ● | | | | | ▲ | ▲ | ● | ● | | | | | | | | | | |
| | | SNMG 120412 NMU | 1,2 | | ● | ● | ● | ▲ | ▲ | ● | ● | | | | | ▲ | ▲ | ● | ● | | | | | | | | | | |
| | | SNMG 120416 NMU | 1,6 | | ● | ● | ● | ▲ | ▲ | ● | ● | | | | | ▲ | ▲ | ● | ● | | | | | | | | | | |
| | | SNMG 150612 NMU | 1,2 | | ○ | ● | ● | ▲ | ▲ | ● | ● | | | | | | | ● | ● | | | | | | | | | | |
| | | SNMG 150616 NMU | 1,6 | | ○ | ● | ● | ▲ | ▲ | ● | ● | | | | | | | ● | ● | | | | | | | | | | |
| | | SNMG 190612 NMU | 1,2 | | ● | ● | ● | ▲ | ▲ | ● | ● | | | | | ▲ | | ● | ● | | | | | | | | | | |
| | | SNMG 190616 NMU | 1,6 | | ● | ● | ● | ▲ | ▲ | ● | ● | | | | | ▲ | | ● | ● | | | | | | | | | | |
| Roughing |  NME | SNMG 120408 NME | 0,8 | | ● | ● | ● | | | | | | | | | | | | | | | | | | | | | |
| | | SNMG 120412 NME | 1,2 | | ● | ● | ● | | | | | | | | | | | | | | | | | | | | | |
| | | SNMG 190612 NME | 1,2 | | ● | ● | ● | | | | | | | | | | | | | | | | | | | | | |
| Roughing |  NMX | SNMG 120408 NMX | 0,8 | | | ● | ● | | ▲ | | | | | | | | | | | | | | | | | | | |
| | | SNMG 120412 NMX | 1,2 | | | ● | ● | | ▲ | | | | | | | | | | | | | | | | | | | |
| | | SNMG 120416 NMX | 1,6 | | | ● | ● | | ▲ | | | | | | | | | | | | | | | | | | | |
| | | SNMG 150612 NMX | 1,2 | | | ● | ● | | | | | | | | | | | | | | | | | | | | | |
| | | SNMG 150616 NMX | 1,6 | | | ● | ● | | | | | | | | | | | | | | | | | | | | | |
| | | SNMG 190612 NMX | 1,2 | | | ● | ● | | | | | | | | | | | | | | | | | | | | | |
| | | SNMG 190616 NMX | 1,6 | | | ● | ● | | | | | | | | | | | | | | | | | | | | | |
| Roughing |  NGZ | SNMG 120408 NGZ | 0,8 | | | | | | | | | ● | | ● | ● | | | | | | | | | | | | | |
| | | SNMG 120412 NGZ | 1,2 | | | | | | | | | ● | | ● | ● | | | | | | | | | | | | | |
| | | SNMG 120416 NGZ | 1,6 | | | | | | | | | ● | | ● | ● | | | | | | | | | | | | | |
| | | SNMG 150612 NGZ | 1,2 | | | | | | | | | ● | | ● | | | | | | | | | | | | | | |
| | | SNMG 150616 NGZ | 1,6 | | | | | | | | | ● | | ● | | | | | | | | | | | | | | |
| | | SNMG 190612 NGZ | 1,2 | | | | | | | | | | | ● | | | | | | | | | | | | | | |
| | | SNMG 190616 NGZ | 1,6 | | | | | | | | | | | ● | | | | | | | | | | | | | | |
| Roughing |  NUZ | SNMG 120408 NUZ | 0,8 | | | | | | | | | ● | ▲ | ● | ● | ▲ | ▲ | | | | | | | | | | | |
| | | SNMG 120412 NUZ | 1,2 | | | | | | | | | ● | ▲ | ● | ● | ▲ | ▲ | | | | | | | | | | | |
| | | SNMG 120416 NUZ | 1,6 | | | | | | | | | ● | ▲ | ● | ● | ▲ | ▲ | | | | | | | | | | | |
| | | SNMG 150612 NUZ | 1,2 | | | | | | | | | | ▲ | | ● | ▲ | ▲ | | | | | | | | | | | |
| | | SNMG 150616 NUZ | 1,6 | | | | | | | | | | ▲ | | ● | ▲ | ▲ | | | | | | | | | | | |
| | | SNMG 190612 NUZ | 1,2 | | | | | | | | | | ▲ | | ● | ▲ | ▲ | | | | | | | | | | | |
| | | SNMG 190616 NUZ | 1,6 | | | | | | | | | | ▲ | | ● | ▲ | ▲ | | | | | | | | | | | |

● = Euro stock ● = 1-st recommended item
○ = Stock item in Japan
▲ = To be replaced by new item

Packing unit and ordering example; 10 pcs. SNMG 120408 NMU, AC810P

90° Square Type | 0° Relief | With Insert Hole




| 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 |
| 2507.. | 25,4 | 25,4 | 7,94 | 9,2 |
| 2509.. | 25,4 | 25,4 | 9,52 | 9,2 |
| 3109.. | 31,75 | 31,75 | 9,52 | 8,8 |

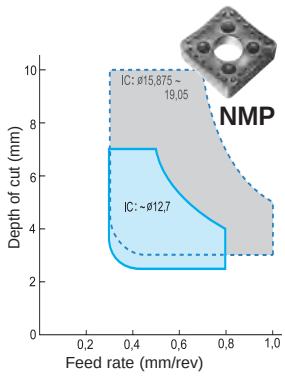
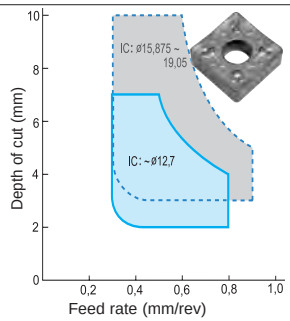
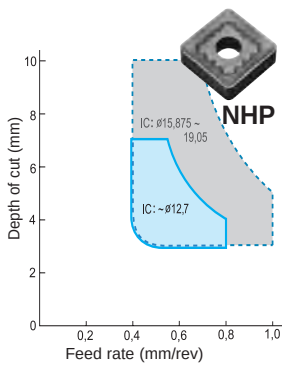
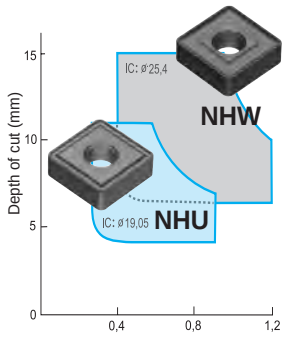

⇨ D12, D18~19


⇨ E10

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

# SNMM ●●●●●● ■-■■

● M-Class One Sided Bumpy Chipbreaker

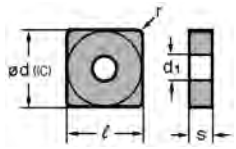
| Application | Shape | ISO Cat. No. | r | Carbide Coated P | Carbide Coated P | Carbide Coated P | Carbide Coated M | Carbide Coated P/M | Carbide Coated K | Carbide Coated K | Carbide Coated K | Carbide Coated K | Carbide Coated K | Carbide Coated K | ZX-Coated K/S | ZX-Coated M/S | ZX-Coated P/M | Cermet P | Cermet P | Cermet P | Cermet P | Carbide Uncoated K | Carbide Uncoated S | Carbide Uncoated S | Carbide Uncoated H |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | AC805P | AC810P | AC820P | AC830P | AC2000 | AC3000 | AC610M | AC630M | AC405K | AC410K | AC415K | AC420K | AC700G | AC900G | AC510U | AC520U | AC530U | T2000Z | T3000Z | T110A | T1200A | T1500A | G10E | EH510 | EH520 | H1 |
| Heavy Roughing |   | SNMM 120408 NMP | 0,8 | | ● | ● | ● | ▲ | ▲ | | ● | | | | | | | ○ | | | | | | | | | | |
| | | SNMM 120412 NMP | 1,2 | | ○ | ● | ● | ▲ | ▲ | | ● | | | | | | | ○ | | | | | | | | | | |
| | | SNMM 120416 NMP | 1,6 | | ○ | ● | ● | ▲ | ▲ | | ● | | | | | | | ○ | | | | | | | | | | |
| | | SNMM 120420 NMP | 2,0 | | | ● | ● | ▲ | ▲ | | | | | | | | | | | | | | | | | | | |
| | | SNMM 150612 NMP | 1,2 | | ● | ● | ● | ▲ | ▲ | | ● | | | | | | | | | | | | | | | | | |
| | | SNMM 150616 NMP | 1,6 | | ● | ● | ● | ▲ | ▲ | | ● | | | | | | | | | | | | | | | | | |
| | | SNMM 190612 NMP | 1,2 | | ● | ● | ● | ▲ | ▲ | | ● | | | | | | | ○ | | | | | | | | | | |
| | | SNMM 190616 NMP | 1,6 | | ● | ● | ● | ▲ | ▲ | | ● | | | | | | | ○ | | | | | | | | | | |
| | | SNMM 190624 NMP | 2,4 | | | ● | ● | ▲ | ▲ | | | | | | | | | | | | | | | | | | | |
| | | SNMM 250724 NMP | 2,4 | | ○ | ○ | ● | | | | ○ | | | | | | | | | | | | | | | | | |
| | | SNMM 250924 NMP | 2,4 | | ○ | ○ | | | | | ○ | | | | | | | | | | | | | | | | | |
| | | SNMM 310924 NMP | 2,4 | | ○ | ○ | | | | | ○ | | | | | | | | | | | | | | | | | |
| Heavy Roughing |   | SNMM 120408 NHG | 0,8 | | ● | ● | ● | ▲ | ▲ | ○ | ● | | | | | ▲ | ▲ | | | | | | | | | | |
| | | SNMM 120412 NHG | 1,2 | | ● | ● | ● | ▲ | ▲ | ○ | ● | | | | | | ▲ | | | | | | | | | | | |
| | | SNMM 120416 NHG | 1,6 | | ● | ● | ● | ▲ | ▲ | ○ | ● | | | | | ▲ | ▲ | | | | | | | | | | | |
| | | SNMM 150612 NHG | 1,2 | | ● | | | ▲ | ▲ | | ● | | | | | ▲ | ▲ | | | | | | | | | | | |
| | | SNMM 150616 NHG | 1,6 | | ● | ○ | | ▲ | ▲ | | ● | | | | | ▲ | ▲ | | | | | | | | | | | |
| | | SNMM 190612 NHG | 1,2 | | ○ | ● | ● | ▲ | ▲ | ○ | ● | | | | | | | | | | | | | | | | | |
| | | SNMM 190616 NHG | 1,6 | | ○ | ● | ● | ▲ | ▲ | ● | ● | | | | | | | | | | | | | | | | | |
| | | SNMM 190624 NHG | 2,4 | | | ● | ● | ▲ | ▲ | | ○ | | | | | | | | | | | | | | | | | |
| Heavy Roughing |   | SNMM 120408 NHP | 0,8 | | | ● | ● | | ▲ | | | | | | | | | | | | | | | | | | |
| | | SNMM 120412 NHP | 1,2 | | | ● | ● | | ▲ | | | | | | | | | | | | | | | | | | | |
| | | SNMM 120416 NHP | 1,6 | | | | ● | | | | | | | | | | | | | | | | | | | | | |
| | | SNMM 150612 NHP | 1,2 | | | | | | ▲ | | | | | | | | | | | | | | | | | | | |
| | | SNMM 190612 NHP | 1,2 | | | ● | | ▲ | ▲ | | ○ | | | | | | | | | | | | | | | | | |
| | | SNMM 190616 NHP | 1,6 | | | ● | ● | ▲ | ▲ | | ○ | | | | | | | | | | | | | | | | | |
| | | SNMM 190624 NHP | 2,4 | | | ● | ● | | ▲ | | | | | | | | | | | | | | | | | | | |
| | | SNMM 250724 NHP | 2,4 | | ○ | ○ | ● | | | | ○ | | | | | | | | | | | | | | | | | |
| | | SNMM 250924 NHP | 2,4 | | ○ | ○ | | | | | ○ | | | | | | | | | | | | | | | | | |
| | | SNMM 310924 NHP | 2,4 | | ○ | ○ | | | | | ○ | | | | | | | | | | | | | | | | | |
| Heavy Roughing |   | SNMM 190616 NHU | 1,6 | | | | | | | | ● | | | | | ▲ | ▲ | | | | | | | | | | |
| | | SNMM 250724 NHU | 2,4 | | ● | ○ | | | | | ● | | | | | ▲ | ▲ | | | | | | | | | | | |
| | | SNMM 250924 NHU | 2,4 | | ● | ○ | | | | | ● | | | | | ▲ | ▲ | | | | | | | | | | | |
| | | SNMM 310924 NHU | 2,4 | | ● | ○ | | | | | ○ | | | | | | ▲ | | | | | | | | | | | |
| | | SNMM 190616 NHW | 1,6 | | | | | | | | ● | | | | | ▲ | ▲ | | | | | | | | | | | |
| | | SNMM 250724 NHW | 2,4 | | ● | ○ | | | | | ● | | | | | ▲ | ▲ | | | | | | | | | | | |
| | | SNMM 250924 NHW | 2,4 | | ● | ○ | | | | | ● | | | | | ▲ | ▲ | | | | | | | | | | | |
| | | SNMM 310924 NHW | 2,4 | | ● | ○ | | | | | ○ | | | | | | ▲ | | | | | | | | | | | |

● = Euro stock ● = 1-st recommended item
○ = Stock item in Japan
▲ = To be replaced by new item

Packing unit and ordering example; 10 pcs. SNMM 120408 NMP, AC810P

# S SQUARE TYPE
## INSERTS FOR TURNING

**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 |
| | | | | |



⇨ D12, D18~19



⇨ E10

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

## SNMA ●●●●●●

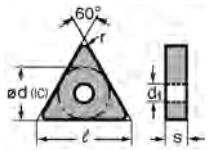
● G/M-Class No Chipbreaker

| Application | Shape | ISO Cat. No. | r | AC805P | AC810P | AC820P | AC830P | AC2000 | AC3000 | AC610M | AC630M | AC405K | AC410K | AC415K | AC420K | AC700G | AC900G | AC510U | AC520U | AC530U | T2000Z | T3000Z | T110A | T1200A | T1500A | G10E | EH510 | EH520 | H1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carbide | | | | | | | | | | | | | | | | | Cermet | | | | | Carbide | | | |
| | | | | Coated | | | | | | | | | | | | | | ZX-Coated | | | | | Uncoated | | | | | | |
| | | | | | | P | | | | M | P/M | | | K | | | | K/S | M/S | P/M | | | P | | | K | S | | H |
| Roughing |  | SNMA 120408 | 0,8 | | | | | | | | | ● | ▲ | ● | ● | | | | | | | | | | | | | | |
| | | SNMA 120412 | 1,2 | | | | | | | | | ● | ▲ | ● | ● | ▲ | | | | | | | | | | | | | |
| | | SNMA 120416 | 1,6 | | | | | | | | | ● | ▲ | ● | ● | | | | | | | | | | | | | | |
| | | SNMA 150612 | 1,2 | | | | | | | | | | ▲ | | | | | | | | | | | | | | | | |
| | | SNMA 190612 | 1,2 | | | | | | | | | ● | ▲ | ● | ● | ▲ | ▲ | | | | | | | | | | | | |
| | | SNMA 190616 | 1,6 | | | | | | | | | ● | ▲ | ● | ● | ▲ | ▲ | | | | | | | | | | | | |

● = Euro stock ● = 1-st recommended item
○ = Stock item in Japan
▲ = To be replaced by new item

Packing unit and ordering example; 10 pcs. SNGA 1204008, AC405K

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




| Dimensions (mm) | | | | |
|---|---|---|---|---|
| TNMG | ℓ | ød (IC) | s | $d_1$ |
| | | | | |
| 1604-- | 16,5 | 9,525 | 4,76 | 3,81 |
| | | | | |
| | | | | |

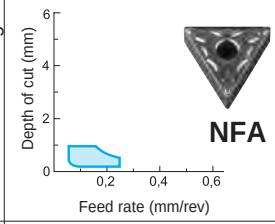
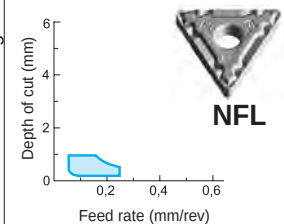
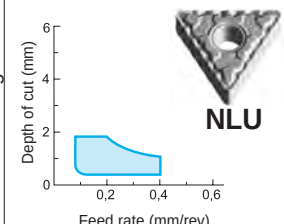
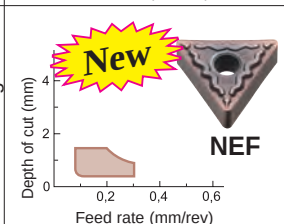
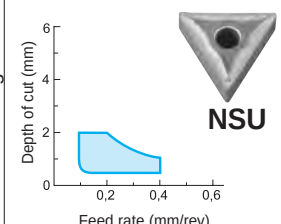
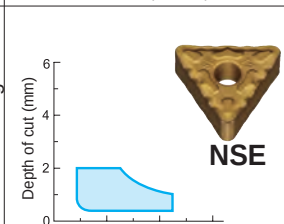


⇨ D13, D20~21 ⇨ E12

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

# TNMG ●●●●●● ■-■■

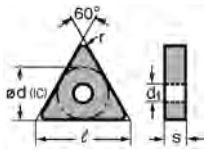
● M-Class Double Sided Bumpy Chipbreaker

| Application | Shape | ISO Cat. No. | r | Carbide: Coated: P: AC805P | AC810P | AC820P | AC830P | M: AC2000 | AC3000 | P/M: AC610M | AC630M | K: AC405K | AC410K | AC415K | AC420K | AC700G | AC900G | Carbide: ZX-Coated: K/S: AC510U | M/S: AC520U | P/M: AC530U | Cermet: Uncoated: P: T2000Z | T3000Z | T110A | T1200A | T1500A | Carbide: Uncoated: K: G10E | S: EH510 | EH520 | H: H1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Fine Finishing |  NFA | TNMG 160404 NFA | 0,4 | | | | | | | | | | | | | | | | | | ● | | | ▲ | ● | | | | |
| | | TNMG 160408 NFA | 0,8 | | | | | | | | | | | | | | | | | | ● | | | ▲ | ● | | | | |
| Fine Finishing |  NFL | TNMG 160404 NFL | 0,4 | | | ○ | | ▲ | | | ○ | | | | | | | | | | ● | ● | | | | | | | |
| | | TNMG 160408 NFL | 0,8 | | | ○ | | ▲ | | | ○ | | | | | | | | | | ● | ● | | | | | | | |
| Finishing |  NLU | TNMG 160402 NLU | 0,2 | | | | | | | | ○ | | | | | | | | | | | | | | | | | | |
| | | TNMG 160404 NLU | 0,4 | | ● | ● | | ▲ | | | ○ | | | | | ▲ | ▲ | | | | ● | | | | | | | | |
| | | TNMG 160408 NLU | 0,8 | | ● | ● | | ▲ | | | ○ | | | | | ▲ | ▲ | | | | ● | | | | | | | | |
| | | TNMG 160412 NLU | 1,2 | | ● | ● | | ▲ | | | ○ | | | | | ▲ | ▲ | | | | ● | | | | | | | | |
| Finishing |  NEF | TNMG 160404 NEF | 0,4 | | | | | | | | ● | | | | | | | ● | ● | | | | | | | | ● | ● |
| | | TNMG 160408 NEF | 0,8 | | | | | | | | ● | | | | | | | ● | ● | | | | | | | | ● | ● |
| Finishing |  NSU | TNMG 160402 NSU | 0,2 | | | | | | | | ○ | | | | | | | | | | | | | | | | | | |
| | | TNMG 160404 NSU | 0,4 | | ● | ● | ○ | ▲ | ▲ | ● | ● | | | | | ▲ | ▲ | | | | ● | | | ▲ | ● | | | | |
| | | TNMG 160408 NSU | 0,8 | | ● | ● | ○ | ▲ | ▲ | ● | ● | | | | | ▲ | ▲ | | | | ● | | | ▲ | ● | | | | |
| | | TNMG 160412 NSU | 1,2 | | ● | ● | | ▲ | | ● | ● | | | | | ▲ | ▲ | | | | ● | | | ▲ | ● | | | | |
| Finishing |  NSE | TNMG 160404 NSE | 0,4 | | ● | ● | ○ | | | | | | | | | | | | | | | | | | | | | | |
| | | TNMG 160408 NSE | 0,8 | | ● | ● | ○ | | | | | | | | | | | | | | | | | | | | | | |
| | | TNMG 160412 NSE | 1,2 | | ● | ● | ○ | | | | | | | | | | | | | | | | | | | | | | |
| | | TNMG 220404 NSE | 0,4 | | ● | ● | ○ | | | | | | | | | | | | | | | | | | | | | | |
| | | TNMG 220408 NSE | 0,8 | | ● | ● | ○ | | | | | | | | | | | | | | | | | | | | | | |

● = Euro stock ● = 1-st recommended item
○ = Stock item in Japan
▲ = To be replaced by new item

Packing unit and ordering example; 10 pcs. TNMG 160404 NFA, T2000Z

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




| Dimensions (mm) | | | | |
|---|---|---|---|---|
| TNMG | ℓ | ød (IC) | s | $d_1$ |
| | | | | |
| 1604-- | 16,5 | 9,525 | 4,76 | 3,81 |
| 2204-- | 22,0 | 12,7 | 4,76 | 5,16 |
| | | | | |

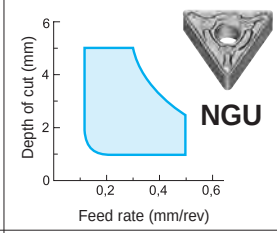
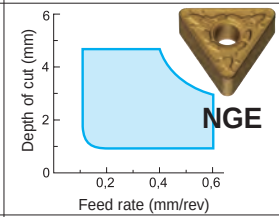
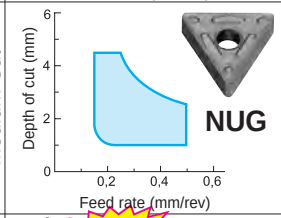
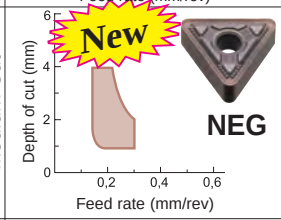
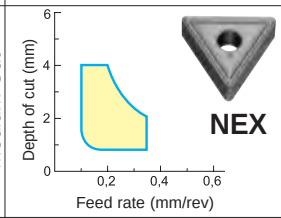
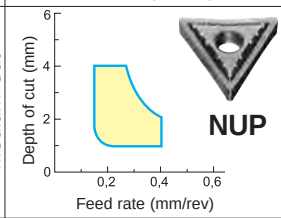
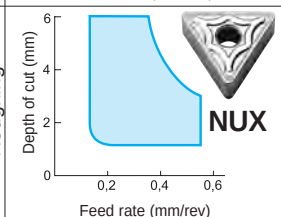


➪ D13, D20~21 ➪ E12

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

# TNMG ●●●●●● ■-■■

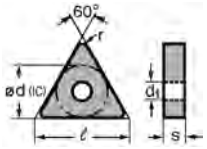
● M-Class Double Sided Bumpy Chipbreaker

| Application | Shape | ISO Cat. No. | r | Carbide Coated P AC805P | Carbide Coated P AC810P | Carbide Coated P **AC820P** | Carbide Coated P AC830P | Carbide Coated P/M AC2000 | Carbide Coated P/M AC3000 | Carbide Coated M AC610M | Carbide Coated P/M AC630M | Carbide Coated K **AC405K** | Carbide Coated K AC410K | Carbide Coated K **AC415K** | Carbide Coated K AC420K | Carbide Coated K AC700G | Carbide Coated K AC900G | Carbide ZX-Coated K/S AC510U | Carbide ZX-Coated M/S AC520U | Carbide ZX-Coated P/M AC530U | Cermet Uncoated P **T2000Z** | Cermet Uncoated P T3000Z | Cermet Uncoated P T110A | Cermet Uncoated P T1200A | Cermet Uncoated P T1500A | Carbide Uncoated K G10E | Carbide Uncoated S EH510 | Carbide Uncoated S EH520 | Carbide H H1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Medium Cut |  NGU | **TNMG 160404 NGU** | 0,4 | | ● | ● | ● | ▲ | | ● | ● | | | | | ▲ | ▲ | | ○ | | | | | | | | | | |
| | | **TNMG 160408 NGU** | 0,8 | | ● | ● | ● | ▲ | | ● | ● | | | | | ▲ | ▲ | | ○ | | | | | | | | | | |
| | | **TNMG 160412 NGU** | 1,2 | | ● | ● | ● | ▲ | | ● | ● | | | | | ▲ | ▲ | | ○ | | | | | | | | | | |
| | | **TNMG 160416 NGU** | 1,6 | | | ● | ● | | | | | | | | | | | | | | | | | | | | | | |
| | | **TNMG 220404 NGU** | 0,4 | | | ○ | | | | | | | | | | | | ○ | ○ | | | | | | | | | | |
| | | **TNMG 220408 NGU** | 0,8 | | ● | ○ | ○ | | | | ● | | | | | ▲ | ▲ | | | | | | | | | | | | |
| | | **TNMG 220412 NGU** | 1,2 | | ● | ○ | ○ | | | | ● | | | | | ▲ | ▲ | | | | | | | | | | | | |
| Medium Cut |  NGE | **TNMG 160404 NGE** | 0,4 | | ● | ● | ○ | | | | | | | | | | | | | | | | | | | | | | |
| | | **TNMG 160408 NGE** | 0,8 | ● | ● | ● | ● | | | | | | | | | | | | | | | | | | | | | | |
| | | **TNMG 160412 NGE** | 1,2 | | ● | ● | ● | | | | | | | | | | | | | | | | | | | | | | |
| | | **TNMG 220408 NGE** | 0,8 | | ● | ● | ● | | | | | | | | | | | | | | | | | | | | | | |
| Medium Cut |  NUG | **TNMG 160404 NUG** | 0,4 | | | | | ▲ | ▲ | | | | | | | | | | | | | | | | | | | | |
| | | **TNMG 160408 NUG** | 0,8 | | | | | ▲ | ▲ | | | | | | | | | | | | | | | | | | | | |
| | | **TNMG 160412 NUG** | 1,2 | | | | | ▲ | ▲ | | | | | | | | | | | | | | | | | | | | |
| | | **TNMG 160416 NUG** | 1,6 | | | | | ▲ | | | | | | | | | | | | | | | | | | | | | |
| | | **TNMG 220408 NUG** | 0,8 | | | | | ▲ | ▲ | | | | | | | | | | | | | | | | | | | | |
| | | **TNMG 220412 NUG** | 1,2 | | | | | ▲ | ▲ | | | | | | | | | | | | | | | | | | | | |
| | | **TNMG 220416 NUG** | 1,6 | | | | | ▲ | ▲ | | | | | | | | | | | | | | | | | | | | |
| Medium Cut |  NEG | **TNMG 160408 NEG** | 0,8 | | | | | | | | ● | | | | | | | ● | ● | | | | | | | | ● | ● | |
| | | **TNMG 160412 NEG** | 1,2 | | | | | | | | ● | | | | | | | ● | ● | | | | | | | | ● | ● | |
| Medium Cut |  NEX | **TNMG 160404 NEX** | 0,4 | | | | | | | ● | ● | | | | | | | ● | ● | | | | | | | | | | |
| | | **TNMG 160408 NEX** | 0,8 | | | | | | | ● | ● | | | | | | | ● | ● | | | | | | | | | | |
| | | **TNMG 160412 NEX** | 1,2 | | | | | | | ● | ● | | | | | | | ● | ● | | | | | | | | | | |
| Medium Cut |  NUP | **TNMG 160404 NUP** | 0,4 | | | ● | ● | ▲ | ▲ | | ● | | | | | | | ● | ● | | | | | | | | | | |
| | | **TNMG 160408 NUP** | 0,8 | | | ● | ● | ▲ | ▲ | | ● | | | | | | | ● | ● | | | | | | | | | | |
| | | **TNMG 160412 NUP** | 1,2 | | | ● | | | | | ● | | | | | | | ● | ● | | | | | | | | | | |
| | | **TNMG 220408 NUP** | 0,8 | | | ○ | ○ | | | | | | | | | | | | | | | | | | | | | | |
| | | **TNMG 220412 NUP** | 1,2 | | | ○ | ○ | | | | | | | | | | | | | | | | | | | | | | |
| Roughing |  NUX | **TNMG 160404 NUX** | 0,4 | | ○ | ● | ● | ▲ | ▲ | | | | ▲ | | | | | | | | | | | | | | | | |
| | | **TNMG 160408 NUX** | 0,8 | | ○ | ● | ● | ▲ | ▲ | | | | ▲ | | | | | | | | | | | | | | | | |
| | | **TNMG 160412 NUX** | 1,2 | | ○ | ● | ● | ▲ | ▲ | | | | ▲ | | | | | | | | | | | | | | | | |
| | | **TNMG 220408 NUX** | 0,8 | | ○ | ● | ○ | | | | | | ▲ | | | | | | | | | | | | | | | | |
| | | **TNMG 220412 NUX** | 1,2 | | ○ | ● | ○ | | | | | | ▲ | | | | | | | | | | | | | | | | |
| | | **TNMG 220416 NUX** | 1,6 | | | | | | | | | | ▲ | | | | | | | | | | | | | | | | |

● = Euro stock ● = 1-st recommended item
○ = Stock item in Japan
▲ = To be replaced by new item

Packing unit and ordering example; 10 pcs. TNMG 160404 NGU, AC810P

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




| Dimensions (mm) | | | | |
|---|---|---|---|---|
| TNMG | ℓ | ød (IC) | s | $d_1$ |
| 1604-- | 16,5 | 9,525 | 4,76 | 3,81 |
| 2204-- | 22,0 | 12,7 | 4,76 | 5,16 |
| 2706-- | 27,5 | 15,875 | 6,35 | 6,35 |
| | | | | |

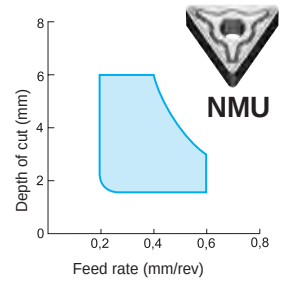
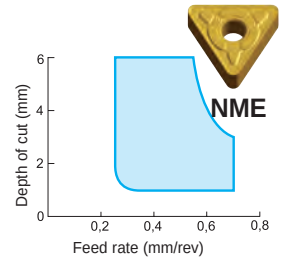
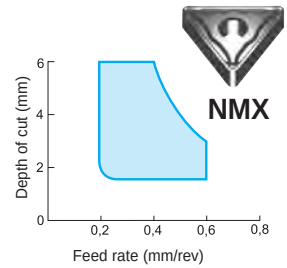
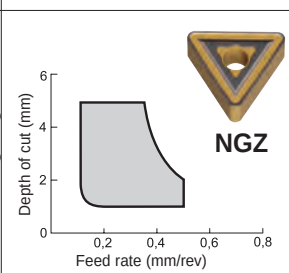
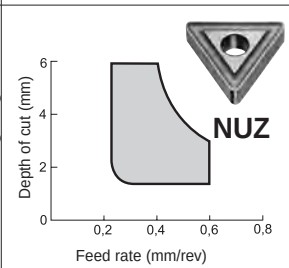


⇨ D13, D20~21 ⇨ E12

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

# TNMG ●●●●●● ■-■■

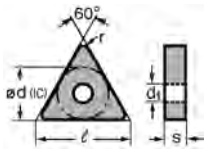
● M-Class Double Sided Bumpy Chipbreaker

| Application | Shape | ISO Cat. No. | r | Carbide | | | | | | | | | | | | | Cermet | | Carbide | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Coated | | | | | | | | | | ZX-Coated | | | Uncoated | | | | | | | |
| | | | | P | | | | | M | P/M | K | | | K/S | M/S | P/M | P | | | | K | S | H |
| | | | | AC805P | AC810P | AC820P | AC830P | AC2000 | AC3000 | AC610M | AC630M | AC405K | AC410K | AC415K | AC420K | AC700G | AC900G | AC510U | AC520U | AC530U | T2000Z | T3000Z | T110A | T1200A | T1500A | G10E | EH510 | EH520 | H1 |
| Roughing |  NMU | TNMG 160408 NMU | 0,8 | | ● | ● | ● | ▲ | ▲ | ● | ● | | | | | ▲ | ▲ | | | | | | | | | | | |
| | | TNMG 160412 NMU | 1,2 | | ● | ● | ● | ▲ | ▲ | ● | ● | | | | | ▲ | ▲ | | | | | | | | | | | |
| | | TNMG 220408 NMU | 0,8 | | ○ | ● | ● | ▲ | ▲ | ● | ● | | | | | | | | | | | | | | | | | |
| | | TNMG 220412 NMU | 1,2 | | ○ | ● | ● | ▲ | ▲ | ● | ● | | | | | | | | | | | | | | | | | |
| | | TNMG 220416 NMU | 1,6 | | ○ | ● | ● | ▲ | ▲ | ○ | ● | | ▲ | | | | | | | | | | | | | | | |
| | | TNMG 270612 NMU | 1,2 | | | ○ | ○ | | | | | | | | | | | | | | | | | | | | | |
| | | TNMG 270616 NMU | 1,6 | | | ○ | | | | | | | | | | | | | | | | | | | | | | |
| Roughing |  NME | TNMG 160408 NME | 0,8 | | ● | ● | ● | | | | | | | | | | | | | | | | | | | | | |
| | | TNMG 160412 NME | 1,2 | | ● | ● | ● | | | | | | | | | | | | | | | | | | | | | |
| Roughing |  NMX | TNMG 160408 NMX | 0,8 | | | ● | ● | | | | | | | | | | | | | | | | | | | | | |
| | | TNMG 160412 NMX | 1,2 | | | ● | ● | | ▲ | | | | | | | | | | | | | | | | | | | |
| | | TNMG 220408 NMX | 0,8 | | | ○ | ○ | | | | | | | | | | | | | | | | | | | | | |
| | | TNMG 220412 NMX | 1,2 | | | ○ | ○ | | | | | | | | | | | | | | | | | | | | | |
| Roughing |  NGZ | TNMG 160404 NGZ | 0,4 | | | | | | | | | ● | | ● | | | | | | | | | | | | | | |
| | | TNMG 160408 NGZ | 0,8 | | | | | | | | | ● | | ● | ● | | | | | | | | | | | | | |
| | | TNMG 160412 NGZ | 1,2 | | | | | | | | | ● | | ● | ● | | | | | | | | | | | | | |
| | | TNMG 220408 NGZ | 0,8 | | | | | | | | | ● | | ● | | | | | | | | | | | | | | |
| | | TNMG 220412 NGZ | 1,2 | | | | | | | | | ● | | ● | | | | | | | | | | | | | | |
| | | TNMG 220416 NGZ | 1,6 | | | | | | | | | ● | | ● | | | | | | | | | | | | | | |
| Roughing |  NUZ | TNMG 160404 NUZ | 0,4 | | ○ | ● | ● | ▲ | ▲ | | | | ▲ | | | | | | | | | | | | | | | |
| | | TNMG 160408 NUZ | 0,8 | | ○ | ● | ● | ▲ | ▲ | | | | ▲ | | | | | | | | | | | | | | | |
| | | TNMG 160412 NUZ | 1,2 | | ○ | ● | ● | ▲ | ▲ | | | | ▲ | | | | | | | | | | | | | | | |
| | | TNMG 160416 NUZ | 1,6 | | ○ | ● | ○ | | | | | | ▲ | | | | | | | | | | | | | | | |
| | | TNMG 220408 NUZ | 1,2 | | ○ | ● | ○ | | | | | | ▲ | | | | | | | | | | | | | | | |
| | | TNMG 220412 NUZ | 1,6 | | | | | | | | | | ▲ | | | | | | | | | | | | | | | |

● = Euro stock ● = 1-st recommended item
○ = Stock item in Japan
▲ = To be replaced by new item

Packing unit and ordering example; 10 pcs. TNMG 160408 NMU, AC810P

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




| Dimensions (mm) | | | | |
|---|---|---|---|---|
| TNMM | ℓ | ød (IC) | s | $d_1$ |
| | | | | |
| 1604-- | 16,5 | 9,525 | 4,76 | 3,81 |
| 2204-- | 22,0 | 12,7 | 4,76 | 5,16 |
| | | | | |

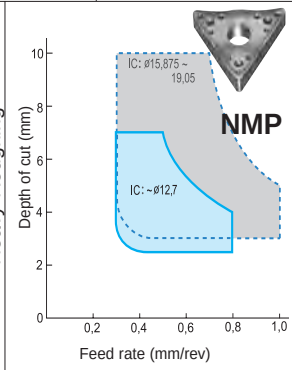
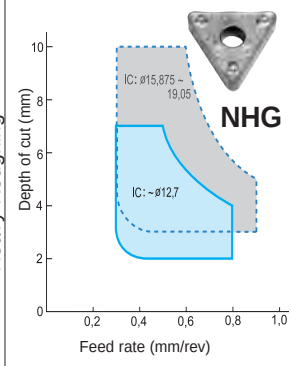
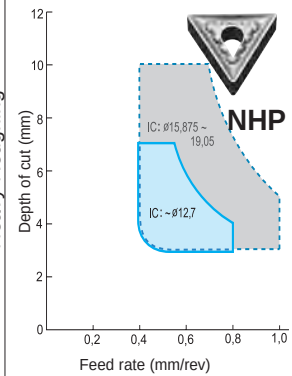


⇨ D13, D20~21 ⇨ E12

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

# TNMM ●●●●●● ■-■■

● M-Class One Sided Bumpy Chipbreaker

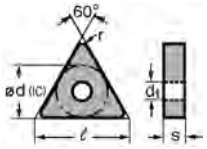
| Application | Shape | ISO Cat. No. | r | Carbide Coated P AC805P | AC810P | AC820P | AC830P | AC2000 | AC3000 | Coated M/P AC610M | AC630M | Coated K AC405K | AC410K | AC415K | AC420K | AC700G | AC900G | ZX-Coated K/S AC510U | ZX-Coated M/S AC520U | ZX-Coated P/M AC530U | Cermet P T2000Z | T3000Z | Uncoated P T110A | T1200A | T1500A | Carbide K G10E | Carbide S EH510 | EH520 | H H1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Heavy Roughing |  NMP | **TNMM 160408 NMP** | 0,8 | | ● | ● | ● | ▲ | ▲ | | ● | | | | | | | | | | | | | | | | | | |
| | | **TNMM 160412 NMP** | 1,2 | | ○ | ● | ● | ▲ | ▲ | | ● | | | | | | | | | | | | | | | | | | |
| | | **TNMM 160416 NMP** | 1,6 | | | ● | | ▲ | ▲ | | | | | | | | | | | | | | | | | | | | |
| | | **TNMM 220408 NMP** | 0,8 | | ○ | ● | ● | ▲ | ▲ | | | | | | | | | | | | | | | | | | | | |
| | | **TNMM 220412 NMP** | 1,2 | | ○ | ● | ● | ▲ | ▲ | | ● | | | | | | | | | | | | | | | | | | |
| | | **TNMM 220416 NMP** | 1,6 | | ○ | ● | ● | ▲ | ▲ | | ● | | | | | | | | | | | | | | | | | | |
| Heavy Roughing |  NHG | **TNMM 160408 NHG** | 0,8 | | ● | | ● | ▲ | ▲ | ○ | ● | | | | | ▲ | ▲ | | | | | | | | | | | | |
| | | **TNMM 160412 NHG** | 1,2 | | ● | | ● | ▲ | ▲ | ○ | ● | | | | | ▲ | ▲ | | | | | | | | | | | | |
| | | **TNMM 160416 NHG** | 1,6 | | ● | | | ▲ | | | | | | | | | | | | | | | | | | | | | |
| | | **TNMM 220408 NHG** | 0,8 | | ○ | ● | ● | ▲ | ▲ | | | | | | | | | | | | | | | | | | | | |
| | | **TNMM 220412 NHG** | 1,2 | | ○ | ● | ● | ▲ | ▲ | | | | | | | | | | | | | | | | | | | | |
| | | **TNMM 220416 NHG** | 1,6 | | ○ | ● | ● | ▲ | ▲ | | | | | | | | | | | | | | | | | | | | |
| Heavy Roughing |  NHP | **TNMM 160408 NHP** | 0,8 | | | | ○ | | | | | | | | | | | | | | | | | | | | | | |
| | | **TNMM 160412 NHP** | 1,2 | | | | ○ | | | | | | | | | | | | | | | | | | | | | | |
| | | **TNMM 220412 NHP** | 1,2 | | | | ○ | | | | | | | | | | | | | | | | | | | | | | |
| | | **TNMM 220416 NHP** | 1,6 | | | | ○ | | | | | | | | | | | | | | | | | | | | | | |

● = Euro stock ● = 1-st recommended item
○ = Stock item in Japan
▲ = To be replaced by new item

Packing unit and ordering example; 10 pcs. TNMM 1600408 NMP, AC810P

## 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 |




⇨ D13, D20~21 ⇨ E12

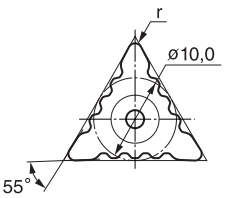

- P Steel
- M Stainless Steel
- K Cast Iron
- N Non-Ferrous Metals
- S Super Alloy
- H Hardened Steel

## TNMA ●●●●●●

● G/M-Class No Chipbreaker

| Application | Shape | ISO Cat. No. | r | AC805P | AC810P | AC820P | AC830P | AC2000 | AC3000 | AC610M | AC630M | AC405K | AC410K | AC415K | AC420K | AC700G | AC900G | AC510U | AC520U | AC530U | T2000Z | T3000Z | T110A | T1200A | T1500A | G10E | EH510 | EH520 | H1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carbide Coated P | | | | | | M | P,M | K | | | | | | Carbide ZX-Coated K,S | M,S | P,M | Cermet Uncoated P | | | | | Carbide K | S | H |
| Roughing |  | **TNMA 160404** | 0,4 | | | | | | | | | ● | ▲ | ● | | | | | | | | | | | | ● | | | |
| | | **TNMA 160408** | 0,8 | | | | | | | | | ● | ▲ | ● | ● | ▲ | | | | | | | | | | ● | | | |
| | | **TNMA 160412** | 1,2 | | | | | | | | | ● | ▲ | ● | ● | ▲ | | | | | | | | | | | | | |
| | | **TNMA 160416** | 1,6 | | | | | | | | | ● | ▲ | ● | | | | | | | | | | | | | | | |
| | | **TNMA 220408** | 0,8 | | | | | | | | | ● | ▲ | ● | | | | | | | | | | | | | | | |
| | | **TNMA 220412** | 1,2 | | | | | | | | | ● | ▲ | ● | | | | | | | | | | | | | | | |
| | | **TNMA 220416** | 1,6 | | | | | | | | | ● | ▲ | ● | | | | | | | | | | | | | | | |









⇨ D9 ⇨ E11


## TRM ●●●●●● -■■

● M-Class Bumpy Chipbreaker

| Application | Shape | ISO Cat. No. | r | AC805P | AC810P | AC820P | AC830P | AC2000 | AC3000 | AC610M | AC630M | AC405K | AC410K | AC415K | AC420K | AC700G | AC900G | AC510U | AC520U | AC530U | T2000Z | T3000Z | T110A | T1200A | T1500A | G10E | EH510 | EH520 | H1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carbide Coated P | | | | | | M | P,M | K | | | | | | Carbide ZX-Coated K,S | M,S | P,M | Cermet Uncoated P | | | | | Carbide K | S | H |
| Finishing |  -LU | **TRM 551704 -LU** | 0,4 | | ● | ● | | ▲ | ▲ | | | | | | | ▲ | ▲ | | | | ● | ● | | | | | | |
| | | **TRM 551708 -LU** | 0,8 | | ● | ● | | ▲ | ▲ | | | | | | | ▲ | ▲ | | | | ● | ● | | | | | | |
| | | **TRM 551712 -LU** | 1,2 | | ● | ● | | | ▲ | | | | | | | ▲ | ▲ | | | | ● | ○ | | | | | | |
| |  -SU | **TRM 551704 -SU** | 0,4 | | | ○ | | | | ● | ● | | | | | | | | | | ● | ○ | | | | | | |
| | | **TRM 551708 -SU** | 0,8 | | | ○ | | | | ● | ● | | | | | | | | | | ● | ○ | | | | | | |
| | | **TRM 551712 -SU** | 1,2 | | | ○ | | | | ● | ● | | | | | | | | | | ● | ○ | | | | | | |
| Light Cut |  -GU | **TRM 551704 -GU** | 0,4 | | ● | ● | ● | ▲ | ▲ | | ● | | | | | ▲ | ▲ | | | | | | | | | | | |
| | | **TRM 551708 -GU** | 0,8 | | ● | ● | ● | ▲ | ▲ | | ● | | | | | ▲ | ▲ | | | | | | | | | | | |
| | | **TRM 551712 -GU** | 1,2 | | ● | ● | ● | ▲ | ▲ | | ○ | | | | | ▲ | ▲ | | | | | | | | | | | |





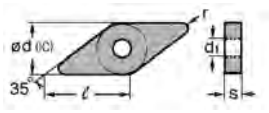


● = Euro stock ● = 1-st recommended item
○ = Stock item in Japan
▲ = To be replaced by new item

Packing unit and ordering example; 10 pcs. TNGA 160408, Ac405K

# V DIAMOND TYPE
## INSERTS FOR TURNING

**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 |
| | | | | |



⇨ D14

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

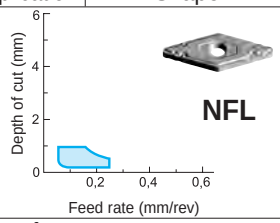
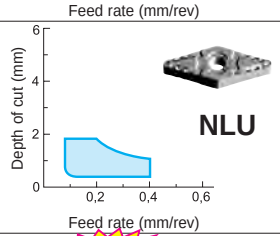
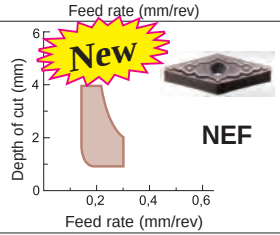
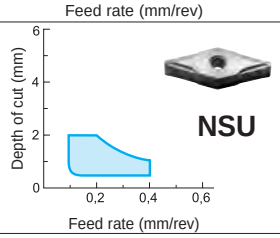
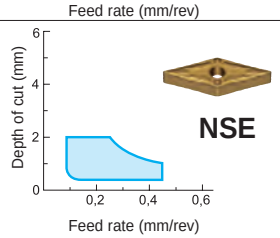
## VNMA ●●●●●●

● M-Class No Chipbreaker

| Application | Shape | ISO Cat. No. | r | Carbide Coated P | Carbide Coated P | Carbide Coated P | Carbide Coated P | Carbide Coated M | Carbide Coated P/M | Carbide Coated K | Carbide Coated K | Carbide Coated K | Carbide Coated K | Carbide Coated K | Carbide Coated K | Carbide ZX-Coated K/S | Carbide ZX-Coated M/S | Carbide ZX-Coated P/M | Cermet Uncoated P | Cermet Uncoated P | Carbide Uncoated P | Carbide Uncoated P | Carbide Uncoated P | Carbide Uncoated K | Carbide Uncoated S | Carbide Uncoated S | Carbide Uncoated H |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | AC805P | AC810P | **AC820P** | AC830P | AC2000 | AC3000 | AC610M | AC630M | **AC405K** | AC410K | **AC415K** | AC420K | AC700G | AC900G | AC510U | AC520U | AC530U | **T2000Z** | T3000Z | T110A | T1200A | T1500A | G10E | EH510 | EH520 | H1 |
| Roughing |  | **VNMA 160404** | 0,4 | | | | | | | | | ● | ▲ | ● | | | | | | | | | | | | | | |
| | | **VNMA 160408** | 0,8 | | | | | | | | | ● | ▲ | ● | | | | | | | | | | | | | | |
| | | **VNMA 160412** | 1,2 | | | | | | | | | ● | ▲ | ● | | | | | | | | | | | | | | |

## VNMG ●●●●●● ■-■■

● M-Class Double Sided Bumpy Chipbreaker

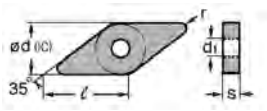
| Application | Shape | ISO Cat. No. | r | Carbide Coated P | Carbide Coated P | Carbide Coated P | Carbide Coated P | Carbide Coated M | Carbide Coated P/M | Carbide Coated K | Carbide Coated K | Carbide Coated K | Carbide Coated K | Carbide Coated K | Carbide Coated K | Carbide ZX-Coated K/S | Carbide ZX-Coated M/S | Carbide ZX-Coated P/M | Cermet Uncoated P | Cermet Uncoated P | Carbide Uncoated P | Carbide Uncoated P | Carbide Uncoated P | Carbide Uncoated K | Carbide Uncoated S | Carbide Uncoated S | Carbide Uncoated H |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | AC805P | AC810P | **AC820P** | AC830P | AC2000 | AC3000 | AC610M | AC630M | **AC405K** | AC410K | **AC415K** | AC420K | AC700G | AC900G | AC510U | AC520U | AC530U | **T2000Z** | T3000Z | T110A | T1200A | T1500A | G10E | EH510 | EH520 | H1 |
| Fine Finishing |  NFL | **VNMG 160404 NFL** | 0,4 | | | ○ | | ▲ | | | ○ | | | | | | | | | | ● | ● | | | | | | | |
| | | **VNMG 160408 NFL** | 0,8 | | | ○ | | ▲ | | | ○ | | | | | | | | | | ● | ● | | | | | | | |
| Finishing |  NLU | **VNMG 160402 NLU** | 0,2 | | | | | | | | ○ | | | | | | | | | | | | | | | | | | |
| | | **VNMG 160404 NLU** | 0,4 | | ● | ● | | ▲ | | | ○ | | | | | ▲ | ▲ | | | | ● | | | | | | | | |
| | | **VNMG 160408 NLU** | 0,8 | | ● | ● | | ▲ | | | ○ | | | | | ▲ | ▲ | | | | ● | | | | | | | | |
| Medium Cut |  NEF | **VNMG 160404 NEF** | 0,4 | | | | | | | | ● | | | | | | | ● | ● | | | | | | | ● | ● | |
| | | **VNMG 160408 NEF** | 0,8 | | | | | | | | ● | | | | | | | ● | ● | | | | | | | ● | ● | |
| Finishing |  NSU | **VNMG 160402 NSU** | 0,2 | | | | | | | | ○ | | | | | | | | ○ | | | | | | | | | |
| | | **VNMG 160404 NSU** | 0,4 | | ● | ● | ○ | ▲ | ▲ | ● | ● | | | | | ▲ | ▲ | ○ | ○ | | | | | | | | | |
| | | **VNMG 160408 NSU** | 0,8 | | ● | ● | ○ | ▲ | ▲ | ● | ● | | | | | ▲ | ▲ | ○ | ○ | | | | | | | | | |
| Medium Cut |  NSE | **VNMG 160404 NSE** | 0,4 | | ● | ● | ○ | | | | | | | | | | | | | | | | | | | | | |
| | | **VNMG 160408 NSE** | 0,8 | | ● | ● | ○ | | | | | | | | | | | | | | | | | | | | | |

● = Euro stock ● = 1-st recommended item
○ = Stock item in Japan
▲ = To be replaced by new item

Packing unit and ordering example; 10 pcs. VNMA 160404, AC405K

# V DIAMOND TYPE
## INSERTS FOR TURNING

**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 |
| | | | | |



⇨ D14

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

# VNMG ●●●●●● ■-■■

● M-Class Double Sided Bumpy Chipbreaker

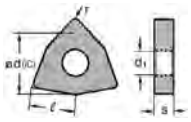
| Application | Shape | ISO Cat. No. | r | Carbide: Coated P: AC805P | AC810P | AC820P | AC830P | Coated M: AC2000 | AC3000 | AC610M | AC630M | Coated K: AC405K | AC410K | AC415K | AC420K | AC700G | AC900G | ZX-Coated: AC510U | AC520U | AC530U | Cermet: T2000Z | T3000Z | Uncoated P: T110A | T1200A | T1500A | Carbide K: G10E | Carbide S: EH510 | EH520 | Carbide H: H1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Medium Cut | NGU | VNMG 160404 NGU | 0,4 | | ● | ● | ○ | ▲ | | ○ | ● | | | | | ▲ | ▲ | | ○ | | | | | | | | | | |
| | | VNMG 160408 NGU | 0,8 | | ● | ● | ○ | ▲ | | ○ | ● | | | | | ▲ | ▲ | | ○ | ○ | | | | | | | | | |
| | | VNMG 160412 NGU | 1,2 | | | ● | | | | | | | | | | | ▲ | | ○ | | | | | | | | | | |
| Medium Cut | NGE | VNMG 160408 NGE | 0,8 | | ● | ● | ● | | | | | | | | | | | | | | | | | | | | | | |
| Medium Cut | NUG | VNMG 160404 NUG | 0,4 | | | | | ▲ | | | | | | | | | | | | | | | | | | | | | |
| | | VNMG 160408 NUG | 0,8 | | | | | ▲ | | | | | | | | | | | | | | | | | | | | | |
| Medium Cut | NEX | VNMG 160404 NEX | 0,4 | | | | | | | | ○ | | | | | | | ● | ● | | | | | | | | | | |
| | | VNMG 160408 NEX | 0,8 | | | | | | | | ○ | | | | | | | ● | ● | | | | | | | | | | |
| Medium Cut | NUP | VNMG 160404 NUP | 0,4 | | | ● | ● | ▲ | ▲ | | ● | | | | | | | ● | ● | | | | | | | | | | |
| | | VNMG 160408 NUP | 0,8 | | | ● | ● | ▲ | ▲ | | ● | | | | | | | ● | ● | | | | | | | | | | |
| Medium Cut | NUX | VNMG 160404 NUX | 0,4 | | ○ | ● | ● | | | | | | ▲ | | | | | | | | | | | | | | | | |
| | | VNMG 160408 NUX | 0,8 | | ○ | ● | ● | | | | | | ▲ | | | | | | | | | | | | | | | | |
| | | VNMG 160412 NUX | 1,2 | | ○ | ● | ● | | | | | | ▲ | | | | | | | | | | | | | | | | |
| Medium Cut | NGZ | VNMG 160404 NGZ | 0,4 | | | | | | | | | ● | | ● | | | | | | | | | | | | | | | |
| | | VNMG 160408 NGZ | 0,8 | | | | | | | | | ● | | ● | | | | | | | | | | | | | | | |
| | | VNMG 160412 NGZ | 1,2 | | | | | | | | | ● | | ● | | | | | | | | | | | | | | | |
| Medium Cut | NUZ | VNMG 160404 NUZ | 0,4 | | | | | | | | | ● | ▲ | ● | | | | | | | | | | | | | | | |
| | | VNMG 160408 NUZ | 0,8 | | | | | | | | | ● | ▲ | ● | | | | | | | | | | | | | | | |
| | | VNMG 160412 NUZ | 1,2 | | | | | | | | | ● | ▲ | ● | | | | | | | | | | | | | | | |

● = Euro stock ● = 1-st recommended item
○ = Stock item in Japan
▲ = To be replaced by new item

Packing unit and ordering example; 10 pcs. VNMG 160404 NGU, AC810P

# W TRIGON TYPE
## INSERTS FOR TURNING

**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 |
| | | | | |



⇨ D15, D21 ⇨ E13

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

## WNMG ●●●●●● ■-■■

● M-Class Double Sided Bumpy Chipbreaker

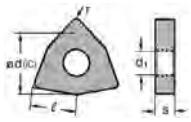
| Application | Shape | ISO Cat. No. | r | Carbide Coated P AC805P | AC810P | AC820P | AC830P | Coated P/M AC2000 | AC3000 | Coated M AC610M | Coated P/M AC630M | Coated K AC405K | AC410K | AC415K | AC420K | AC700G | AC900G | ZX-Coated K/S AC510U | ZX-Coated M/S AC520U | ZX-Coated P/M AC530U | Cermet Uncoated P T2000Z | T3000Z | T110A | T1200A | T1500A | Carbide Uncoated K G10E | S EH510 | EH520 | H H1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Fine Finishing | NFA | WNMG 080404 NFA | 0,4 | | | | | | | | | | | | | | | | | | ● | | | ▲ | ● | | | |
| | | WNMG 080408 NFA | 0,8 | | | | | | | | | | | | | | | | | | ● | | | ▲ | ● | | | |
| Fine 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 | | ● | ● | | | | | ○ | | | | | ▲ | ▲ | | | | | | | | | | | |
| | 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 | | ● | ● | | | | ● | ● | ● | ▲ | ● | | ▲ | ▲ | | | | ● | | | | | | | |
| | | WNMG 080412 NLU-W | 1,2 | | ● | ● | | | | | ○ | ● | ▲ | ● | | ▲ | ▲ | | | | | | | | | | | |
| Finishing | NEF | WNMG 080404 NEF | 0,4 | | | | | | | | ● | | | | | | | ● | ● | | | | | | | | ● | ● |
| | | WNMG 080408 NEF | 0,8 | | | | | | | | ● | | | | | | | ● | ● | | | | | | | | ● | ● |
| Finishing | NSU | WNMG 060404 NSU | 0,4 | | ● | ● | ○ | ▲ | ▲ | ● | ● | | | | | ▲ | ▲ | ● | ● | | | | | | | | | |
| | | WNMG 060408 NSU | 0,8 | | ● | ● | ○ | ▲ | ▲ | ● | ● | | | | | ▲ | ▲ | ● | ● | | | | | | | | | |
| | | WNMG 080404 NSU | 0,4 | | ● | ● | ○ | ▲ | | ● | ● | | | | | ▲ | ▲ | ● | ● | | ● | | | ▲ | ● | | | |
| | | WNMG 080408 NSU | 0,8 | | ● | ● | ○ | ▲ | | ● | ● | | | | | ▲ | ▲ | ● | ● | | ● | | | ▲ | ● | | | |
| | | WNMG 080412 NSU | 1,2 | | ● | ● | ○ | ▲ | | | ○ | | | | | ▲ | ▲ | ● | ● | | | | | | | | | |
| Finishing | NSE | WNMG 080404 NSE | 0,4 | | ● | ● | ○ | | | | | | | | | | | | | | | | | | | | | |
| | | WNMG 080408 NSE | 0,8 | ● | ● | ● | ○ | | | | | | | | | | | | | | | | | | | | | |
| | | WNMG 080412 NSE | 1,2 | ● | ● | ● | ○ | | | | | | | | | | | | | | | | | | | | | |
| | NSE-W | WNMG 080404 NSE-W | 0,4 | | ● | ● | | | | | | | | | | | | | | | | | | | | | | |
| | | WNMG 080408 NSE-W | 0,8 | ● | ● | ● | | | | | | | | | | | | | | | | | | | | | | |
| | | WNMG 080412 NSE-W | 1,2 | ● | ● | ● | | | | | | | | | | | | | | | | | | | | | | |

● = Euro stock ● = 1-st recommended item
○ = Stock item in Japan
▲ = To be replaced by new item

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

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 |
| | | | | |



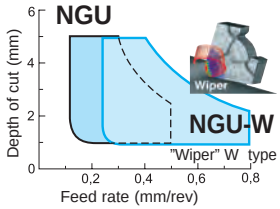
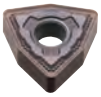


⇨ D15, D21 ⇨ E13

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

## WNMG ●●●●●● ■-■■

● M-Class Double Sided Bumpy Chipbreaker

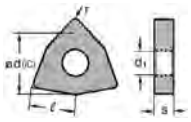
| Application | Shape | ISO Cat. No. | r | Carbide | | | | | | | | | | | | | | Cermet | | Carbide | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Coated | | | | | | | | | | | ZX-Coated | | | Uncoated | | | | | |
| | | | | P | | | | M | P/M | K | | | | | K/S | M/S | P/M | P | | K | S | | H |
| | | | | AC805P | AC810P | AC820P | AC830P | AC2000 | AC3000 | AC610M | AC630M | AC405K | AC410K | AC415K | AC420K | AC700G | AC900G | AC510U | AC520U | AC530U | T2000Z | T3000Z | T110A | T1200A | T1500A | G10E | EH510 | EH520 | H1 |
| Medium Cut |  "Standard" NGU  NGU-W "Wiper" W type | WNMG 060404 NGU | 0,4 | | ● | ● | | ▲ | | ● | ● | | | | | ▲ | ▲ | | | | | | | | | | | | |
| | | WNMG 060408 NGU | 0,8 | | ● | ● | | ▲ | | ● | ● | | | | | ▲ | ▲ | | | | | | | | | | | | |
| | | WNMG 060412 NGU | 1,2 | | ● | ● | | ▲ | | ● | ● | | | | | ▲ | ▲ | | | | | | | | | | | | |
| | | WNMG 080404 NGU | 0,4 | | ● | ● | ● | ▲ | ▲ | ● | ● | | | | | ▲ | ▲ | | ❍ | | | | | | | | | | |
| | | WNMG 080408 NGU | 0,8 | ● | ● | ● | ● | ▲ | ▲ | ● | ● | | | | | ▲ | ▲ | | ❍ | | | | | | | | | | |
| | | WNMG 080412 NGU | 1,2 | ● | ● | ● | ● | ▲ | ▲ | ● | ● | | | | | ▲ | ▲ | | ❍ | | | | | | | | | | |
| | | WNMG 080408 NGU-W | 0,8 | ● | ● | ● | | ▲ | | ● | ● | ● | ▲ | ● | | ▲ | ▲ | | | | | | | | | | | | |
| | | WNMG 080412 NGU-W | 1,2 | ● | ● | ● | | ▲ | | ● | ● | ● | ▲ | ● | | ▲ | ▲ | | | | | | | | | | | | |
| Medium Cut |  NGE | WNMG 060408 NGE | 0,8 | ● | ● | ● | ● | | | | | | | | | | | | | | | | | | | | | | |
| | | WNMG 060412 NGE | 1,2 | ● | ● | ● | ● | | | | | | | | | | | | | | | | | | | | | | |
| | | WNMG 080408 NGE | 0,8 | ● | ● | ● | ● | | | | | | | | | | | | | | | | | | | | | | |
| | | WNMG 080412 NGE | 1,2 | ● | ● | ● | ● | | | | | | | | | | | | | | | | | | | | | | |
| | | WNMG 080416 NGE | 1,6 | ● | ● | ● | ● | | | | | | | | | | | | | | | | | | | | | | |
| Medium Cut |  NUG | WNMG 060404 NUG | 0,4 | | | | | ▲ | | | | | | | | | | | | | | | | | | | | | |
| | | WNMG 060408 NUG | 0,8 | | | | | ▲ | | | | | | | | | | | | | | | | | | | | | |
| | | WNMG 080408 NUG | 0,8 | | | | | ▲ | ▲ | | | | | | | | | | | | | | | | | | | | |
| | | WNMG 080412 NUG | 1,2 | | | | | ▲ | ▲ | | | | | | | | | | | | | | | | | | | | |
| Medium Cut | New  NEG | WNMG 080408 NEG | 0,8 | | | | | | | | ● | | | | | | | ● | ● | | | | | | | | ● | ● |
| | | WNMG 080412 NEG | 1,2 | | | | | | | | ● | | | | | | | ● | ● | | | | | | | | ● | ● |
| Medium Cut |  NEX | WNMG 060404 NEX | 0,8 | | | | | | | ● | ● | | | | | | | ● | ● | | | | | | | | | | |
| | | WNMG 060408 NEX | 1,2 | | | | | | | ● | ● | | | | | | | ● | ● | | | | | | | | | | |
| | | WNMG 080404 NEX | 0,4 | | | | | | | ● | ● | | | | | | | ● | ● | | | | | | | | | | |
| | | WNMG 080408 NEX | 0,8 | | | | | | | ● | ● | | | | | | | ● | ❍ | | | | | | | | | | |
| | | WNMG 080412 NEX | 1,2 | | | | | | | ● | ● | | | | | | | ❍ | ❍ | | | | | | | | | | |
| Medium Cut |  NUP | WNMG 080408 NUP | 0,8 | | | ● | ● | ▲ | ▲ | ❍ | ● | | | | | | | ● | ● | | | | | | | | | | |
| | | WNMG 080412 NUP | 1,2 | | | ● | ● | ▲ | ▲ | ❍ | ● | | | | | | | ● | ● | | | | | | | | | | |

● = Euro stock ● = 1-st recommended item
❍ = Stock item in Japan
▲ = To be replaced by new item

Packing unit and ordering example; 10 pcs. WNMG 060404 NGU, AC810P

# W TRIGON TYPE
## INSERTS FOR TURNING

**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 |
| | | | | |

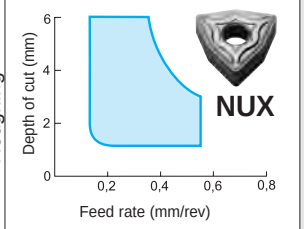
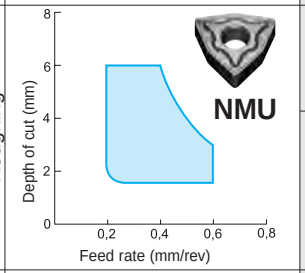
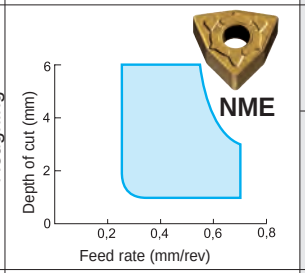
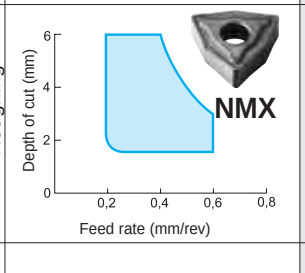
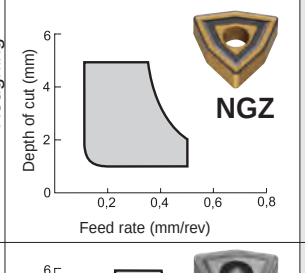
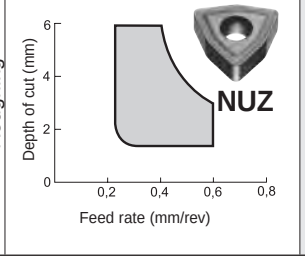


⇨ D15, D21 ⇨ E13

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

## WNMG ●●●●●● ■-■■

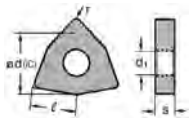
● M-Class Double Sided Bumpy Chipbreaker

| Application | Shape | ISO Cat. No. | r | Carbide Coated P AC805P | AC810P | AC820P | AC830P | Coated P/M AC2000 | AC3000 | Coated M AC610M | Coated P/M AC630M | Coated K AC405K | AC410K | AC415K | AC420K | AC700G | AC900G | ZX-Coated K/S AC510U | ZX-Coated M/S AC520U | ZX-Coated P/M AC530U | Cermet P T2000Z | T3000Z | Uncoated P T110A | T1200A | T1500A | Carbide K G10E | Carbide S EH510 | EH520 | H H1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Roughing |  NUX | **WNMG 080404 NUX** | 0,4 | | ○ | ● | ● | ▲ | ▲ | | | | ▲ | | | | | | | | | | | | | | | | |
| | | **WNMG 080408 NUX** | 0,8 | | ● | ● | ● | ▲ | ▲ | | | | ▲ | | | ▲ | ▲ | | | | | | | | | | | | |
| | | **WNMG 080412 NUX** | 1,2 | | ● | ● | ● | ▲ | ▲ | | | | ▲ | | | ▲ | ▲ | | | | | | | | | | | | |
| Roughing |  NMU | **WNMG 060408 NMU** | 0,8 | | ● | ● | ● | ▲ | ▲ | ● | ● | | | | | ▲ | ▲ | ● | ● | | | | | | | | | | |
| | | **WNMG 060412 NMU** | 1,2 | | ● | ● | ● | | ▲ | ● | ● | | | | | ▲ | ▲ | ● | ● | | | | | | | | | | |
| | | **WNMG 080408 NMU** | 0,8 | | ● | ● | ● | ▲ | ▲ | ● | ● | | | | | ▲ | ▲ | ● | ● | | | | | | | | | | |
| | | **WNMG 080412 NMU** | 1,2 | | ● | ● | ● | ▲ | ▲ | ● | ● | | | | | ▲ | ▲ | ● | ● | | | | | | | | | | |
| | | **WNMG 080416 NMU** | 1,6 | | ● | ● | ● | ▲ | ▲ | | | | | | | ▲ | ▲ | | | | | | | | | | | | |
| Roughing |  NME | **WNMG 060412 NME** | 0,8 | ● | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | **WNMG 060412 NME** | 1,2 | ● | ● | ● | ● | | | | | | | | | | | | | | | | | | | | | | |
| | | **WNMG 080408 NME** | 0,8 | ● | ● | ● | ● | | | | | | | | | | | | | | | | | | | | | | |
| | | **WNMG 080412 NME** | 1,2 | ● | ● | ● | ● | | | | | | | | | | | | | | | | | | | | | | |
| | | **WNMG 080416 NME** | 1,6 | ● | ● | ● | ● | | | | | | | | | | | | | | | | | | | | | | |
| Roughing |  NMX | **WNMG 080408 NMX** | 0,8 | | | ● | ● | | | | | | | | | | | | | | | | | | | | | | |
| | | **WNMG 080412 NMX** | 1,2 | | | ● | ● | | | | | | | | | | | | | | | | | | | | | | |
| Roughing |  NGZ | **WNMG 080404 NGZ** | 0,4 | | | | | | | | | ● | | ● | | | | | | | | | | | | | | | |
| | | **WNMG 080408 NGZ** | 0,8 | | | | | | | | | ● | | ● | ● | | | | | | | | | | | | | | |
| | | **WNMG 080412 NGZ** | 1,2 | | | | | | | | | ● | | ● | ● | | | | | | | | | | | | | | |
| Roughing |  NUZ | **WNMG 080404 NUZ** | 0,4 | | ○ | ● | ● | ▲ | ▲ | | | | ▲ | | | | | | | | | | | | | | | | |
| | | **WNMG 080408 NUZ** | 0,8 | | ● | ● | ● | ▲ | ▲ | | | | ▲ | | | ▲ | ▲ | | | | | | | | | | | | |
| | | **WNMG 080412 NUZ** | 1,2 | | ● | ● | ● | ▲ | ▲ | | | | ▲ | | | ▲ | ▲ | | | | | | | | | | | | |

● = Euro stock ● = 1-st recommended item
○ = Stock item in Japan
▲ = To be replaced by new item

Packing unit and ordering example; 10 pcs. WNMG 060404 NUX, AC820P

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 |
| | | | | |



⇨ D15, D21



⇨ E13

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

## WNMM ●●●●●● ■-■■

● M-Class One Sided Bumpy Chipbreaker

| Application | Shape | ISO Cat. No. | r | Carbide: Coated P: AC805P | AC810P | AC820P | AC830P | Coated M: AC2000 | AC3000 | Coated P/M: AC610M | AC630M | Coated K: AC405K | AC410K | AC415K | AC420K | AC700G | AC900G | ZX-Coated K/S: AC510U | ZX-Coated M/S: AC520U | ZX-Coated P/M: AC530U | Cermet P: T2000Z | T3000Z | Uncoated P: T110A | T1200A | T1500A | Carbide K: G10E | Carbide S: EH510 | EH520 | Carbide H: H1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Heavy Roughing |  NMP  | WNMM 080408 NMP | 0,8 | | ● | ● | ● | | ▲ | | ● | | | | | | | | | | | | | | | | | | |
| | | WNMM 080412 NMP | 1,2 | | ● | ● | ● | ▲ | ▲ | | ● | | | | | | | | | | | | | | | | | | |
| Heavy Roughing |  NHG  | WNMM 080408 NHG | 0,8 | | ● | ● | ● | ▲ | ▲ | | ● | | | | | ▲ | ▲ | | | | | | | | | | | | |
| | | WNMM 080412 NHG | 1,2 | | ● | ● | ● | ▲ | ▲ | | ● | | | | | ▲ | ▲ | | | | | | | | | | | | |

Depth of cut (mm): 0, 2, 4, 6, 8, 10, 12
Feed rate (mm/rev): 0,2 0,4 0,6 0,8

## WNMA ●●●●●●

● M-Class No Chipbreaker

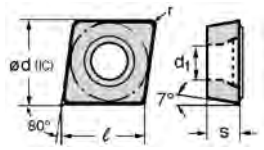
| Application | Shape | ISO Cat. No. | r | Carbide: Coated P: AC805P | AC810P | AC820P | AC830P | Coated M: AC2000 | AC3000 | Coated P/M: AC610M | AC630M | Coated K: AC405K | AC410K | AC415K | AC420K | AC700G | AC900G | ZX-Coated K/S: AC510U | ZX-Coated M/S: AC520U | ZX-Coated P/M: AC530U | Cermet P: T2000Z | T3000Z | Uncoated P: T110A | T1200A | T1500A | Carbide K: G10E | Carbide S: EH510 | EH520 | Carbide H: H1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Roughing |  | WNMA 080408 | 0,8 | | | | | | | | | ● | ▲ | ● | ● | ▲ | | | | | | | | | | | | | |
| | | WNMA 080412 | 1,2 | | | | | | | | | ● | ▲ | ● | ● | ▲ | | | | | | | | | | | | | |
| | | WNMA 080416 | 1,6 | | | | | | | | | ● | ▲ | ● | ● | | | | | | | | | | | | | | |

● = Euro stock ● = 1-st recommended item
○ = Stock item in Japan
▲ = To be replaced by new item

Packing unit and ordering example; 10 pcs. WNMM 080408 NMP, AC810P

# C DIAMOND TYPE
INSERTS FOR TURNING

**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 |
| | | | | |

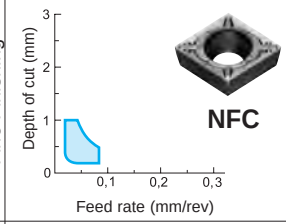
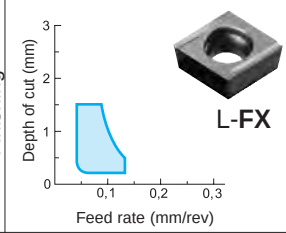
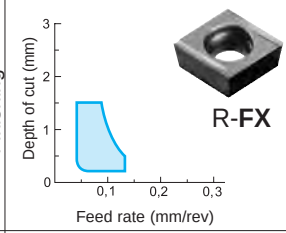
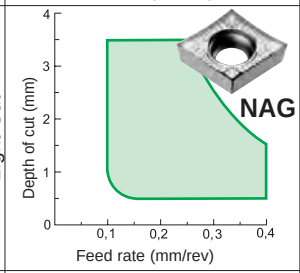
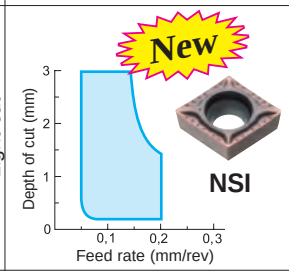
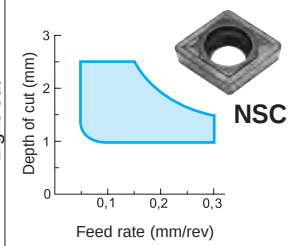


⇨ D29 ⇨ E14

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

## CCGT ●●●●●● ●-■■

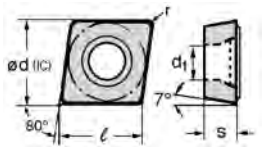
● G-Class Handed and Bumpy Chipbreaker

| Application | Shape | ISO Cat. No. | r | Carbide Coated P AC805P | AC810P | AC820P | AC830P | P M AC2000 | AC3000 | M AC610M | P M AC630M | K AC405K | AC410K | K AC415K | AC420K | AC700G | AC900G | K S AC510U | M S AC520U | P M AC530U | Cermet ZX-Coated T2000Z | T3000Z | Uncoated P T110A | T1200A | T1500A | Carbide K G10E | S EH510 | EH520 | H H1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Fine Finishing |  NFC | CCGT 060201 NFC | 0,1 | | | | | | | | | | | | | | | | | ● | | | | | | | | | |
| | | CCGT 060202 NFC | 0,2 | | | | | | | | | | | | | | | | | ● | | | | | | | | | |
| | | CCGT 060204 NFC | 0,4 | | | | | | | | | | | | | | | | | ● | | | | | | | | | |
| | | CCGT 09T301 NFC | 0,1 | | | | | | | | | | | | | | | | | ● | | | | | | | | | |
| | | CCGT 09T302 NFC | 0,2 | | | | | | | | | | | | | | | | | ● | | | | | | | | | |
| | | CCGT 09T304 NFC | 0,4 | | | | | | | | | | | | | | | | | ● | | | | | | | | | |
| Finishing |  L-FX | CCGT 0602003 LFX | 0,03 | | | | | | | | | | | | | | | | | ○ | | | | | | | | | |
| | | CCGT 060201 LFX | 0,1 | | | | | | | | | | | | | | | | | ○ | ● | | | ▲ | ● | | | | |
| | | CCGT 060202 LFX | 0,2 | | | | | | | | | | | | | | | | | ● | ● | | | ▲ | ● | | | | |
| | | CCGT 060204 LFX | 0,4 | | | | | | | | | | | | | | | | | ● | ● | | | ▲ | ● | | | | |
| | | CCGT 09T301 LFX | 0,1 | | | | | | | | | | | | | | | | | | ● | | | ▲ | ○ | | | | |
| | | CCGT 09T302 LFX | 0,2 | | | | | | | | | | | | | | | | | ● | ● | | | ▲ | ● | | | | |
| | | CCGT 09T304 LFX | 0,4 | | | | | | | | | | | | | | | | | ● | ● | | | ▲ | ● | | | | |
| | | CCGT 09T308 LFX | 0,8 | | | | | | | | | | | | | | | | | ○ | | | | | | | | | |
| Finishing |  R-FX | CCGT 0602003 RFX | 0,03 | | | | | | | | | | | | | | | | | ○ | | | | | | | | | |
| | | CCGT 060201 RFX | 0,1 | | | | | | | | | | | | | | | | | ○ | ● | | | ▲ | ● | | | | |
| | | CCGT 060202 RFX | 0,2 | | | | | | | | | | | | | | | | | ● | ● | | | ▲ | ● | | | | |
| | | CCGT 060204 RFX | 0,4 | | | | | | | | | | | | | | | | | ● | ● | | | ▲ | ● | | | | |
| | | CCGT 09T301 RFX | 0,1 | | | | | | | | | | | | | | | | | | ● | | | ▲ | ● | | | | |
| | | CCGT 09T302 RFX | 0,2 | | | | | | | | | | | | | | | | | ● | ● | | | ▲ | ● | | | | |
| | | CCGT 09T304 RFX | 0,4 | | | | | | | | | | | | | | | | | ● | ● | | | ▲ | ● | | | | |
| | | CCGT 09T308 RFX | 0,8 | | | | | | | | | | | | | | | | | ○ | | | | | | | | | |
| Light Cut |  NAG | CCGT 060202 NAG | 0,2 | | | | | | | | | | | | | | | | | | | | | | | | | | ● |
| | | CCGT 060204 NAG | 0,4 | | | | | | | | | | | | | | | | | | | | | | | | | | ● |
| | | CCGT 09T302 NAG | 0,2 | | | | | | | | | | | | | | | | | | | | | | | | | | ● |
| | | CCGT 09T304 NAG | 0,4 | | | | | | | | | | | | | | | | | | | | | | | | | | ● |
| | | CCGT 09T308 NAG | 0,8 | | | | | | | | | | | | | | | | | | | | | | | | | | ● |
| | | CCGT 120404 NAG | 0,4 | | | | | | | | | | | | | | | | | | | | | | | | | | ● |
| | | CCGT 120408 NAG | 0,8 | | | | | | | | | | | | | | | | | | | | | | | | | | ● |
| Light cut |  New NSI | CCGT 09T301M NSI | 0,1 | | | | | | | ● | ● | | | | | | | ● | ● | ● | | | | | | | | | |
| | | CCGT 09T302M NSI | 0,2 | | | | | | | ● | ● | | | | | | | ● | ● | ● | | | | | | | | | |
| | | CCGT 09T304M NSI | 0,4 | | | | | | | ● | ● | | | | | | | ● | ● | ● | | | | | | | | | |
| Light cut |  NSC | CCGT 0602003 NSC | 0,03 | | | | | | | | | | | | | | | | | ○ | | | | | | | | | |
| | | CCGT 060201 NSC | 0,1 | | | | | | | | | | | | | | | | | ○ | ● | | | ▲ | ● | | | | |
| | | CCGT 060202 NSC | 0,2 | | | | | | | | | | | | | | | | | ● | ● | | | ▲ | ● | | | | |
| | | CCGT 060204 NSC | 0,4 | | | | | | | | | | | | | | | | | ● | ● | | | ▲ | ● | | | | |
| | | CCGT 09T3003 NSC | 0,03 | | | | | | | | | | | | | | | | | ○ | | | | | | | | | |
| | | CCGT 09T301 NSC | 0,1 | | | | | | | | | | | | | | | | | ○ | ● | | | ▲ | ● | | | | |
| | | CCGT 09T302 NSC | 0,2 | | | | | | | | | | | | | | | | | ● | ● | | | ▲ | ● | | | | |
| | | CCGT 09T304 NSC | 0,4 | | | | | | | | | | | | | | | | | ● | ● | | | ▲ | ● | | | | |
| | | CCGT 09T308 NSC | 0,8 | | | | | | | | | | | | | | | | | ● | ● | | | ▲ | ● | | | | |

● = Euro stock ● = 1-st recommended item
○ = Stock item in Japan
▲ = To be replaced by new item

Packing unit and ordering example; 10 pcs. CCGT 060201 NFC, AC530U

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 |
| | | | | |



➪ D29 ➪ E14

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

# CCMT/-W ●●●●●● ●-■■

● M-Class Bumpy Chipbreaker

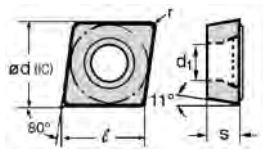
| Application | Shape | ISO Cat. No. | r | Carbide: Coated P: AC805P | AC810P | AC820P | AC830P | Coated M/P/M: AC2000 | AC3000 | AC610M | AC630M | Coated K: AC405K | AC410K | AC415K | AC420K | AC700G | AC900G | ZX-Coated K/S: AC510U | ZX-Coated M/S: AC520U | ZX-Coated P/M: AC530U | Cermet P: T2000Z | T3000Z | Uncoated P: T110A | T1200A | T1500A | Carbide K: G10E | Carbide S: EH510 | EH520 | Carbide H: H1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Finishing ~ Light Cut | NFP | CCMT 060202 NFP | 0,2 | | | | | | | | | | | | | | | | | | ● | ● | ● | ▲ | ● | | | | |
| | | CCMT 060204 NFP | 0,4 | | | | | | | | | | | | | | | | | | ● | ● | ● | ▲ | ● | | | | |
| | | CCMT 060208 NFP | 0,8 | | | | | | | | | | | | | | | | | | ● | ● | ● | ▲ | ● | | | | |
| | | CCMT 09T302 NFP | 0,2 | | | | | | | | | | | | | | | | | | ● | ● | ● | ▲ | ● | | | | |
| | | CCMT 09T304 NFP | 0,4 | | | | | | | | | | | | | | | | | | ● | ● | ● | ▲ | ● | | | | |
| | | CCMT 09T308 NFP | 0,8 | | | | | | | | | | | | | | | | | | ● | ● | ● | ▲ | ● | | | | |
| | | CCMT 120404 NFP | 0,4 | | | | | | | | | | | | | | | | | | ● | | | ▲ | ● | | | | |
| | | CCMT 120408 NFP | 0,8 | | | | | | | | | | | | | | | | | | ● | | | ▲ | ● | | | | |
| Finishing | NLU | CCMT 060202 NLU | 0,2 | | ● | ○ | | | | ● | ● | | | | | ▲ | ▲ | | | ● | | ● | | | | | | | |
| | | CCMT 060204 NLU | 0,4 | | ● | ○ | | | | ● | ● | | | | | ▲ | ▲ | | | ● | | ● | | | | | | | |
| | | CCMT 09T302 NLU | 0,2 | | | | | | | | | | | | | | | | | ● | | ● | | | | | | | |
| | | CCMT 09T304 NLU | 0,4 | | ● | ● | | | | ● | ● | | | | | ▲ | ▲ | | | ● | | ● | | | | | | | |
| | | CCMT 09T308 NLU | 0,8 | | ● | ● | | | | ● | ● | | | | | ▲ | ▲ | | | ● | | ● | | | | | | | |
| | NLU-W | CCMT 09T304 NLU-W | 0,4 | | | ● | | | | ● | ● | ● | ▲ | ● | | ▲ | ▲ | | | ● | | ● | | | | | | | |
| | | CCMT 09T308 NLU-W | 0,8 | | | ● | | | | ● | ● | ● | ▲ | ● | | ▲ | ▲ | | | ● | | ● | | | | | | | |
| Light Cut | NSU | CCMT 060202 NSU | 0,2 | | ● | ● | ○ | ▲ | ▲ | ● | ● | ● | ▲ | ● | | ▲ | ▲ | ● | ● | ● | ● | ● | | ▲ | ● | | | | |
| | | CCMT 060204 NSU | 0,4 | | ● | ● | ○ | ▲ | ▲ | ● | ● | ● | ▲ | ● | | ▲ | ▲ | ● | ● | ● | ● | ● | | ▲ | ● | | | | |
| | | CCMT 060208 NSU | 0,8 | | ● | ● | ○ | ▲ | ▲ | ● | ● | | | | | ▲ | ▲ | | | ● | ● | ● | | ▲ | ● | | | | |
| | | CCMT 09T302 NSU | 0,2 | ● | | ● | ○ | | | ● | | | | | | | | | | ● | ● | | | ▲ | ● | | | | |
| | | CCMT 09T304 NSU | 0,4 | ● | ● | ● | ○ | ▲ | ▲ | ● | ● | ● | ▲ | ● | | ▲ | ▲ | ● | ● | ● | ● | ● | | ▲ | ● | | | | |
| | | CCMT 09T308 NSU | 0,8 | | ● | ● | ○ | ▲ | ▲ | ● | ● | ● | ▲ | ● | | ▲ | ▲ | ● | ● | ● | ● | ● | | ▲ | ● | | | | |
| | | CCMT 120404 NSU | 0,4 | | ● | ● | ○ | ▲ | ▲ | ● | ● | ● | ▲ | ● | | ▲ | ▲ | | | ● | | | | | | | | | |
| | | CCMT 120408 NSU | 0,8 | | ● | ● | ○ | ▲ | ▲ | ● | ● | ● | ▲ | ● | | ▲ | ▲ | | | ● | | | | | | | | | |
| Light Cut | NSK | CCMT 060204 NSK | 0,4 | | | ● | ● | ▲ | ▲ | | | | | | | ▲ | | | | | | | | | | | | | |
| | | CCMT 060208 NSK | 0,8 | | | ● | ● | ▲ | ▲ | | | | | | | ▲ | | | | | | | | | | | | | |
| | | CCMT 09T304 NSK | 0,4 | | | ● | ● | ▲ | ▲ | | | | | | | ▲ | | | | | | | | | | | | | |
| | | CCMT 09T308 NSK | 0,8 | | | ● | ● | ▲ | ▲ | | | | | | | ▲ | | | | | | | | | | | | | |
| | | CCMT 120404 NSK | 0,4 | | | ● | ● | ▲ | ▲ | | | | | | | ▲ | | | | | | | | | | | | | |
| | | CCMT 120408 NSK | 0,8 | | | ● | ● | ▲ | ▲ | | | | | | | ▲ | | | | | | | | | | | | | |
| Roughing | NMU | CCMT 09T304 NMU | 0,4 | | ● | ● | ● | ▲ | ▲ | ● | ● | ● | ▲ | ● | ● | ▲ | ▲ | | | | | | | | | | | | |
| | | CCMT 09T308 NMU | 0,8 | | ● | ● | ● | ▲ | ▲ | ● | ● | ● | ▲ | ● | ● | ▲ | ▲ | | | | | | | | | | | | |
| Roughing | | CCMW 09T304 | 0,4 | | | | | | | | | ● | | ● | | | | | | | | | | | | | | | |
| | | CCMW 09T308 | 0,8 | | | | | | | | | ● | | ● | | | | | | | | | | | | | | | |

● = Euro stock ● = 1-st recommended item
○ = Stock item in Japan
▲ = To be replaced by new item

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

## 80° Diamond Type

11° Relief
With Insert Hole




| Dimensions (mm) | | | | |
|---|---|---|---|---|
| CP__ | ℓ | ød (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 | |

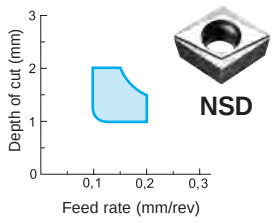


⇨ E15

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

## CPGT ●●●●●● NSD

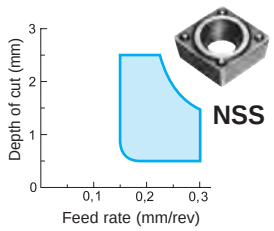
● G-Class Bumpy Chipbreaker

| Application | Shape | ISO Cat. No. | r | Carbide Coated P AC805P | AC810P | AC820P | AC830P | M AC2000 | AC3000 | PM AC610M | AC630M | K AC405K | AC410K | AC415K | AC420K | AC700G | AC900G | Carbide Coated ZX-Coated KS AC510U | MS AC520U | PM AC530U | Cermet Uncoated P T2000Z | T3000Z | T110A | T1200A | T1500A | Carbide Uncoated K G10E | S EH510 | EH520 | H H1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Finishing ~ Light Cut |  NSD | CPGT 080202 NSD | 0,2 | | | | | | | | | | | | | | | | | | ● | | | ▲ | | | | | |
| | | CPGT 080204 NSD | 0,4 | | | | | | | | | | | | | | | | | | ● | | | ▲ | | | | | |
| | | CPGT 090304 NSD | 0,4 | | | | | | | | | | | | | | | | | | | | | ▲ | ● | | | | |



## CPMH ●●●●●● NSS

● M-Class Bumpy Chipbreaker

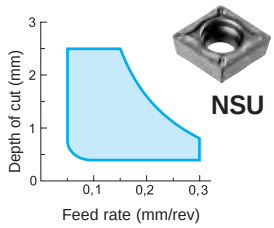
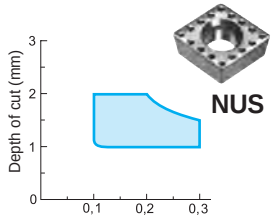
| Application | Shape | ISO Cat. No. | r | Carbide Coated P AC805P | AC810P | AC820P | AC830P | M AC2000 | AC3000 | PM AC610M | AC630M | K AC405K | AC410K | AC415K | AC420K | AC700G | AC900G | Carbide Coated ZX-Coated KS AC510U | MS AC520U | PM AC530U | Cermet Uncoated P T2000Z | T3000Z | T110A | T1200A | T1500A | Carbide Uncoated K G10E | S EH510 | EH520 | H H1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Light Cut |  NSS | CPMH 090308 NSS | 0,8 | | | | | ▲ | | | | | | | | | | | | | | | | | | | | | |



The shape of insert hole : ___T /A/W  ___H 

## CPMT ●●●●●● ●-■■

● M-Class Bumpy Chipbreaker

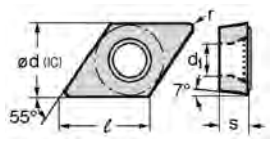
| Application | Shape | ISO Cat. No. | r | Carbide Coated P AC805P | AC810P | AC820P | AC830P | M AC2000 | AC3000 | PM AC610M | AC630M | K AC405K | AC410K | AC415K | AC420K | AC700G | AC900G | Carbide Coated ZX-Coated KS AC510U | MS AC520U | PM AC530U | Cermet Uncoated P T2000Z | T3000Z | T110A | T1200A | T1500A | Carbide Uncoated K G10E | S EH510 | EH520 | H H1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Light Cut |  NSU | CPMT 080204 NSU | 0,4 | | ○ | ○ | ○ | | | ○ | ○ | | | | | | | | | | | | | | | | | | |
| | | CPMT 080208 NSU | 0,8 | | ○ | ○ | ○ | | | ○ | ○ | | | | | | | | | | | | | | | | | | |
| | | CPMT 090304 NSU | 0,4 | | ○ | ○ | ○ | | | ○ | ○ | | | | | | | | | | | | | | | | | | |
| | | CPMT 090308 NSU | 0,8 | | ○ | ○ | ○ | | | ○ | ○ | | | | | | | | | | | | | | | | | | |
| Light Cut |  NUS | CPMT 060204 NUS | 0,4 | | | | | | ▲ | | | | | | | | | | | | | | | | | | | | |
| | | CPMT 09T308 NUS | 0,8 | | | | | ▲ | ▲ | | | | | | | | | | | | | | | | | | | | |



● = Euro stock ● = 1-st recommended item
○ = Stock item in Japan
▲ = To be replaced by new item

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

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 | |
| | | | | |

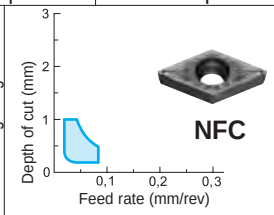
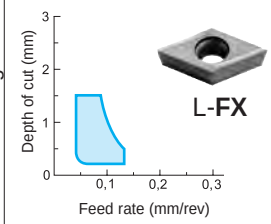
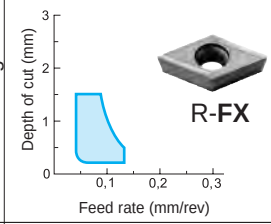
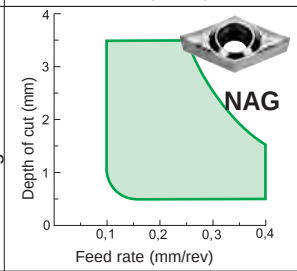
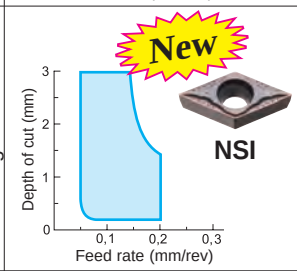
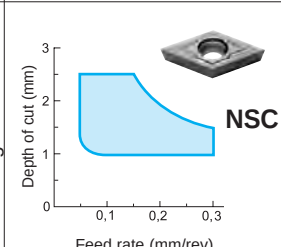


➪ D30~31 ➪ E16~17

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

# DCGT ●●●●●● ●-■■

● G-Class Handed and Bumpy Chipbreaker

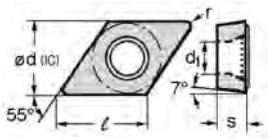
| Application | Shape | ISO Cat. No. | r | Carbide Coated P AC805P | Carbide Coated P AC810P | Carbide Coated P **AC820P** | Carbide Coated P AC830P | Carbide Coated M AC610M | Carbide Coated P/M AC630M | Carbide Coated K **AC405K** | Carbide Coated K AC410K | Carbide Coated K **AC415K** | Carbide Coated K AC420K | Carbide Coated K AC700G | Carbide Coated K AC900G | Carbide ZX-Coated K/S AC510U | Carbide ZX-Coated M/S AC520U | Carbide ZX-Coated P/M AC530U | Cermet Uncoated P **T2000Z** | Cermet Uncoated P T3000Z | Cermet Uncoated P T110A | Cermet Uncoated P T1200A | Cermet Uncoated P T1500A | Carbide Uncoated K G10E | Carbide Uncoated S EH510 | Carbide Uncoated S EH520 | Carbide Uncoated H H1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Finishing ~ Light Cut |  NFC | DCGT 070201 NFC | 0,1 | | | | | | | | | | | | | ○ | ● | | | | | | | | | | |
| | | DCGT 070202 NFC | 0,2 | | | | | | | | | | | | | ○ | ● | | | | | | | | | | |
| | | DCGT 070204 NFC | 0,4 | | | | | | | | | | | | | ○ | ● | | | | | | | | | | |
| | | DCGT 11T301 NFC | 0,1 | | | | | | | | | | | | | ○ | ● | | | | | | | | | | |
| | | DCGT 11T302 NFC | 0,2 | | | | | | | | | | | | | ○ | ● | | | | | | | | | | |
| | | DCGT 11T304 NFC | 0,4 | | | | | | | | | | | | | ○ | ● | | | | | | | | | | |
| Finishing |  L-FX | DCGT 0702003 LFX | 0,03 | | | | | | | | | | | | | ○ | ○ | | | | | | | | | | |
| | | DCGT 070201 LFX | 0,1 | | | | | | | | | | | | | ○ | ● | ● | | | | ▲ | ● | | | | |
| | | DCGT 070202 LFX | 0,2 | | | | | | | | | | | | | ○ | ● | ● | | | | ▲ | ● | | | | |
| | | DCGT 070204 LFX | 0,4 | | | | | | | | | | | | | | ● | ● | | | | ▲ | ● | | | | |
| | | DCGT 11T3003 LFX | 0,03 | | | | | | | | | | | | | ○ | ○ | | | | | | | | | | |
| | | DCGT 11T301 LFX | 0,1 | | | | | | | | | | | | | ○ | ● | ● | | | | ▲ | ● | | | | |
| | | DCGT 11T302 LFX | 0,2 | | | | | | | | | | | | | ○ | ● | ● | | | | ▲ | ● | | | | |
| | | DCGT 11T304 LFX | 0,4 | | | | | | | | | | | | | | ● | ● | | | | ▲ | ● | | | | |
| Finishing |  R-FX | DCGT 0702003 RFX | 0,03 | | | | | | | | | | | | | ○ | ○ | | | | | | | | | | |
| | | DCGT 070201 RFX | 0,1 | | | | | | | | | | | | | ○ | ● | ● | | | | ▲ | ● | | | | |
| | | DCGT 070202 RFX | 0,2 | | | | | | | | | | | | | ○ | ● | ● | | | | ▲ | ● | | | | |
| | | DCGT 070204 RFX | 0,4 | | | | | | | | | | | | | | ● | ● | | | | ▲ | ● | | | | |
| | | DCGT 11T3003 RFX | 0,03 | | | | | | | | | | | | | ○ | ○ | | | | | | | | | | |
| | | DCGT 11T301 RFX | 0,1 | | | | | | | | | | | | | ○ | ● | ● | | | | ▲ | ● | | | | |
| | | DCGT 11T302 RFX | 0,2 | | | | | | | | | | | | | ○ | ● | ● | | | | ▲ | ● | | | | |
| | | DCGT 11T304 RFX | 0,4 | | | | | | | | | | | | | | ● | ● | | | | ▲ | ● | | | | |
| Light Cut |  NAG | DCGT 070202 NAG | 0,2 | | | | | | | | | | | | | | | | | | | | | | | | ● |
| | | DCGT 070204 NAG | 0,4 | | | | | | | | | | | | | | | | | | | | | | | | ● |
| | | DCGT 11T302 NAG | 0,2 | | | | | | | | | | | | | | | | | | | | | | | | ● |
| | | DCGT 11T304 NAG | 0.4 | | | | | | | | | | | | | | | | | | | | | | | | ● |
| | | DCGT 11T308 NAG | 0.8 | | | | | | | | | | | | | | | | | | | | | | | | ● |
| Light cut |  New NSI | DCGT 070201M NSI | 0,1 | | | | | ● | ● | | | | | | | ● | ● | ● | | | | | | | | | |
| | | DCGT 070202M NSI | 0,2 | | | | | ● | ● | | | | | | | ● | ● | ● | | | | | | | | | |
| | | DCGT 070204M NSI | 0,4 | | | | | ● | ● | | | | | | | ● | ● | ● | | | | | | | | | |
| | | DCGT 11T301M NSI | 0,1 | | | | | ● | ● | | | | | | | ● | ● | ● | | | | | | | | | |
| | | DCGT 11T302M NSI | 0,2 | | | | | ● | ● | | | | | | | ● | ● | ● | | | | | | | | | |
| | | DCGT 11T304M NSI | 0,4 | | | | | ● | ● | | | | | | | ● | ● | ● | | | | | | | | | |
| | | DCGT 11T308M NSI | 0,8 | | | | | ● | ● | | | | | | | ● | ● | ● | | | | | | | | | |
| Light cut |  NSC | DCGT 0702003 NSC | 0,03 | | | | | | | | | | | | | | | ○ | | | | | | | | | |
| | | DCGT 070201 NSC | 0,1 | | | | | | | | | | | | | | | ● | ● | | | ▲ | ● | | | | |
| | | DCGT 070202 NSC | 0,2 | | | | | | | | | | | | | | | ● | ● | | | ▲ | ● | | | | |
| | | DCGT 070204 NSC | 0,4 | | | | | | | | | | | | | | | ● | ● | | | ▲ | ● | | | | |
| | | DCGT 110302 NSC | 0,2 | | | | | | | | | | | | | | | | ● | | | ▲ | ● | | | | |
| | | DCGT 11T3003 NSC | 0,03 | | | | | | | | | | | | | | | ○ | | | | | | | | | |
| | | DCGT 11T301 NSC | 0,1 | | | | | | | | | | | | | | | ● | ● | | | ▲ | ● | | | | |
| | | DCGT 11T302 NSC | 0,2 | | | | | | | | | | | | | | | ● | ● | | | ▲ | ● | | | | |
| | | DCGT 11T304 NSC | 0,4 | | | | | | | | | | | | | | | ● | ● | | | ▲ | ● | | | | |
| | | DCGT 11T308 NSC | 0,8 | | | | | | | | | | | | | | | ● | ● | | | ▲ | ● | | | | |

● = Euro stock ● = 1-st recommended item
○ = Stock item in Japan
▲ = To be replaced by new item

Packing unit and ordering example; 10 pcs. DCGT 070201 NFC, AC530U

# D DIAMOND TYPE
INSERTS FOR TURNING

**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 |
| 11T3-- | 11,6 | 9,525 | 3,97 | 4,4 |
| | | | | |

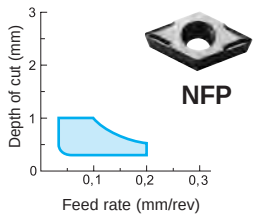
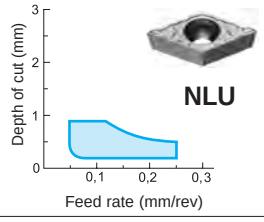
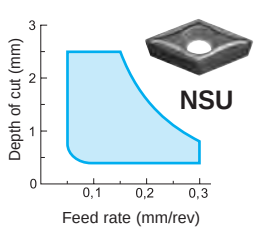
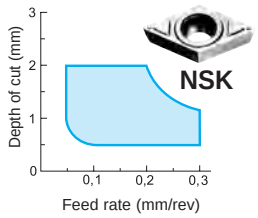
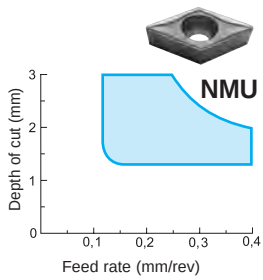


⇨ D31~31 ⇨ E16~17

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

## DCMT ●●●●●● ●-■■

● M-Class Bumpy Chipbreaker

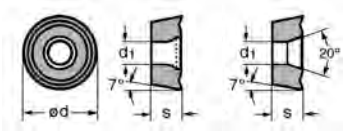
| Application | Shape | ISO Cat. No. | r | Carbide Coated P | Carbide Coated P/M | Carbide Coated M | Carbide Coated K | Carbide ZX-Coated K/S | Carbide ZX-Coated M/S | Carbide ZX-Coated P/M | Cermet Uncoated P | Carbide Uncoated K | Carbide Uncoated S | Carbide Uncoated H |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | AC805P | AC810P | **AC820P** | AC830P | AC2000 | AC3000 | AC610M | AC630M | **AC405K** | AC410K | **AC415K** | AC420K | AC700G | AC900G | AC510U | AC520U | AC530U | **T2000Z** | T3000Z | T110A | T1200A | T1500A | G10E | EH510 | EH520 | H1 |
| Finishing ~ Light Cut |  NFP | **DCMT 070202 NFP** | 0,2 | | | | | | | | | | | | | | | | | | ● | ● | | ▲ | ● | | | | |
| | | **DCMT 070204 NFP** | 0,4 | | | | | | | | | | | | | | | | | | ● | ● | ● | ▲ | ● | | | | |
| | | **DCMT 11T302 NFP** | 0,2 | | | | | | | | | | | | | | | | | | ● | ● | | ▲ | ● | | | | |
| | | **DCMT 11T304 NFP** | 0,4 | | | | | | | | | | | | | | | | | | ● | ● | ● | ▲ | ● | | | | |
| | | **DCMT 11T308 NFP** | 0,8 | | | | | | | | | | | | | | | | | | ● | ● | ● | ▲ | ● | | | | |
| | | **DCMT 11T312 NFP** | 1,2 | | | | | | | | | | | | | | | | | | ● | ● | ● | ▲ | ● | | | | |
| Finishing |  NLU | **DCMT 070202 NLU** | 0,2 | | ● | ● | | | | ● | ● | | | | | ▲ | ▲ | | | ● | | ● | | | | | | | |
| | | **DCMT 070204 NLU** | 0,4 | | ● | ● | | | | ● | ● | | | | | ▲ | ▲ | | | ● | | ● | | | | | | | |
| | | **DCMT 11T302 NLU** | 0,2 | | ● | ● | | | | ● | ● | | | | | ▲ | ▲ | | | ● | | ● | | | | | | | |
| | | **DCMT 11T304 NLU** | 0,4 | ● | ● | ● | | | | ● | ● | | | | | ▲ | ▲ | | | ● | | ● | | | | | | | |
| | | **DCMT 11T308 NLU** | 0,8 | ● | ● | ● | | | | ● | ● | | | | | ▲ | ▲ | | | ● | | ● | | | | | | | |
| Light Cut |  NSU | **DCMT 070202 NSU** | 0,2 | | ● | ● | ○ | ▲ | ▲ | ● | ● | ● | ▲ | ● | | ▲ | ▲ | ● | ● | ● | ● | ● | | ▲ | ● | | | | |
| | | **DCMT 070204 NSU** | 0,4 | | ● | ● | ○ | ▲ | ▲ | ● | ● | ● | ▲ | ● | | ▲ | ▲ | ● | ● | ● | ● | ● | | ▲ | ● | | | | |
| | | **DCMT 070208 NSU** | 0,8 | | ● | ● | ○ | ▲ | ▲ | ● | ● | ● | ▲ | ● | | ▲ | ▲ | | | ● | | | | | | | | | |
| | | **DCMT 11T302 NSU** | 0,2 | | ● | ● | ○ | | | ● | | ● | ▲ | ● | | ▲ | | | | ● | ● | | | | | | | | |
| | | **DCMT 11T304 NSU** | 0,4 | ● | ● | ● | ○ | ▲ | ▲ | ● | ● | ● | ▲ | ● | | ▲ | ▲ | ● | ● | ● | ● | ● | | ▲ | ● | | | | |
| | | **DCMT 11T308 NSU** | 0,8 | ● | ● | ● | ○ | ▲ | ▲ | ● | ● | ● | ▲ | ● | | ▲ | ▲ | ● | ● | ● | ● | ● | | ▲ | ● | | | | |
| Light Cut |  NSK | **DCMT 070204 NSK** | 0,4 | | | ● | ● | ▲ | ▲ | | | | | | | ▲ | | | | | | | | | | | | | |
| | | **DCMT 070208 NSK** | 0,8 | | | ● | ● | ▲ | ▲ | | | | | | | ▲ | | | | | | | | | | | | | |
| | | **DCMT 11T304 NSK** | 0,4 | | | ● | ● | ▲ | ▲ | | | | | | | ▲ | | | | | | | | | | | | | |
| | | **DCMT 11T308 NSK** | 0,8 | | | ● | ● | ▲ | ▲ | | | | | | | ▲ | | | | | | | | | | | | | |
| | | **DCMT 11T312 NSK** | 1,2 | | | ● | | | | | | | | | | | | | | | | | | | | | | | |
| Roughing |  NMU | **DCMT 11T304 NMU** | 0,4 | | ● | ● | ● | ▲ | ▲ | ● | ● | ● | ▲ | ● | ● | ▲ | ▲ | | | | | | | | | | | | |
| | | **DCMT 11T308 NMU** | 0,8 | | ● | ● | ● | ▲ | ▲ | ● | ● | ● | ▲ | ● | ● | ▲ | ▲ | | | | | | | | | | | | |
| Roughing |  | **DCMW 11T304** | 0,4 | | | | | | | | | ● | | ● | | | | | | | | | | | | | | |
| | | **DCMW 11T308** | 0,8 | | | | | | | | | ● | | ● | | | | | | | | | | | | | | |

● = Euro stock ● = 1-st recommended item
○ = Stock item in Japan
▲ = To be replaced by new item

Packing unit and ordering example; 10 pcs. DCMT 070202 NFP, T2000Z

Round Type Inserts | 7° Relief | With Insert Hole

RCMT RCMX




| RC__ | ℓ | ød (IC) | s | $d_1$ |
|---|---|---|---|---|
| 1003 | – | 10,0 | 3,18 | 3,6 |
| 10T3 | | | 3,97 | |
| 12 | – | 12,0 | 4,76 | 4,2 |
| 16 | – | 16,0 | 6,35 | 5,2 |
| 20 | – | 20,0 | 6,35 | 6,5 |
| 25 | – | 25,0 | 7,94 | 7,2 |
| 32 | – | 32,0 | 9,52 | 9,5 |

(M0: IC ist metrisch.)

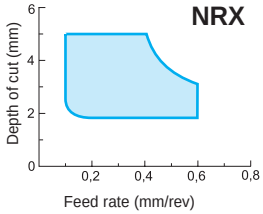


Lever lock holders for RCMX
⇨ D32~33

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

## RCMT ●●●●M0 ●-■■

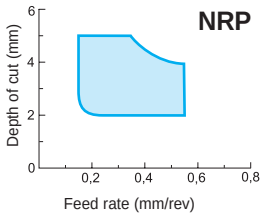
● M-Class Bumpy Chipbreaker

| Application | Shape | ISO Cat. No. | r | AC805P | AC810P | AC820P | AC830P | AC2000 | AC3000 | AC610M | AC630M | AC405K | AC410K | AC415K | AC420K | AC700G | AC900G | AC510U | AC520U | AC530U | T2000Z | T3000Z | T110A | T1200A | T1500A | G10E | EH510 | EH520 | H1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carbide | | | | | | | | | | | | | | | | | Cermet | | Carbide | | | | | | |
| | | | | Coated | | | | | | | | | | | | | | ZX-Coated | | | Uncoated | | | | | | | | | |
| | | | | P | | | | | | M | P M | | | K | | | | K S | M S | P M | P | | | | | K | S | | H |
| Roughing |  NRX  | RCMT 1003M0 NRX | – | | ● | ● | ● | ▲ | ▲ | | ● | | | | | ▲ | ▲ | | | | | | | | | | | | |
| | | RCMT 10T3M0 NRX | – | | ● | ● | ● | | | | ● | | | | | ▲ | ▲ | | | | | | | | | | | | |
| | | RCMT 1204M0 NRX | – | | ● | ● | ● | ▲ | ▲ | | ● | | | | | ▲ | ▲ | | | | | | | | | | | | |
| | | RCMT 1606M0 NRX | – | | ● | ● | ● | ▲ | ▲ | | ● | | | | | ▲ | ▲ | | | | | | | | | | | | |
| | | RCMT 2006M0 NRX | – | | ● | ● | ● | ▲ | ▲ | | ● | | | | | ▲ | ▲ | | | | | | | | | | | | |
| | | RCMT 2507M0 NRX | – | | ● | ● | ● | ▲ | ▲ | | ● | | | | | | ▲ | | | | | | | | | | | | |

Depth of cut (mm): 0, 2, 4, 6
Feed rate (mm/rev): 0,2 0,4 0,6 0,8

## RCMX ●●●●M0 ●-■■

● M-Class Grooved Chipbreaker

| Application | Shape | ISO Cat. No. | r | AC805P | AC810P | AC820P | AC830P | AC2000 | AC3000 | AC610M | AC630M | AC405K | AC410K | AC415K | AC420K | AC700G | AC900G | AC510U | AC520U | AC530U | T2000Z | T3000Z | T110A | T1200A | T1500A | G10E | EH510 | EH520 | H1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carbide | | | | | | | | | | | | | | | | | Cermet | | Carbide | | | | | | |
| | | | | Coated | | | | | | | | | | | | | | ZX-Coated | | | Uncoated | | | | | | | | | |
| | | | | P | | | | | | M | P M | | | K | | | | K S | M S | P M | P | | | | | K | S | | H |
| Roughing |  NRP  | RCMX 1003M0 NRP | – | | ❍ | ● | ● | ▲ | ▲ | | | | | | | | | | | | | | | | | | | | |
| | | RCMX 1204M0 NRP | – | | ❍ | ● | ● | ▲ | ▲ | | | | | | | | | ❍ | | | | | | | | | | | | |
| | | RCMX 1606M0 NRP | – | | ❍ | ● | ● | ▲ | ▲ | | | | | | | | | | | | | | | | | | | | |
| | | RCMX 2006M0 NRP | – | | ❍ | ● | ● | ▲ | ▲ | | | | | | | | | ❍ | | | | | | | | | | | | |
| | | RCMX 2507M0 NRP | – | | ❍ | ● | ❍ | | | | | | | | | | | | | | | | | | | | | | |
| | | RCMX 3209M0 NRP | – | | ❍ | ❍ | | | | | | | | | | | | | | | | | | | | | | | |

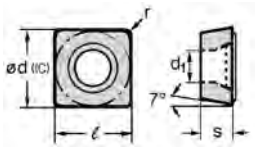
Depth of cut (mm): 0, 2, 4, 6
Feed rate (mm/rev): 0,2 0,4 0,6 0,8

● = Euro stock ● = 1-st recommended item
❍ = Stock item in Japan
▲ = To be replaced by new item

Packing unit and ordering example; 10 pcs. RCMT 1003M0 NRX, AC810P

# S SQUARE TYPE
INSERTS FOR TURNING

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




| Dimensions (mm) | | | | |
|---|---|---|---|---|
| SC__ | ℓ | ød (IC) | s | $d_1$ |
| 09 | 9,525 | 9,525 | 3,97 | 4,4 |
| 12 | 12,7 | 12,7 | 4,76 | 5,5 |



⇨ D34

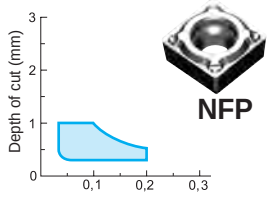
"S ... SSKC" - Type
(⇨ Stock in Japan)

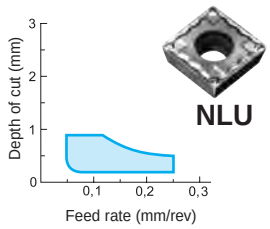
- P Steel
- M Stainless Steel
- K Cast Iron
- N Non-Ferrous Metals
- S Super Alloy
- H Hardened Steel

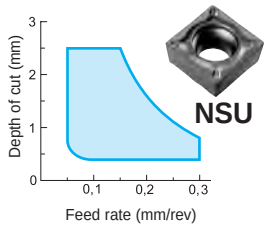
## SCMT ●●●●●● ●-■■

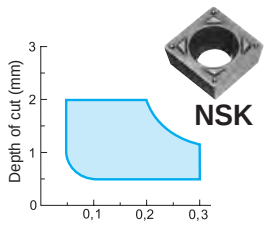
● M-Class Bumpy Chipbreaker

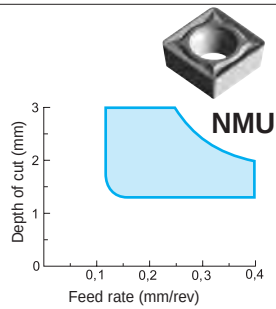
| Application | Shape | ISO Cat. No. | r | Carbide Coated P AC805P | Carbide Coated P AC810P | Carbide Coated P **AC820P** | Carbide Coated P AC830P | Carbide Coated M AC2000 | Carbide Coated M AC3000 | Carbide Coated PM AC610M | Carbide Coated PM AC630M | Carbide Coated K **AC405K** | Carbide Coated K AC410K | Carbide Coated K **AC415K** | Carbide Coated K AC420K | Carbide Coated K AC700G | Carbide Coated K AC900G | ZX-Coated KS AC510U | ZX-Coated MS AC520U | ZX-Coated PM AC530U | Cermet P **T2000Z** | Cermet P T3000Z | Uncoated P T110A | Uncoated P T1200A | Uncoated P T1500A | Carbide K G10E | Carbide S EH510 | Carbide S EH520 | Carbide H H1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Finishing ~ Light Cut | NFP | SCMT 09T304 NFP | 0,4 | | | | | | | | | | | | | | | | | | ● | | | ▲ | ● | | | | |
| | | SCMT 09T308 NFP | 0,8 | | | | | | | | | | | | | | | | | | ● | | | ▲ | ● | | | | |
| Finishing | NLU | SCMT 09T304 NLU | 0,4 | | ● | | | | | | | | | | | | | | | | | | | | | | | | |
| | | SCMT 09T308 NLU | 0,8 | | ● | | | | | | | | | | | | | | | | | | | | | | | | |
| Light Cut | NSU | SCMT 09T304 NSU | 0,4 | | ● | ● | ○ | ▲ | ▲ | ● | ● | ● | ▲ | ● | | ▲ | ▲ | ● | ● | ● | | | | | | | | | |
| | | SCMT 09T308 NSU | 0,8 | | ● | ● | ○ | ▲ | ▲ | ● | ● | ● | ▲ | ● | | ▲ | ▲ | ● | ● | ● | | | | | | | | | |
| | | SCMT 120404 NSU | 0,4 | | ● | ● | ○ | ▲ | ▲ | ● | ● | ● | ▲ | ● | | ▲ | ▲ | | | ● | | | | | | | | | |
| | | SCMT 120408 NSU | 0,8 | | ● | ● | ○ | ▲ | ▲ | ● | ● | ● | ▲ | ● | | ▲ | ▲ | | | ● | | | | | | | | | |
| Light Cut | NSK | SCMT 09T304 NSK | 0,4 | | | ● | ● | ▲ | ▲ | | | | | | | | | | | | | | | | | | | | |
| | | SCMT 09T308 NSK | 0,8 | | | ● | ● | ▲ | ▲ | | | | | | | | | | | | | | | | | | | | |
| | | SCMT 120404 NSK | 0,4 | | | ● | | ▲ | | | | | | | | | | | | | | | | | | | | | |
| | | SCMT 120408 NSK | 0,8 | | | ● | ● | ▲ | ▲ | | | | | | | | | | | | | | | | | | | | |
| | | SCMT 120412 NSK | 1,2 | | | ● | | ▲ | | | | | | | | | | | | | | | | | | | | | |
| Roughing | NMU | SCMT 09T308 NMU | 0,8 | | | ● | ● | ▲ | ▲ | | ○ | ● | ▲ | ● | ● | | | | | | | | | | | | | | |
| | | SCMT 120408 NMU | 0,8 | | | ● | ● | ▲ | ▲ | | ○ | ● | ▲ | ● | ● | | | | | | | | | | | | | | |
| | | SCMT 120412 NMU | 1,2 | | | | | | | | | ● | | ● | | | | | | | | | | | | | | | |



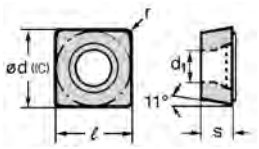




● = Euro stock ● = 1-st recommended item
○ = Stock item in Japan
▲ = To be replaced by new item

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

90° Square Type | 11° Relief | With Insert Hole




| Dimensions (mm) | | | | |
|---|---|---|---|---|
| SP_ _ | ℓ | ød (IC) | s | $d_1$ |
| 0903-- | 9,525 | 9,525 | 3,18 | 3,3 |

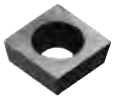


⇨ E18

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

## SPGW ●●●●●●

● G-Class No Chipbreaker

| Application | Shape | ISO Cat. No. | r |
|---|---|---|---|
| Light Cut |  | **SPGW 090304 T** | 0,4 |

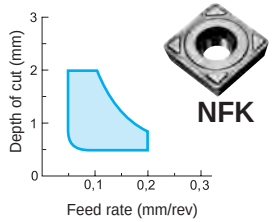
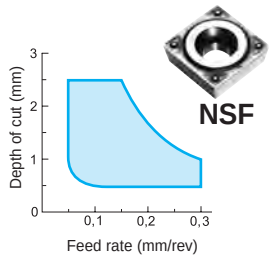
| Carbide | | | | | | | | | | | | | | | Cermet | | Carbide | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Coated | | | | | | | | | | | ZX-Coated | | | Uncoated | | | | | |
| P | | | | | | M | PM | K | | | KS | MS | PM | P | | | K | S | H |
| AC805P | AC810P | **AC820P** | AC830P | AC2000 | AC3000 | AC610M | AC630M | **AC405K** | AC410K | **AC415K** | AC420K | AC700G | AC900G | AC510U | AC520U | AC530U | **T2000Z** | T3000Z | T110A | T1200A | T1500A | G10E | EH510 | EH520 | H1 |
| | | | | | | | | | | | | | | | | | | | ▲ | ● | | | | | |

SPGW / SPMT ..... NFK / NSF




## SPMT ●●●●●● ●-■■

● M-Class Bumpy Chipbreaker

| Application | Shape | ISO Cat. No. | r |
|---|---|---|---|
| Finishing |   | **SPMT 090304 NFK**<br>**SPMT 090308 NFK** | 0,4<br>0,8 |
| Light Cut |   | **SPMT 090304 NSF**<br>**SPMT 090308 NSF** | 0,4<br>0,8 |

| Carbide | | | | | | | | | | | | | | | Cermet | | Carbide | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Coated | | | | | | | | | | | ZX-Coated | | | Uncoated | | | | | |
| P | | | | | | M | PM | K | | | KS | MS | PM | P | | | K | S | H |
| AC805P | AC810P | **AC820P** | AC830P | AC2000 | AC3000 | AC610M | AC630M | **AC405K** | AC410K | **AC415K** | AC420K | AC700G | AC900G | AC510U | AC520U | AC530U | **T2000Z** | T3000Z | T110A | T1200A | T1500A | G10E | EH510 | EH520 | H1 |
| | | ● | ● | ▲ | ▲ | | | | | | | | | | | | | | | ▲ ● | | | | | |
| | | ● | ● | | | | | | | | | | | | | | | | | ▲ | | | | | |
| | | ○ | ○ | | | | | | | | | | | | | | | | | | | | | | |

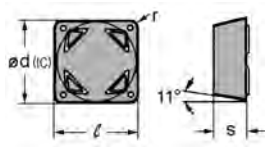


● = Euro stock ● = 1-st recommended item
○ = Stock item in Japan
▲ = To be replaced by new item

Packing unit and ordering example; 10 pcs. SPMT 090304 NFK, T1200A

# S SQUARE TYPE
## INSERTS FOR TURNING

**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 M K N S H



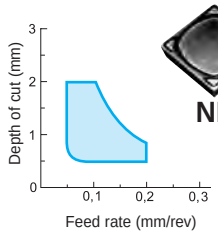
"S… CSKP…09/12" - Type
(⇨ Stock in Japan)

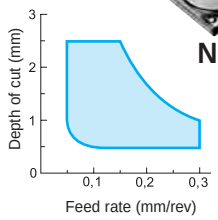
- P Steel
- M Stainless Steel
- K Cast Iron
- N Non-Ferrous Metals
- S Super Alloy
- H Hardened Steel

## SPMR ●●●●●● ●-■■

● M-Class Bumpy Chipbreaker

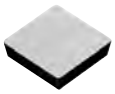
| Application | Shape | ISO Cat. No. | r | AC805P | AC810P | AC820P | AC830P | AC2000 | AC3000 | AC610M | AC630M | AC405K | AC410K | AC415K | AC420K | AC700G | AC900G | AC510U | AC520U | AC530U | T2000Z | T3000Z | T110A | T1200A | T1500A | G10E | EH510 | EH520 | H1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Finishing |  NFK | SPMR 090304 NFK | 0,4 | | | | | | | | | | | | | | | | | | | | | ▲ | ● | | | | |
| | | SPMR 090304 NFK | 0,8 | | | | | | | | | | | | | | | | | | | | | ▲ | | | | | |
| Light Cut |  NSF | SPMR 090304 NSF | 0,4 | | | ○ | ○ | | | | | | | | | | | | | | | | | | | | | | |
| | | SPMR 090308 NSF | 0,8 | | | ● | ● | ▲ | ▲ | | | | | | | | | | | | | | | | | | | | |
| | | SPMR 120304 NSF | 0,4 | | | ● | ● | ▲ | | | | | | | | | | | | | | | | | | | | | |
| | | SPMR 120308 NSF | 0,8 | | | ● | ● | ▲ | | | | | | | | | | | | | | | | | | | | | |
| | | SPMR 120312 NSF | 1,2 | | | ● | | ▲ | | | | | | | | | | | | | | | | | | | | | |




## SPGN ●●●●●●

● G-Class No Chipbreaker

| Application | Shape | ISO Cat. No. | r | AC805P | AC810P | AC820P | AC830P | AC2000 | AC3000 | AC610M | AC630M | AC405K | AC410K | AC415K | AC420K | AC700G | AC900G | AC510U | AC520U | AC530U | T2000Z | T3000Z | T110A | T1200A | T1500A | G10E | EH510 | EH520 | H1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Light Cut |  | SPGN 090304 T | 0,4 | | | | | | | | | | | | | | | | | | | | | ▲ | ● | | | | |
| | | SPGN 090308 T | 0,8 | | | | | | | | | | | | | | | | | | | | | ▲ | ● | | | | |

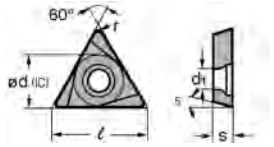
● = Euro stock ● = 1-st recommended item
○ = Stock item in Japan
▲ = To be replaced by new item

Packing unit and ordering example; 10 pcs. SPMR 090304 NFK, T1200A

Pos. Inserts
C
D
K
R
S
T
V
W

## 60° Triangle Type

5° Relief
With Insert Hole




Dimensions (mm)

| TB_ _ | ℓ | ød (IC) | s | d1 |
|---|---|---|---|---|
| 0601-- | 6,9 | 3,97 | 1,59 | 2,3 |

P
M
K
N
S
H

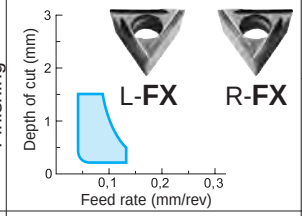
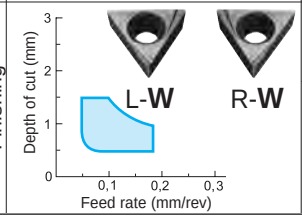


⇨ E20

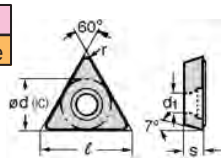
P Steel
M Stainless Steel
K Cast Iron
N Non-Ferrous Metals
S Super Alloy
H Hardened Steel

# TBGT ●●●●●● ●-■■

● G-Class Handed Chipbreaker

| Application | Shape | ISO Cat. No. | r | Carbide: Coated: P: AC805P | AC810P | AC820P | AC830P | Coated: M/P/M: AC2000 | AC3000 | AC610M | AC630M | Coated: K: AC405K | AC410K | AC415K | AC420K | AC700G | AC900G | ZX-Coated: K/S: AC510U | ZX-Coated: M/S: AC520U | ZX-Coated: P/M: AC530U | Cermet: P: T2000Z | T3000Z | Uncoated: P: T110A | T1200A | T1500A | Carbide: Uncoated: K: G10E | S: EH510 | EH520 | H: H1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Finishing |   | TBGT 060102 LFX | 0,2 | | | | | | | | | | | | | | | ○ | | ○ | | | | | | | | | |
| | | TBGT 060104 LFX | 0,4 | | | | | | | | | | | | | | | ○ | | ○ | | | | | | | | | |
| | | TBGT 060102 RFX | 0,2 | | | | | | | | | | | | | | | ○ | | ○ | | | | | | | | | |
| | | TBGT 060104 RFX | 0,4 | | | | | | | | | | | | | | | ○ | | ○ | | | | | | | | | |
| Finishing |   | TBGT 060102 LW | 0,2 | | | | | | | | | | | | | | | | | ○ | | | ● | ▲ | ● | | | | |
| | | TBGT 060104 LW | 0,4 | | | | | | | | | | | | | | | | | ○ | | | ● | ▲ | ● | | | | |
| | | TBGT 060102 RW | 0,2 | | | | | | | | | | | | | | | | | ○ | | | | ▲ | ● | | | | |
| | | TBGT 060104 RW | 0,4 | | | | | | | | | | | | | | | | | ○ | | | | ▲ | ● | | | | |

## 0° Relief
## Without Insert Hole




Dimensions (mm)

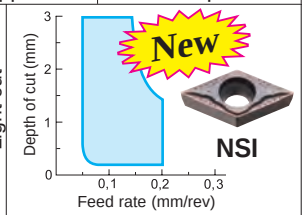
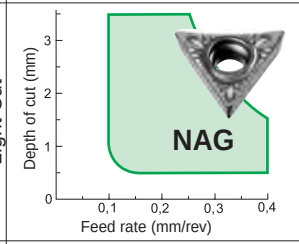
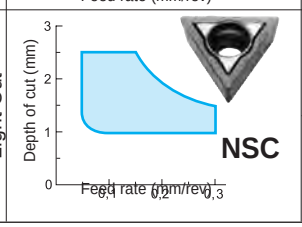
| TC_ _ | ℓ | ød (IC) | s | d1 |
|---|---|---|---|---|
| 0802-- | 8,2 | 4,76 | 2,38 | 2,3 |
| 0902-- | 9,62 | 5,56 | 2,38 | 2,5 |
| 1102-- | 11,0 | 6,35 | 2,38 | 2,8 |
| 16T3-- | 16,5 | 9,525 | 3,97 | 4,3 |



⇨ D35 ⇨ E19

# TCGT ●●●●●● ●-■■

● G-Class Bumpy Chipbreaker

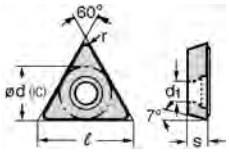
| Application | Shape | ISO Cat. No. | r | Carbide: Coated: P: AC805P | AC810P | AC820P | AC830P | Coated: M/P/M: AC2000 | AC3000 | AC610M | AC630M | Coated: K: AC405K | AC410K | AC415K | AC420K | AC700G | AC900G | ZX-Coated: K/S: AC510U | ZX-Coated: M/S: AC520U | ZX-Coated: P/M: AC530U | Cermet: P: T2000Z | T3000Z | Uncoated: P: T110A | T1200A | T1500A | Carbide: Uncoated: K: G10E | S: EH510 | EH520 | H: H1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Light cut |   | TCGT 110204M NSI | 0,4 | | | | | | | ● | ● | | | | | | | ● | ● | ● | | | | | | | | | |
| Light Cut |   | TCGT 110202 NAG | 0,2 | | | | | | | | | | | | | | | | | | | | | | | | | | ● |
| | | TCGT 110204 NAG | 0,4 | | | | | | | | | | | | | | | | | | | | | | | | | | ● |
| | | TCGT 16T304 NAG | 0,4 | | | | | | | | | | | | | | | | | | | | | | | | | | ● |
| | | TCGT 16T308 NAG | 0,8 | | | | | | | | | | | | | | | | | | | | | | | | | | ● |
| Light Cut |   | TCGT 090201 NSC | 0,1 | | | | | | | | | | | | | | | | | ○ | | | | | | | | | |
| | | TCGT 090202 NSC | 0,2 | | | | | | | | | | | | | | | | | ○ | | | | ▲ | ● | | | | |
| | | TCGT 090204 NSC | 0,4 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | TCGT 110202 NSC | 0,2 | | | | | | | | | | | | | | | | | ● | | | | ▲ | ● | | | | |
| | | TCGT 110204 NSC | 0,4 | | | | | | | | | | | | | | | | | ● | | | | ▲ | ● | | | | |

● = Euro stock ● = 1-st recommended item
○ = Stock item in Japan
▲ = To be replaced by new item

Packing unit and ordering example; 10 pcs. TBGT 060102 LW, T1200A

# T TRIANGLE TYPE
INSERTS FOR TURNING

**60° Triangle Type** | 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 |
| | | | | |

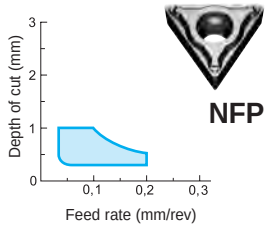
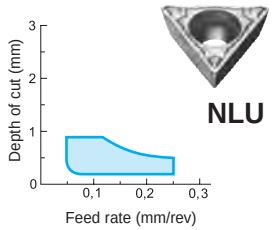
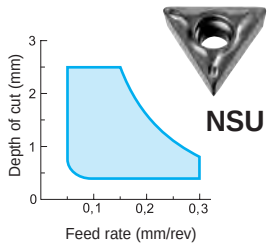
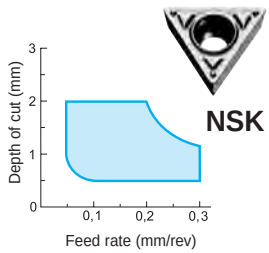


⇨ D35 ⇨ E19

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

## TCMT/-W ●●●●●● ●-■■

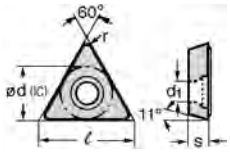
● M-Class Bumpy Chipbreaker

| Application | Shape | ISO Cat. No. | r | Carbide Coated P AC805P | Carbide Coated P AC810P | Carbide Coated P **AC820P** | Carbide Coated P AC830P | Carbide Coated P/M AC2000 | Carbide Coated P/M AC3000 | Carbide Coated M AC610M | Carbide Coated P/M AC630M | Carbide Coated K **AC405K** | Carbide Coated K AC410K | Carbide Coated K **AC415K** | Carbide Coated K AC420K | Carbide Coated K AC700G | Carbide Coated K AC900G | Carbide ZX-Coated K/S AC510U | Carbide ZX-Coated M/S AC520U | Carbide ZX-Coated P/M AC530U | Cermet Uncoated P **T2000Z** | Cermet Uncoated P T3000Z | Cermet Uncoated P T110A | Cermet Uncoated P T1200A | Cermet Uncoated P T1500A | Carbide Uncoated K G10E | Carbide Uncoated S EH510 | Carbide Uncoated S EH520 | Carbide Uncoated H H1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Finishing ~ Light Cut |  NFP | **TCMT 090202 NFP** | 0,2 | | | | | | | | | | | | | | | | | | | | | ▲ | ● | | | | |
| | | **TCMT 090204 NFP** | 0,4 | | | | | | | | | | | | | | | | | | | | | ▲ | ● | | | | |
| | | **TCMT 090208 NFP** | 0,8 | | | | | | | | | | | | | | | | | | | | | ▲ | ● | | | | |
| | | **TCMT 110202 NFP** | 0,2 | | | | | | | | | | | | | | | | | | ● | | | ▲ | ● | | | | |
| | | **TCMT 110204 NFP** | 0,4 | | | | | | | | | | | | | | | | | | ● | ● | | ▲ | ● | | | | |
| | | **TCMT 110208 NFP** | 0,8 | | | | | | | | | | | | | | | | | | ● | ● | | ▲ | ● | | | | |
| | | **TCMT 16T304 NFP** | 0,4 | | | | | | | | | | | | | | | | | | ● | ● | | ▲ | ● | | | | |
| | | **TCMT 16T308 NFP** | 0,8 | | | | | | | | | | | | | | | | | | ● | ● | | ▲ | ● | | | | |
| Finishing |  NLU | **TCMT 110204 NLU** | 0,4 | | ❍ | ● | | | | | | | | | | | | | | ● | | | | | | | | | |
| | | **TCMT 110208 NLU** | 0,8 | | ❍ | ● | | | | | | | | | | | | | | ● | | | | | | | | | |
| Light Cut |  NSU | **TCMT 110204 NSU** | 0,4 | | ● | ● | ❍ | ▲ | ▲ | ● | ● | ● | ▲ | ● | | ▲ | ▲ | | | ● | ● | ● | | | | | | | |
| | | **TCMT 110208 NSU** | 0,8 | | ● | ● | ❍ | ▲ | ▲ | ● | ● | ● | ▲ | ● | | ▲ | ▲ | | | ● | | ● | | | | | | | |
| | | **TCMT 16T304 NSU** | 0,4 | | ● | ● | ❍ | ▲ | ▲ | ● | ● | ● | ▲ | ● | | ▲ | ▲ | | | ● | | | | | | | | | |
| | | **TCMT 16T308 NSU** | 0,8 | | ● | ● | ❍ | ▲ | ▲ | ● | ● | ● | ▲ | ● | | ▲ | ▲ | | | ● | | | | | | | | | |
| Light Cut |  NSK | **TCMT 110204 NSK** | 0,4 | | | ● | ● | ▲ | ▲ | | | | | | | ▲ | | | | | | | | | | | | | |
| | | **TCMT 110208 NSK** | 0,8 | | | ● | ● | ▲ | ▲ | | | | | | | | | | | | | | | | | | | | | |
| | | **TCMT 16T304 NSK** | 0,4 | | | ● | ● | ▲ | ▲ | | | | | | | ▲ | | | | | | | | | | | | | | |
| | | **TCMT 16T308 NSK** | 0,8 | | | ● | ● | ▲ | | | | | | | | ▲ | | | | | | | | | | | | | | |
| | | **TCMT 16T312 NSK** | 1,2 | | | ● | | ▲ | | | | | | | | | | | | | | | | | | | | | | |
| Roughing |  | **TCMW 110204** | 0,4 | | | | | | | | | ● | | ● | | | | | | | | | | | | | | | |
| | | **TCMW 110208** | 0,8 | | | | | | | | | ● | | ● | | | | | | | | | | | | | | | |
| | | **TCMW 16T304** | 0,4 | | | | | | | | | ● | | ● | | | | | | | | | | | | | | | |
| | | **TCMW 16T308** | 0,8 | | | | | | | | | ● | | ● | | | | | | | | | | | | | | | |

● = Euro stock ● = 1-st recommended item
❍ = Stock item in Japan
▲ = To be replaced by new item

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

60° Triangle Type | 11° Relief With Insert Hole




| Dimensions (mm) | | | | |
|---|---|---|---|---|
| TP_ _ | ℓ | ød (IC) | s | $d_1$ |
| 0802-- | 8,2 | 4,76 | 2,38 | 2,3 |
| 1103-- | 11,0 | 6,35 | 3,18 | 3,3 |
| 1604-- | 16,5 | 9,525 | 4,76 | 4,3 |
| | | | | |



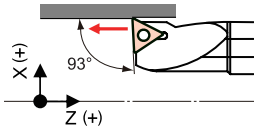
⇨ E20

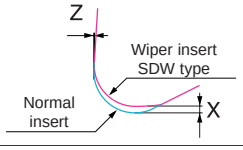
- P Steel
- M Stainless Steel
- K Cast Iron
- N Non-Ferrous Metals
- S Super Alloy
- H Hardened Steel

# TPGT ●●●●●● ●-■■

● G-Class Handed Chipbreaker

| Application | Shape | ISO Cat. No. | r | Carbide: Coated P: AC805P | AC810P | AC820P | AC830P | Coated M/P/M: AC2000 | AC3000 | AC610M | AC630M | Coated K: AC405K | AC410K | AC415K | AC420K | AC700G | AC900G | ZX-Coated K/S: AC510U | ZX-Coated M/S: AC520U | ZX-Coated P/M: AC530U | Cermet P: T2000Z | T3000Z | Uncoated P: T110A | T1200A | T1500A | Carbide K: G10E | Carbide S: EH510 | EH520 | H: H1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Finishing | L-FX | TPGT 110302 LFX | 0,2 | | | | | | | | | | | | | | | | ○ | ● | | | | | | | | | |
| | | TPGT 110304 LFX | 0,4 | | | | | | | | | | | | | | | | ○ | ● | | | | | | | | | |
| | | TPGT 110308 LFX | 0,8 | | | | | | | | | | | | | | | | ○ | | | | | | | | | | |
| | R-FX | TPGT 110302 RFX | 0,2 | | | | | | | | | | | | | | | | ○ | ● | | | | | | | | | |
| | | TPGT 110304 RFX | 0,4 | | | | | | | | | | | | | | | | ○ | ● | | | | | | | | | |
| | | TPGT 110308 RFX | 0,8 | | | | | | | | | | | | | | | | ○ | | | | | | | | | | |
| Finishing | L-W | TPGT 080202 LW | 0,2 | | | | | | | | | | | | | | | | | | | | | ▲ | ● | | | | |
| | | TPGT 080204 LW | 0,4 | | | | | | | | | | | | | | | | | ● | | | | ▲ | ● | | | | |
| | | TPGT 110302 LW | 0,2 | | | | | | | | | | | | | | | | | ● | | | | ▲ | ● | | | | |
| | | TPGT 110304 LW | 0,4 | | | | | | | | | | | | | | | | | ● | | | | ▲ | ● | | | | |
| | | TPGT 160402 LW | 0,2 | | | | | | | | | | | | | | | | | | | | | ▲ | ● | | | | |
| | | TPGT 160404 LW | 0,4 | | | | | | | | | | | | | | | | | | | | | ▲ | ● | | | | |
| | R-W | TPGT 080202 RW | 0,2 | | | | | | | | | | | | | | | | | | | | | ▲ | ● | | | | |
| | | TPGT 080204 RW | 0,4 | | | | | | | | | | | | | | | | | ● | | | | ▲ | ● | | | | |
| | | TPGT 110302 RW | 0,2 | | | | | | | | | | | | | | | | | ● | | | | ▲ | ● | | | | |
| | | TPGT 110304 RW | 0,4 | | | | | | | | | | | | | | | | | ● | | | | ▲ | ● | | | | |
| | | TPGT 160404 RW | 0,4 | | | | | | | | | | | | | | | | | | | | | ▲ | ● | | | | |
| Finishing | L-SD | TPGT 110302 LSD | 0,2 | | | | | | | | | | | | | | | | | | | | | ▲ | ● | | | | |
| | | TPGT 110304 LSD | 0,4 | | | | | | | | | | | | | | | | ○ | ● | | | | ▲ | ● | | | | |
| | | TPGT 160402 LSD | 0,2 | | | | | | | | | | | | | | | | | | | | | ▲ | ● | | | | |
| | | TPGT 160404 LSD | 0,4 | | | | | | | | | | | | | | | | ○ | | | | | ▲ | ● | | | | |
| | R-SD | TPGT 110302 RSD | 0,2 | | | | | | | | | | | | | | | | | | | | | ▲ | ● | | | | |
| | | TPGT 110304 RSD | 0,4 | | | | | | | | | | | | | | | | | ● | | | | ▲ | ● | | | | |
| | | TPGT 160404 RSD | 0,4 | | | | | | | | | | | | | | | | | | | | | ▲ | ● | | | | |
| | | TPGT 160408 RSD | 0,8 | | | | | | | | | | | | | | | | | | | | | ▲ | ● | | | | |
| Finishing | L-SDW | TPGX 110304 L-SDW | 0,4 | | | | | | | | | | | | | | | | | | | ● | | | | | | | |
| | | TPGX 110308 L-SDW | 0,8 | | | | | | | | | | | | | | | | | | | ● | | | | | | | |
| | R-SDW | TPGX 110304 R-SDW | 0,4 | | | | | | | | | | | | | | | | | | | ● | | | | | | | |
| | | TPGX 110308 R-SDW | 0,8 | | | | | | | | | | | | | | | | | | | ● | | | | | | | |




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

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

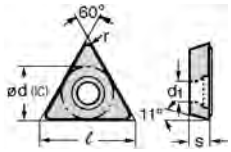
● = Euro stock ● = 1-st recommended item
○ = Stock item in Japan
▲ = To be replaced by new item

Packing unit and ordering example; 10 pcs. TPGT 110302 LFX, AC530U

## 60° Triangle Type

11° Relief
With Insert Hole

| Dimensions (mm) | | | | |
|---|---|---|---|---|
| TP__ | ℓ | ød (IC) | s | $d_1$ |
| | | | | |
| 1103-- | 11,0 | 6,35 | 3,18 | 3,3 |
| 1604-- | 16,5 | 9,525 | 4,76 | 4,3 |
| | | | | |



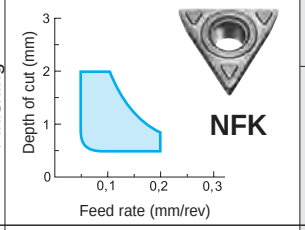
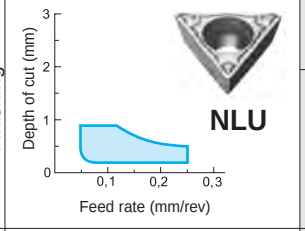
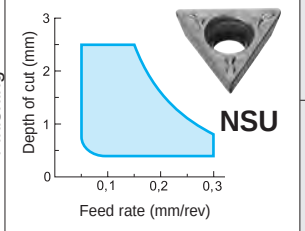
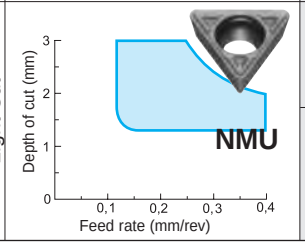



⇨ E20

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

## TPMT ●●●●●● ●-■■

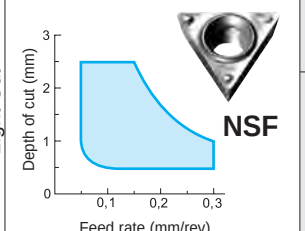
● M-Class Bumpy Chipbreaker

| Application | Shape | ISO Cat. No. | r | Carbide Coated P: AC805P | AC810P | AC820P | AC830P | M: AC2000 | AC3000 | PM: AC610M | AC630M | K: AC405K | AC410K | AC415K | AC420K | AC700G | AC900G | Carbide Coated ZX-Coated KS: AC510U | AC520U | MS: AC530U | PM: T2000Z | T3000Z | Cermet Uncoated P: T110A | T1200A | T1500A | Carbide Uncoated K: G10E | S: EH510 | EH520 | H: H1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Finishing |  NFK | **TPMT 110304 NFK** | 0,4 | | | | | | | | | | | | | | | | | | | | ● | ▲ | ● | | | | |
| | | **TPMT 110308 NFK** | 0,8 | | | | | | | | | | | | | | | | | | | | ● | ▲ | ● | | | | |
| | | **TPMT 160404 NFK** | 0,4 | | | | | | | | | | | | | | | | | | | | ● | ▲ | ● | | | | |
| | | **TPMT 160408 NFK** | 0,8 | | | | | | | | | | | | | | | | | | | | ● | ▲ | ● | | | | |
| Finishing |  NLU | **TPMT 080204 NLU** | 0,4 | | ● | | | | | ● | ● | | | | | ▲ | ▲ | | | | | ● | | | | | | | |
| | | **TPMT 080208 NLU** | 0,8 | | | | | | | ● | ● | | | | | ▲ | ▲ | | | | | ● | | | | | | | |
| | | **TPMT 110304 NLU** | 0,4 | | ● | | | | | ● | ● | | | | | ▲ | ▲ | | | ● | | ● | | | | | | | |
| | | **TPMT 110308 NLU** | 0,8 | | ● | | | | | ● | ● | | | | | ▲ | ▲ | | | ● | | ● | | | | | | | |
| Finishing |  NSU | **TPMT 110302 NSU** | 0,2 | | | ○ | ○ | | | | | | | | | | | | | | | | | | | | | | |
| | | **TPMT 110304 NSU** | 0,4 | | ● | ● | ○ | ▲ | | ● | ● | ● | ▲ | ● | | ▲ | ▲ | | | ● | ● | | | | ● | | | | |
| | | **TPMT 110308 NSU** | 0,8 | | ● | ● | ○ | ▲ | | ● | ● | ● | ▲ | ● | | ▲ | ▲ | | | ● | ● | | | | ● | | | | |
| | | **TPMT 160404 NSU** | 0,4 | | ● | ● | ○ | ▲ | | ● | ● | ● | ▲ | ● | | ▲ | ▲ | | | ● | ● | | | | ● | | | | |
| | | **TPMT 160408 NSU** | 0,8 | | ● | ● | ○ | ▲ | | ● | ● | ● | ▲ | ● | | ▲ | ▲ | | | ● | ● | | | | ● | | | | |
| Light Cut |  NMU | **TPMT 110304 NMU** | 0,4 | | | ○ | | | | ○ | ○ | | | | | | | | | | | | | | | | | | |
| | | **TPMT 110308 NMU** | 0,8 | | | ○ | | | | ○ | ○ | | | | | | | | | | | | | | | | | | |
| | | **TPMT 160404 NMU** | 0,4 | | | ○ | | | | | | | | | | | | | | | | | | | | | | | |
| | | **TPMT 160408 NMU** | 0,8 | | | ○ | | | | | | | | | | | | | | | | | | | | | | | |

The shape of insert hole : ___T /A/W  ___H 

## TPMT/-H ●●●●●● NSF

● M-Class Bumpy Chipbreaker

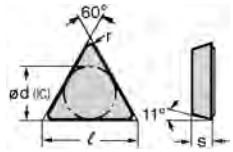
| Application | Shape | ISO Cat. No. | r | Carbide Coated P: AC805P | AC810P | AC820P | AC830P | M: AC2000 | AC3000 | PM: AC610M | AC630M | K: AC405K | AC410K | AC415K | AC420K | AC700G | AC900G | Carbide Coated ZX-Coated KS: AC510U | AC520U | MS: AC530U | PM: T2000Z | T3000Z | Cermet Uncoated P: T110A | T1200A | T1500A | Carbide Uncoated K: G10E | S: EH510 | EH520 | H: H1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Light Cut |  NSF | **TPMH 110304 NSF** | 0,4 | | | ● | ● | ▲ | ▲ | | | | | | | | | | | | | | | | | | | | |
| | | **TPMH 110308 NSF** | 0,8 | | | ● | ● | ▲ | ▲ | | | | | | | | | | | | | | | | | | | | |
| | | **TPMT 160404 NSF** | 0,4 | | | ● | ● | ▲ | ▲ | | | | | | | | | | | | | | | | | | | | |
| | | **TPMT 160408 NSF** | 0,8 | | | ● | ● | ▲ | ▲ | | | | | | | | | | | | | | | | | | | | |

● = Euro stock ● = 1-st recommended item
○ = Stock item in Japan
▲ = To be replaced by new item

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

## 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
K
N
S
H



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

## TPGR ●●●●●● ●-■

● G-Class Handed Chipbreaker

| Application | Shape | ISO Cat. No. | r | Carbide Coated P | Carbide Coated P | Carbide Coated P | Carbide Coated P | Carbide Coated M | Carbide Coated P/M | Carbide Coated K | Carbide Coated K | Carbide Coated K | Carbide Coated K | Carbide Coated K | Carbide Coated K | Carbide ZX-Coated K/S | Carbide ZX-Coated M/S | Carbide ZX-Coated P/M | Cermet Uncoated P | Cermet Uncoated P | Cermet Uncoated P | Carbide Uncoated K | Carbide Uncoated S | Carbide Uncoated S | Carbide Uncoated H |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | AC805P | AC810P | **AC820P** | AC830P | AC2000 | AC3000 | AC610M | AC630M | **AC405K** | AC410K | **AC415K** | AC420K | AC700G | AC900G | AC510U | AC520U | AC530U | **T2000Z** | T3000Z | T110A | T1200A | T1500A | G10E | EH510 | EH520 | H1 |
| Finishing |  L-W | **TPGR 110304 LW** | | | | | | | | | | | | | | | | | | | | | | ▲ ● | | | | |
| | | **TPGR 160304 LW**<br>**TPGR 160308 LW** | | | | | | | | | | | | | | | | | | | | | | ▲ ●<br>▲ ● | | | | |
| Finishing |  R-W | **TPGR 110304 RW** | | | | | | | | | | | | | | | | | | | | | | ▲ ● | | | | |
| | | **TPGR 160304 RW**<br>**TPGR 160308 RW** | | | | | | | | | | | | | | | | | | | | | | ▲ ●<br>▲ ● | | | | |

## TPMR ●●●●●● ●-■■

● M-Class Bumpy Chipbreaker

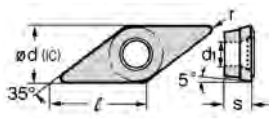
| Application | Shape | ISO Cat. No. | r | Carbide Coated P | Carbide Coated P | Carbide Coated P | Carbide Coated P | Carbide Coated M | Carbide Coated P/M | Carbide Coated K | Carbide Coated K | Carbide Coated K | Carbide Coated K | Carbide Coated K | Carbide Coated K | Carbide ZX-Coated K/S | Carbide ZX-Coated M/S | Carbide ZX-Coated P/M | Cermet Uncoated P | Cermet Uncoated P | Cermet Uncoated P | Carbide Uncoated K | Carbide Uncoated S | Carbide Uncoated S | Carbide Uncoated H |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | AC805P | AC810P | **AC820P** | AC830P | AC2000 | AC3000 | AC610M | AC630M | **AC405K** | AC410K | **AC415K** | AC420K | AC700G | AC900G | AC510U | AC520U | AC530U | **T2000Z** | T3000Z | T110A | T1200A | T1500A | G10E | EH510 | EH520 | H1 |
| Finishing |  NFK | **TPMR 110302 NFK** | 0,2 | | | | | | | | | | | | | | | | | | | | | ▲ ● | | | | |
| | | **TPMR 110304 NFK** | 0,4 | | | | | | | | | | | | | | | | | | | | ● | ▲ ● | | | | |
| | | **TPMR 110308 NFK** | 0,8 | | | | | | | | | | | | | | | | | | | | ● | ▲ ● | | | | |
| | | **TPMR 160304 NFK** | 0,2 | | | | | | | | | | | | | | | | | | | | | ▲ ● | | | | |
| | | **TPMR 160308 NFK** | 0,4 | | | | | | | | | | | | | | | | | | | | | ▲ ● | | | | |
| Light Cut |  NSF | **TPMR 110304 NSF** | 0,4 | | | ● | ● | ▲ | | | | | | | | | | | | | | | | | | | | |
| | | **TPMR 110308 NSF** | 0,8 | | | ● | ● | ▲ | | | | | | | | | | | | | | | | | | | | |
| | | **TPMR 160304 NSF** | 0,4 | | | ● | ● | ▲ | ▲ | | | | | | | | | | | | | | | | | | | |
| | | **TPMR 160308 NSF** | 0,8 | | | ● | ● | ▲ | ▲ | | | | | | | | | | | | | | | | | | | |
| | | **TPMR 160312 NSF** | 1,2 | | | ● | | | | | | | | | | | | | | | | | | | | | | |
| Light Cut |  NUJ | **TPMR 110304 NUJ** | 0,4 | | | | | ▲ | | | | | | | | | | | | | | | | | | | | |
| | | **TPMR 110308 NUJ** | 0,8 | | | | | ▲ | | | | | | | | | | | | | | | | | | | | |
| | | **TPMR 160304 NUJ** | 0,4 | | | | | ▲ | ▲ | | | | | | | | | | | | | | | | | | | |
| | | **TPMR 160308 NUJ** | 0,8 | | | | | ▲ | ▲ | | | | | | | | | | | | | | | | | | | |

● = Euro stock ● = 1-st recommended item
○ = Stock item in Japan
▲ = To be replaced by new item

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

# V DIAMOND TYPE
INSERTS FOR TURNING

**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 |
| | | | | |

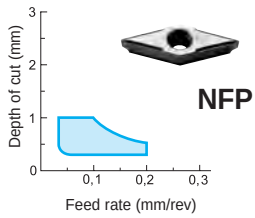
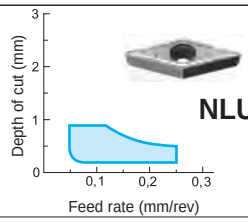
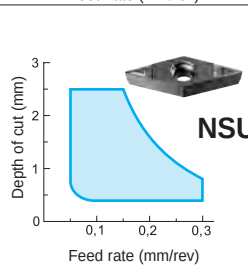
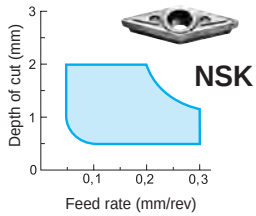
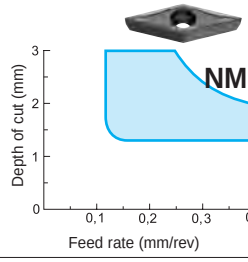


⇨ D36 ⇨ E21~22

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

## VBMT/-W ●●●●●● ●-■■

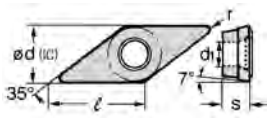
● M-Class Bumpy Chipbreaker

| Application | Shape | ISO Cat. No. | r | Carbide Coated P | Carbide Coated P | Carbide Coated P/M | Carbide Coated M | Carbide Coated P/M | Carbide Coated K | Carbide Coated K | Carbide Coated K | Carbide Coated K | Carbide Coated K | Carbide Coated K | Carbide ZX-Coated K/S | Carbide ZX-Coated M/S | Carbide ZX-Coated P/M | Cermet Uncoated P | Cermet Uncoated P | Cermet Uncoated P | Cermet Uncoated P | Carbide Uncoated K | Carbide Uncoated S | Carbide Uncoated S | Carbide Uncoated H |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | AC805P | AC810P | AC820P | AC830P | AC2000 | AC3000 | AC610M | AC630M | AC405K | AC410K | AC415K | AC420K | AC700G | AC900G | AC510U | AC520U | AC530U | T2000Z | T3000Z | T110A | T1200A | T1500A | G10E | EH510 | EH520 | H1 |
| Finishing ~ Light Cut |  NFP | VBMT 110202 NFP | 0,2 | | | | | | | | | | | | | | | | ● | ● | ● | ▲ | ● | | | | |
| | | VBMT 110204 NFP | 0,4 | | | | | | | | | | | | | | | | ● | ● | ● | ● | ● | | | | |
| | | VBMT 110208 NFP | 0,8 | | | | | | | | | | | | | | | | ● | | | | | | | | |
| | | VBMT 160404 NFP | 0,4 | | | | | | | | | | | | | | | ● | ● | ● | ● | ● | ● | | | | |
| | | VBMT 160408 NFP | 0,8 | | | | | | | | | | | | | | | ● | ● | ● | ● | ● | ● | | | | |
| Finishing |  NLU | VBMT 110304 NLU | 0,4 | | ○ | ○ | | | | | | | | | | | | | | | | | | | | | |
| | | VBMT 160404 NLU | 0,4 | | ● | ● | | | | | | | | | | ▲ | | | | ● | | | | | | | | |
| | | VBMT 160408 NLU | 0,8 | | ● | ● | | | | | | | | | | | | | | | | | | | | | |
| Light Cut |  NSU | VBMT 110204 NSU | 0,4 | | ● | ● | | ▲ | | ● | ● | | | | | ▲ | | | | ● | | | | | | | | |
| | | VBMT 110208 NSU | 0,8 | | ● | ● | | ▲ | | ● | ● | | | | | ▲ | | | | ● | | | | | | | | |
| | | VBMT 110304 NSU | 0,4 | | ● | ● | | ▲ | | ● | ● | ● | ▲ | ● | | ▲ | | | | ● | | | | | | | | |
| | | VBMT 110308 NSU | 0,8 | | ● | ● | | ▲ | | ● | ● | ● | ▲ | ● | | ▲ | | | | ● | | | | | | | | |
| | | VBMT 160404 NSU | 0,4 | | ● | ● | ○ | ▲ | ▲ | ● | ● | ● | ▲ | ● | | ▲ | ▲ | ● | ● | ● | ● | ● | | | | | | | |
| | | VBMT 160408 NSU | 0,8 | | ● | ● | ○ | ▲ | ▲ | ● | ● | ● | ▲ | ● | | ▲ | ▲ | ● | ● | ● | ● | ● | | | | | | | |
| Light Cut |  NSK | VBMT 110204 NSK | 0,4 | | | ● | ● | ▲ | | | | | | | | | | | | | | | | | | | | |
| | | VBMT 110208 NSK | 0,8 | | | ● | ● | ▲ | ▲ | | | | | | | | | | | | | | | | | | | |
| | | VBMT 160404 NSK | 0,4 | | | ● | ● | ▲ | ▲ | | | | | | | ▲ | | ● | ● | | | | | | | | | |
| | | VBMT 160406 NSK | 0,6 | | | ● | ● | ▲ | ▲ | | | | | | | | | | | | | | | | | | | |
| | | VBMT 160408 NSK | 0,8 | | | ● | ● | ▲ | ▲ | | | | | | | ▲ | | ● | ● | | | | | | | | | |
| | | VBMT 160412 NSK | 1,2 | | | ● | ● | ▲ | ▲ | | | | | | | | | | | | | | | | | | | |
| Light Cut |  NMU | VBMT 160408 NMU | 0,8 | | ● | | | | | | ● | | | | | ▲ | ▲ | | | | | | | | | | | |
| Light Cut |  | VBMW 160404 | 0,4 | | | | | | | | | ● | | ● | | | | | | | | | | | | | | |
| | | VBMW 160408 | 0,8 | | | | | | | | | ● | | ● | | | | | | | | | | | | | | |

● = Euro stock ● = 1-st recommended item
○ = Stock item in Japan
▲ = To be replaced by new item

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

**35° Diamond Type** | 7° Relief | With Insert Hole




| Dimensions (mm) | | | | |
|---|---|---|---|---|
| VC_ _ | ℓ | ød (IC) | s | $d_1$ |
| | | | | |
| 1103-- | 11,0 | 6,35 | 3,18 | 2,8 |
| 1604-- | 16,6 | 9,525 | 4,76 | 4,4 |
| | | | | |



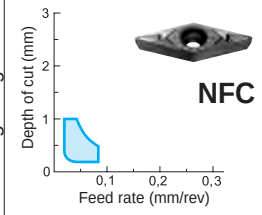
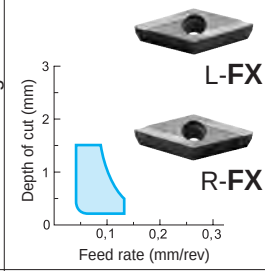
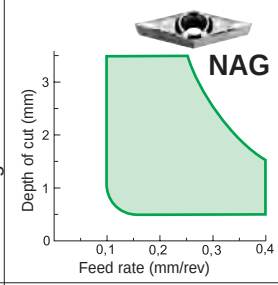
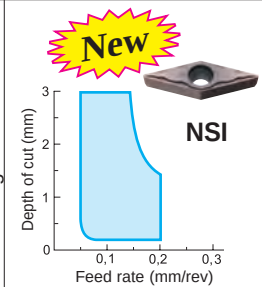
⇨ D37

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

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

## VCGT ●●●●●● ●-■■

● G-Class Handed and Bumpy Chipbreaker

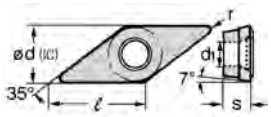
| Application | Shape | ISO Cat. No. | r | Carbide: Coated: P: AC805P | AC810P | AC820P | AC830P | Coated: M: AC2000 | AC3000 | Coated: P/M: AC610M | AC630M | Coated: K: AC405K | AC410K | AC415K | AC420K | AC700G | AC900G | ZX-Coated: K/S: AC510U | ZX-Coated: M/S: AC520U | ZX-Coated: P/M: AC530U | Cermet: P: T2000Z | T3000Z | Uncoated: P: T110A | T1200A | T1500A | Carbide: Uncoated: K: G10E | S: EH510 | EH520 | H: H1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Finishing ~ Light Cut |  NFC | VCGT 110301 NFC | 0,1 | | | | | | | | | | | | | | | | | ● | | | | | | | | | |
| | | VCGT 110302 NFC | 0,2 | | | | | | | | | | | | | | | | | ● | | | | | | | | | |
| Finishing |  L-FX | VCGT 110301 LFX | 0,1 | | | | | | | | | | | | | | | | ○ | ● | | | | ▲ | ● | | | | |
| | | VCGT 110302 LFX | 0,2 | | | | | | | | | | | | | | | | ○ | ● | | | | ▲ | ● | | | | |
| |  R-FX | VCGT 110301 RFX | 0,1 | | | | | | | | | | | | | | | | ○ | ● | | | | ▲ | ● | | | | |
| | | VCGT 110302 RFX | 0,2 | | | | | | | | | | | | | | | | ○ | ● | | | | ▲ | ● | | | | |
| Light Cut |  NAG | VCGT 110302 NAG | 0,2 | | | | | | | | | | | | | | | | | | | | | | | | | | ● |
| | | VCGT 110304 NAG | 0,4 | | | | | | | | | | | | | | | | | | | | | | | | | | ● |
| | | VCGT 160408 NAG | 0,8 | | | | | | | | | | | | | | | | | | | | | | | | | | ● |
| | | VCGT 160412 NAG | 1,2 | | | | | | | | | | | | | | | | | | | | | | | | | | ● |
| Light Cut |  New NSI | VCGT 110301M NSI | 0,1 | | | | | | | ● | ● | | | | | | | ● | ● | ● | | | | | | | | | |
| | | VCGT 110302M NSI | 0,2 | | | | | | | ● | ● | | | | | | | ● | ● | ● | | | | | | | | | |
| | | VCGT 110304M NSI | 0,4 | | | | | | | ● | ● | | | | | | | ● | ● | ● | | | | | | | | | |
| | | VCGT 110308M NSI | 0,8 | | | | | | | ● | ● | | | | | | | ● | ● | ● | | | | | | | | | |
| | | VCGT 160401M NSI | 0,1 | | | | | | | ● | ● | | | | | | | ● | ● | ● | | | | | | | | | |
| | | VCGT 160402M NSI | 0,2 | | | | | | | ● | ● | | | | | | | ● | ● | ● | | | | | | | | | |
| | | VCGT 160404M NSI | 0,4 | | | | | | | ● | ● | | | | | | | ● | ● | ● | | | | | | | | | |

● = Euro stock ● = 1-st recommended item
○ = Stock item in Japan
▲ = To be replaced by new item

Packing unit and ordering example; 10 pcs. VCGT 110202 LFX, AC530U

# V DIAMOND TYPE
## INSERTS FOR TURNING

**35° Diamond Type** | 7° Relief | With Insert Hole




| Dimensions (mm) | | | | |
|---|---|---|---|---|
| VC__ | ℓ | ød (IC) | s | $d_1$ |
| | | | | |
| 1103-- | 11,0 | 6,35 | 3,18 | 2,8 |
| 1604-- | 16,6 | 9,525 | 4,76 | 4,4 |
| | | | | |



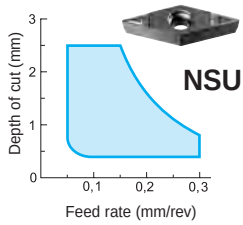
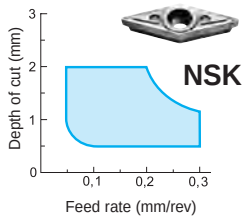
⇨ D37

"S…- SV…C" - Type
(⇨ Stock in Japan)

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

## VCMT ●●●●●● ●-■■

● M-Class Bumpy Chipbreaker

| Application | Shape | ISO Cat. No. | r | AC805P | AC810P | AC820P | AC830P | AC2000 | AC3000 | AC610M | AC630M | AC405K | AC410K | AC415K | AC420K | AC700G | AC900G | AC510U | AC520U | AC530U | T2000Z | T3000Z | T110A | T1200A | T1500A | G10E | EH510 | EH520 | H1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carbide | | | | | | | | | | | | | | | | | Cermet | | | | | Carbide | | | |
| | | | | Coated | | | | | | | | | | | | | | ZX-Coated | | | | | Uncoated | | | | | | |
| | | | | | | P | | | | M | P/M | | | K | | | | K/S | M/S | P/M | | | P | | | K | S | | H |
| Light Cut |  NSU | VCMT 110302 NSU | 0,2 | | | | | | | | ○ | | | | | | | | | | | | | | | | | | |
| | | VCMT 110304 NSU | 0,4 | | | | | | | | ○ | | | | | | | | | | | | | | | | | | |
| | | VCMT 110308 NSU | 0,8 | | | | | | | | ○ | | | | | | | | | | | | | | | | | | |
| | | VCMT 160404 NSU | 0,4 | | ● | ● | ○ | ▲ | ▲ | ● | ● | ● | ▲ | ● | | ▲ | | ● | ● | ● | | | | | | | | | |
| | | VCMT 160408 NSU | 0,8 | | ● | ● | ○ | ▲ | ▲ | ● | ● | ● | ▲ | ● | | ▲ | | ● | ● | ● | | | | | | | | | |
| Light Cut |  NSK | VCMT 160404 NSK | 0,4 | | | ● | ● | ▲ | ▲ | | | | | | | | | | ● | | | | | | | | | | |
| | | VCMT 160408 NSK | 0,8 | | | ● | ● | | ▲ | | | | | | | | | | ● | | | | | | | | | | |

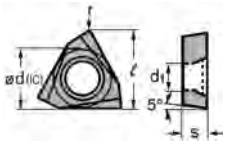


● = Euro stock ● = 1-st recommended item
○ = Stock item in Japan
▲ = To be replaced by new item

Packing unit and ordering example; 10 pcs. VCMT 160404 NSU, AC810P

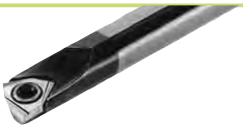
Pos. Inserts
C
D
K
R
S
T
V
W

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




Dimensions (mm)

| WBGT | ℓ | ød (IC) | s | $d_1$ |
|---|---|---|---|---|
| | | | | |
| 060102 | 5,0 | 3,97 | 1,59 | 2,2 |
| 060104 | 4,9 | | | |
| | | | | |

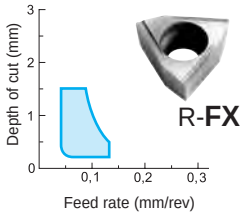
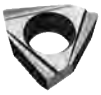
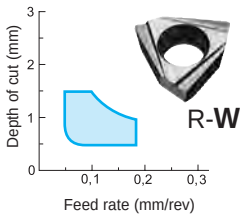


⇨ E23

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

# WBGT ●●●●●● ●-■■

● G-Class Handed Chipbreaker

| Application | Shape | ISO Cat. No. | r | Carbide: Coated P: AC805P | AC810P | AC820P | AC830P | Coated M: AC2000 | AC3000 | AC610M | AC630M | Coated K: AC405K | AC410K | AC415K | AC420K | AC700G | AC900G | ZX-Coated: AC510U | AC520U | AC530U | Cermet P: T2000Z | T3000Z | Uncoated P: T110A | T1200A | T1500A | Carbide K: G10E | Carbide S: EH510 | EH520 | Carbide H: H1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Finishing |  L-**FX** | **WBGT 060102 LFX** | 0,2 | | | | | | | | | | | | | | | | | ● | | | | | | | | | |
| | | **WBGT 060104 LFX** | 0.4 | | | | | | | | | | | | | | | | | ● | | | | | | | | | |
| |  R-**FX** | **WBGT 060102 RFX** | 0,2 | | | | | | | | | | | | | | | ○ | | ● | | | | | | | | | |
| | | **WBGT 060104 RFX** | 0.4 | | | | | | | | | | | | | | | ○ | | ● | | | | | | | | | |
| Finishing |  L-**W** | **WBGT 060102 LW** | 0,2 | | | | | | | | | | | | | | | | | ● | | | | ▲ | ● | | | | |
| | | **WBGT 060104 LW** | 0.4 | | | | | | | | | | | | | | | | | ● | | | | ▲ | ● | | | | |
| |  R-**W** | **WBGT 060102 RW** | 0,2 | | | | | | | | | | | | | | | | | ● | | | | ▲ | ● | | | | |
| | | **WBGT 060104 RW** | 0.4 | | | | | | | | | | | | | | | | | ● | | | | ▲ | ● | | | | |



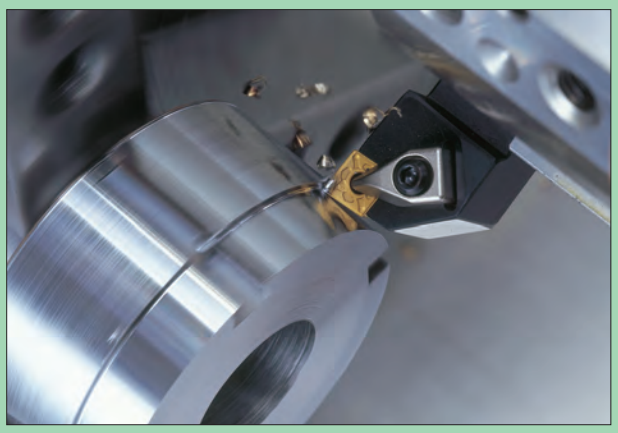
● = Euro stock ● = 1-st recommended item
○ = Stock item in Japan
▲ = To be replaced by new item

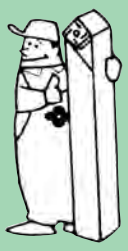
Packing unit and ordering example; 10 pcs. WBGT 060102 LFX, AC530U

# External Holders

D

**D1 ~ D38**








Selection — **Turning Holder Serie** ..... D2 - 5
ISO — Turning Holder Identification Table ..... D6
Calculation of The Cutting Edge Position ..... D7

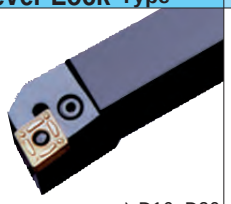
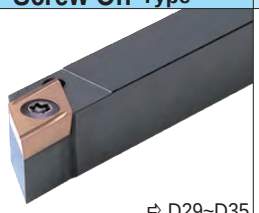
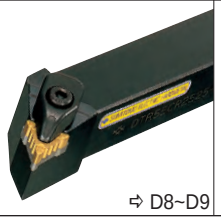
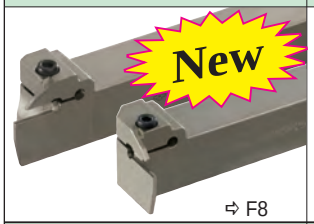
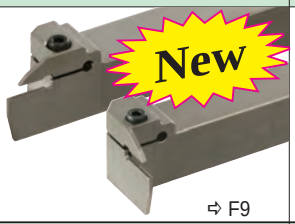
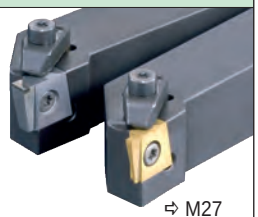
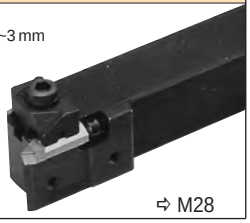
T-REX Tool Holders — **SumiTurn T-REX Tool Holders** ..... D8 - 9

For High Performance Turning — **D Type Double Clamp Holders**
DC Type Holders ..... D10
DD Type Holders ..... D11
DS Type Holders ..... D12
DT Type Holders ..... D13
DV Type Holders ..... D14
DW Type Holders ..... D15

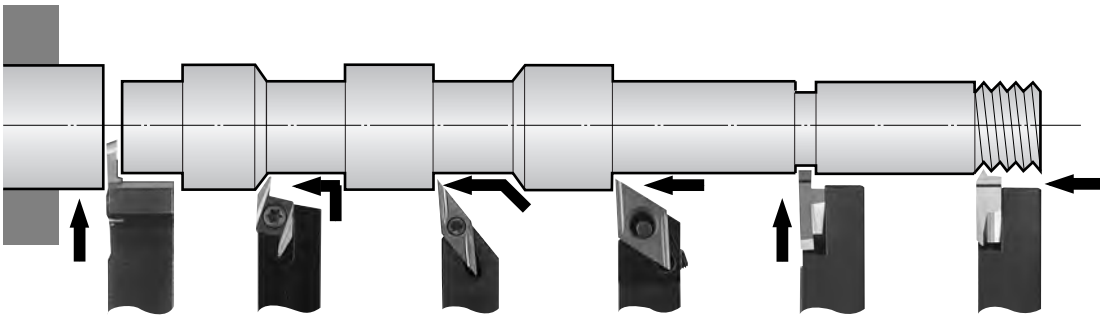
General Turning — **P Type Lever Lock and**
**M Type Top & Hole Clamp Holders**
PC Type Holders..... D16
PD Type Holders ..... D17
PS Type Holders ..... D18-19
PT / MT Type Holders ..... D20-21
PW / MW Type Holders ..... D22

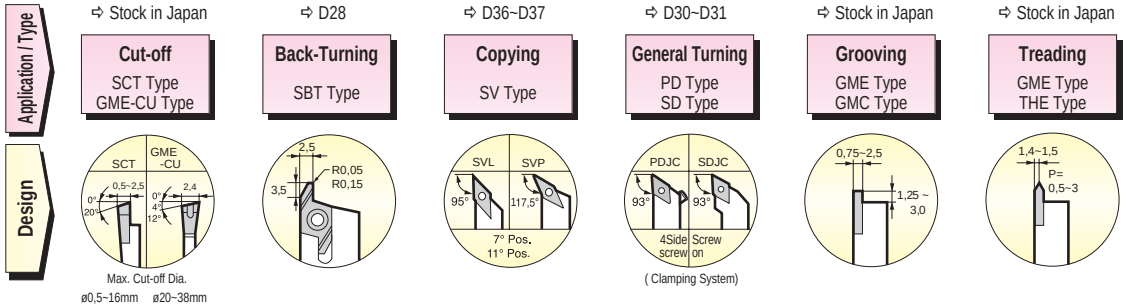
For Solid CBN Inserts — **C Type Clamp On Holders** ..... D23-24
**X Type Dimple Lock Holders** ..... D25

Selection — **Mini Holders Series**..... D26-27
Special for Back Facing — SBT Type Mini Holders ..... D28
Small Product Turning — PC / SC Type Mini Holders ..... D29
PD / SD Type Mini Holders ..... D30-31
PR Type Holders ..... D32
SR Type Holders ..... D33
SS Type Mini Holders ..... D34
ST Type Mini Holders ..... D35
SV Type Copying Holders ..... D36-37

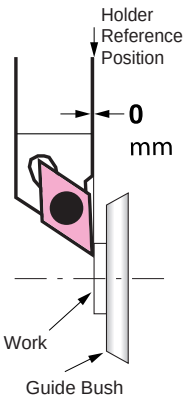
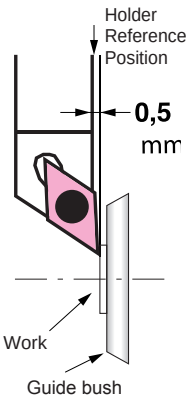
| Application | Economical Type for Neg. Inserts | Economical Type for Pos. Inserts | Special Type for Hardened Steel |
|---|---|---|---|
| General Turning | **P Type Lever Lock Type**  ➪ D16~D20 | **P Type Lever Lock Type**  ➪ D29, D30 | **D Type Double Lock Type**  ➪ D10~D15 |
| | **M Type Double Lock Type**  ➪ D21~D22 | **S Type Screw On Type**  ➪ D29~D35 | **C Type Top Clamp Type**  ➪ D23~D25 |
| Copying | **T-REX**  ➪ D8~D9 | **S Type Screw On Type**  ➪ D36~D37 | **D Type Double Lock Type**  ➪ D11, D14 |
| Parting-Off Grooving | **GNDM and GNDMS Type**   ➪ F8 | **GNDL and GNDLS Type**   ➪ F9 | **GNDF Type**   ➪ F10 |
| | **SCT and GWC Type**  ➪ F15~16 | **Sumi Grip and Sumi Grip Jr.**   ➪ F17~22 | **GWB Type**  ➪ M27 |
| Threading | **LTE and STE Type** Pitch {1~4 mm / 24~8 Threads/inch   ➪ F26 | **THE Type** Pitch {0,8~3 mm / 24~10 Threads/inch  ➪ Stock in Jp. | **BNGG-TT Type** Pitch 1~3 mm  ➪ M28 |

## Ext. Turning






## Holder Selection for Autolathe

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

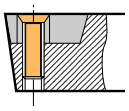
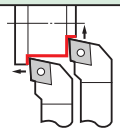
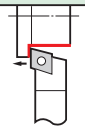
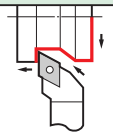
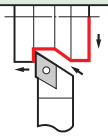
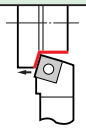
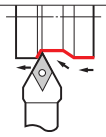
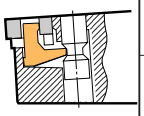
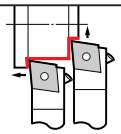
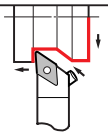
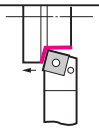
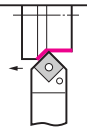
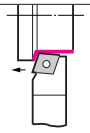
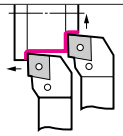
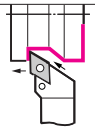
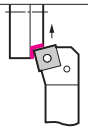
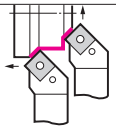
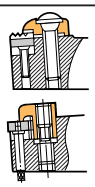
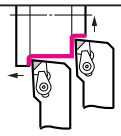
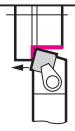
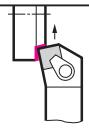
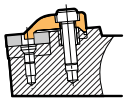
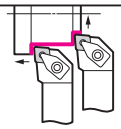
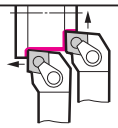
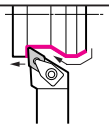
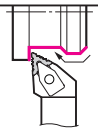
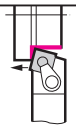
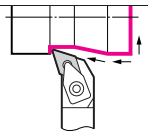
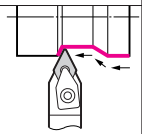
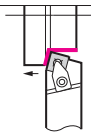
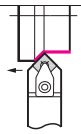


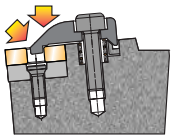
# External Tool Holder Series



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 / System | | | 80° Diamond Type | | 55° Diamond Type | | T-REX 55° | 90° Square Type | |
| Screw Lock System | S Type Mini Holder |  |  SCLC ⇨ D29 |  SCAC ⇨ D29 |  SDJC ⇨ D30<br>SDHC ⇨ D30 |  SDAC ⇨ D31 | – | – |  SSBC ⇨ D34 |
| | | | – | – |  SDNC ⇨ D31 | – | – | – | – |
| Lever Lock System | P Type (✳ Side Lever Lock Type) |  |  PCLC (✳) ⇨ D29 | – |  PDJC (✳) ⇨ D30 | – | – |  PSBN ⇨ D18 |  PSDN ⇨ D18 |
| | | |  PCBN ⇨ D16 |  PCLN ⇨ D16 |  PDJN ⇨ D17 | – | – |  PSKN ⇨ D19 |  PSSN ⇨ D19 |
| Top-On Clamp System | C & M Type |  |  CCLN ⇨ D23 | – | – | – | – |  CSBN ⇨ D23 |  CSKN ⇨ D23 |
| Double Lock (D) Dimple Lock (X) | D & X Type |  |  DCLN ⇨ D10 |  XCLN ⇨ D25 |  DDJN ⇨ D11 | – |  DTR ⇨ D8~9 |  XSBN ⇨ D25 | – |
| | | | – | – |  DDHN ⇨ D11 |  DDNN ⇨ D11 | – |  DSBN ⇨ D12 |  DSDN ⇨ D12 |



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 ⇨ D35 | STGC ⇨ D35 | – | SVJB ⇨ D36<br>SVLC ⇨ D37 | SVVB ⇨ D36 | – | SRDC ⇨ D33 | SRSC ⇨ D33 |
| | | – | – | – | SVPB ⇨ D36<br>SVPC ⇨ D37 | – | – | SBT ⇨ D28 | – |
| Lever Lock System | P Type | PTGN ⇨ D20 | PTFN ⇨ D20 | PTTN ⇨ D20 | – | – | PWLN ⇨ D22 | PRDC ⇨ D32 | PRGC ⇨ D32 |
| | | – | – | – | – | – | – | – | – |
| Top-On Clamp System | C & M Type | MTJN ⇨ D21 | MTXN ⇨ D21 | – | – | – | MWLN ⇨ D22 | CRDN ⇨ D24 | CRSN ⇨ D24 |
| Double Lock (D) Dimple Lock (X) | D & X Type | DTJN ⇨ D13 | DTFN ⇨ D13 | – | DVJN ⇨ D14 | – | DWLN ⇨ D15 | – | – |
| | | DTGN ⇨ D13 | – | – | DVQN ⇨ D14 | DVVN ⇨ D14 | – | – | – |

# ISO Holders Identification

## ■ Catalogue Classification System For SEC-Tool Holders

| P | T | G | N | R | 25 | 25 | P | 22 | E |
|---|---|---|---|---|---|---|---|---|---|
| Clamping System Chart 1 | Insert Shape Chart 2 | Holder Style Chart 3 | Seat Clearance Angle Chart 4 | Feed Direction Chart 5 | Shank Height Chart 6 | Shank Width Chart 7 | Shank Length Chart 8 | Insert Size Chart 9 | For D-Type Euro- Inserts D□□□1506○○ |

PTGNR2525P22

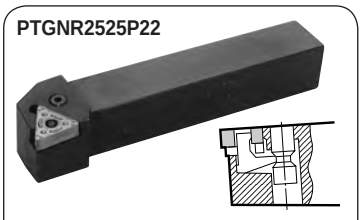


Chart 1

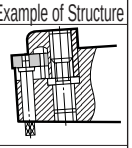
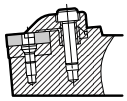
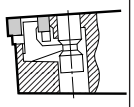
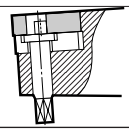
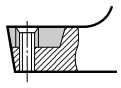
| Clamping System | | | | | |
|---|---|---|---|---|---|
| Symbol | Clamp Types | Example of Structure | Symbol | Clamp Types | Example of Structure |
| C | Top Clamp |  | M | Top & Hole Clamp Type |  |
| D | Double Clamp |  | P | Lever Lock Type (Insert is Supported by 1 face) |  |
| E | Pin Lock Type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

Chart 2

| 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 5

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

Chart 3

| Holder Style | | | | | |
|---|---|---|---|---|---|
| Symbol | Shape | Offset | Symbol | Shape | Offset |
| A | 90° | Nil | L | 95° 95° | With Offset |
| B | 75° | Nil | N | 63° | Nil |
| D | 45° | Nil | R | 75° | With Offset |
| E | 60° | Nil | S | 45° | With Offset |
| F | 90° | With Offset | T | 60° | With Offset |
| G | 90° | With Offset | U | 93° | With Offset |
| J | 93° | With Offset | W | 60° | With Offset |
| K | 75° | With Offset | Y | 85° | With Offset |

Chart 6

| Shank Height | |
|---|---|
| Symbol | Height (mm) |
| 12 | 12 |
| 16 | 16 |
| 20 | 20 |
| 25 | 25 |
| 32 | 32 |
| 40 | 40 |
| 50 | 50 |
| 00 | Round shank, |

Chart 7

| Shank Width | |
|---|---|
| Symbol | Width (mm) |
| 12 | 12 |
| 16 | 16 |
| 20 | 20 |
| 25 | 25 |
| 32 | 32 |
| 40 | 40 |
| 50 | 50 |
| | Shank Diamater is Shown for Round Shank, |

2 digits are used for each dimension in mm.

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 Hypen is used Instead of an alphabet.

Chart 9

| Cutting Edge | |
|---|---|
| Symbol | Length (mm) |

Eg. for Triangle Inserts:

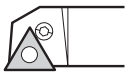
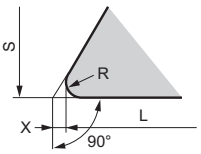
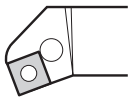
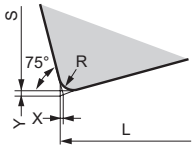
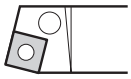
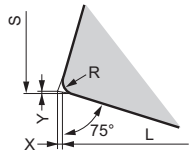
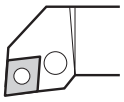
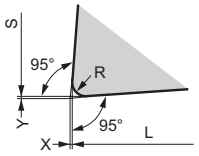
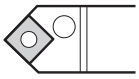
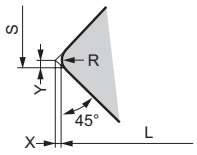
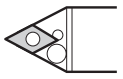
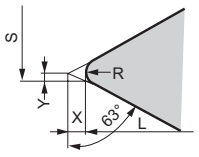
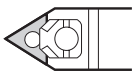
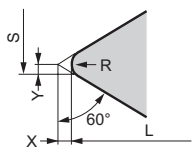
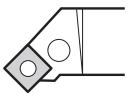
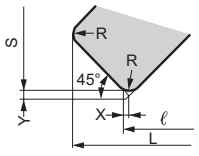
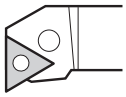
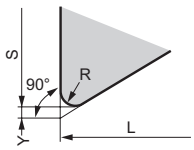
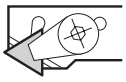
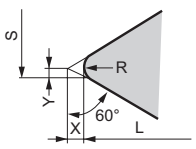
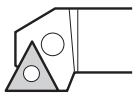
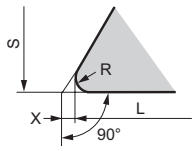
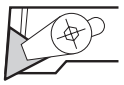
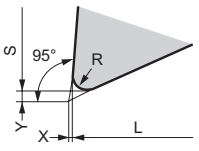
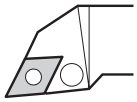
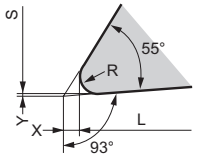
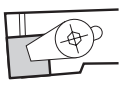
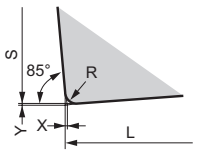
| | |
|---|---|
| 06 | 6,9 |
| 08 | 8,2 |
| 09 | 9,6 |
| 11 | 11,0 |
| 16 | 16,5 |
| 22 | 22,0 |
| 27 | 27,5 |
| 33 | 33,0 |

For Round Inserts:

| | |
|---|---|
| 10 | 10 |
| 12 | 12 |
| 16 | 16 |
| 20 | 20 |
| 25 | 25 |
| 32 | 32 |

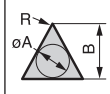
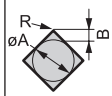
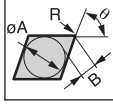
## ■ Cutting Edge Dimensions by Corner Radius

(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 |

### ● Calculation of the Nose Radius Dimensions

(Unit in mm)

| Insert Shape | | Calculation |
|---|---|---|
|  | Triangle | $B = \frac{3}{2}A - R$ |
|  | Square | $B=(\sqrt{2}-1) \times (\frac{A}{2}-R)$ |
|  | Rhombic | $B=\{\frac{1}{\mathrm{Sin}(\theta/2)}-1\} \times (\frac{A}{2}-R)$ |

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

| I.C. size (inch) | | „øA“ dimensions (mm) |
|---|---|---|
| – | 5/32 | 3,9688 |
| – | 6/32 | 4,7625 |
| – | 7/32 | 5,5562 |
| 2/8 | 8/32 | 6,3500 |
| – | (0) | 7,9375 |
| 3/8 | – | 9,5250 |
| 4/8 | – | 12,7000 |
| 5/8 | – | 15,8750 |
| 6/8 | – | 19,0500 |
| 8/8 | – | 25,4000 |

| Nose symbol | Size (inch) | „R“ dimension (mm) |
|---|---|---|
| 02 | (0) | 0,203 |
| 04 | 1/64 | 0,397 |
| 08 | 2/64 | 0,794 |
| 12 | 3/64 | 1,191 |
| 16 | 4/64 | 1,588 |
| 24 | 6/64 | 2,389 |

# T-REX Tool Holders

RIGIDITY - ECONOMY - PRECISION

The Biting Force Behind

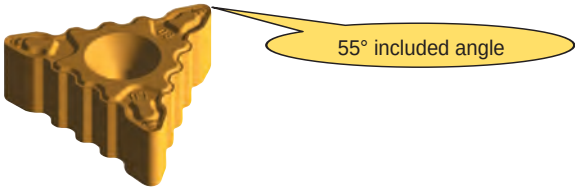






SumiTurn T-REX

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



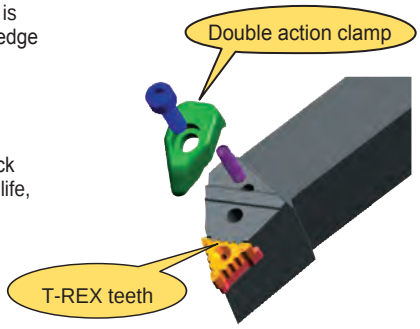

## ■ Advantages

### ● T-REX Inserts for Maximum Economy

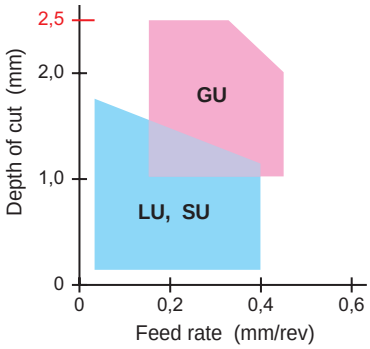
With 6 cutting edges and a 55 degree included angle - T-Rex is the intelligent alternative to profile turning with a traditional 4 edge DNMG insert.

### ● 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.

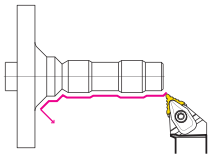



### ● Application Range

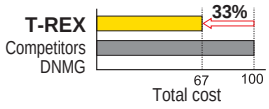



## ■ Application Examples

**● 20Cr4 Shaft**

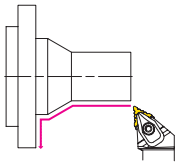


**[Results]**
**33% cost saving**

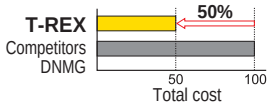



Insert: TRM551708-GU, AC2000
Cutting data: $v_c$= 150m/min, f = 0,25mm/rev, $d_{oc}$ < 2,0mm, Wet

**● 25CrMo4 Gear**



**[Results]**
**1,3 times long tool life**




Insert: TRM551708-LU, AC700G
Cutting data: $v_c$= 220m/min, f = 0,2~0,3mm/rev, $d_{oc}$ < 1,0mm, Wet

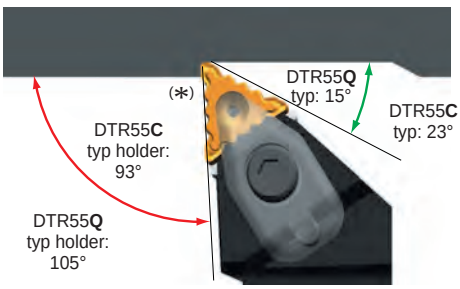
## ■ Recommendations

### ● Depth of Cut




Max. $a_p$ = 2,5 mm

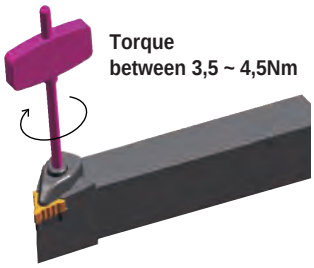
### ● Approach Angle




(*) Angle of major cutting edge

C-Type: 95,5°
Q-Type: 107,5°

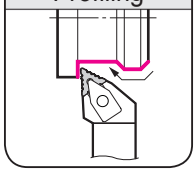
### ● Insert Clamping

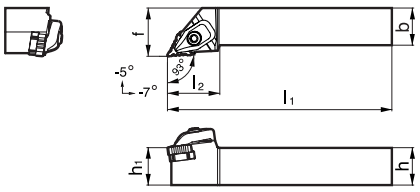


SumiTurn

## External Turning & Copying

### DTR55C
Profiling



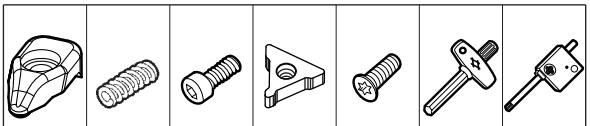



■ Holders

Above figures show right hand tools.

| Ordering No. | Stock R | Stock L | h | $h_1$ | b | $l_1$ | $l_2$ | f |
|---|---|---|---|---|---|---|---|---|
| DTR 55C-R/L 2020–K17 | ● | ● | 20 | 20 | 20 | 125 | 35 | 25 |
| DTR 55C-R/L 2525–M17 | ● | ● | 25 | 25 | 25 | 150 | 35 | 32 |

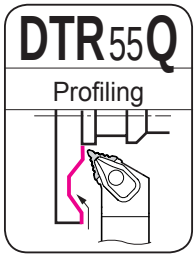
■ Spare Parts

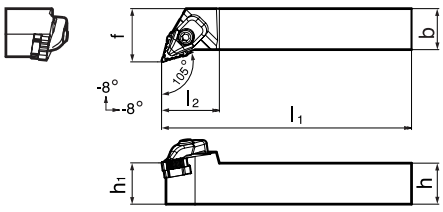


| Clamp | Spring | Screw | Shim | Screw | Wrench | Wrench |
|---|---|---|---|---|---|---|
| TRCP3 | S-SP4-20 | BX0520 | TRW5505 | BFTX0307N | TSW040 | TRX10(*) |

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

### DTR55Q
Profiling



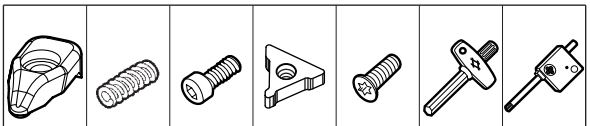



■ Holders

Above figures show right hand tools.

| Ordering No. | Stock R | Stock L | h | $h_1$ | b | $l_1$ | $l_2$ | f |
|---|---|---|---|---|---|---|---|---|
| DTR 55Q-R/L 2020–K17 | ● | ● | 20 | 20 | 20 | 125 | 35 | 28,5 |
| DTR 55Q-R/L 2525–M17 | ● | ● | 25 | 25 | 25 | 150 | 35 | 32 |

■ Spare Parts



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

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

■ Inserts

● Type **LU**



● Type **SU**

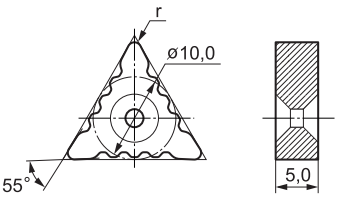


Application P Steel
M Stainles steel

| | Ordering No. | r | Coated Carbide AC700G | AC810P | AC820P | AC830P | AC2000 | AC3000 | AC610M | AC630M | Coated Cermet T2000Z | T3000Z |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 AC700G | AC810P | AC820P | AC830P | AC2000 | AC3000 | AC610M | AC630M | Coated Cermet T2000Z | T3000Z |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 AC700G | AC810P | AC820P (AC2000) | AC830P (AC3000) | AC610M | AC630M | Coated Cermet T2000Z | T3000Z |
|---|---|---|---|---|---|---|---|---|---|
| Work materials | Low carbon steel | 220 400 | 220 400 | 150 280 | 90 250 | | | 100 400 | 100 350 |
| | Alloy steel | 150 300 | 150 300 | 100 250 | 80 200 | | | 100 300 | 100 250 |
| | Stainless steel | | | | 50 150 | 130 210 | 100 160 | | |
| Application range | Finishing | ◎ | ◎ | ○ | ○ | ◎ | ○ | ◎ | ◎ |
| | Medium cutting | ○ | ○ | ◎ | ○ | ○ | ◎ | ○ | ○ |
| | Interrupted cutting | | | ○ | ◎ | | ○ | | ○ |

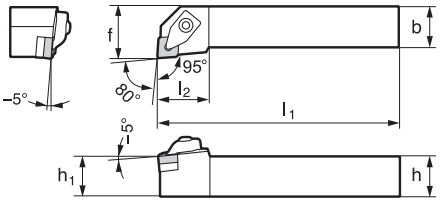
◎ 1-st recommandation ○ 2-nd recommandation

● = Euro stock Packing unit and ordering example; 1 pce DTR55CR2020–K17 ( R: right handed )

## General Turning and Facing



DCLN




### Inserts

Eg.



N-GU

❶ CNMG 120408 N–GU
❷ CNMM 190612 N-HG
❸ CNMM 250924 N-HU

### Spare Parts

### Holders

Above figures show right hand tools.

| Ordering No. | Stock | | Dimensions (mm) | | | | | | Clamp | Spring | Clamp bolt | Shim | Shim Screw | Wrench | Wrench | Insert |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | R | L | h | $h_1$ | b | $l_1$ | $l_2$ | f | | | | | | | | |
| **DCLN R/L 2020 K12** | ● | ● | 20 | 20 | 20 | 125 | 32 | 25 | SCP–2 | | | CNS1204 | BFTX0409N | TRX15(*) | LH040 | ❶ |
| **DCLN R/L 2525 M12** | ● | ● | 25 | 25 | 25 | 150 | 32 | 32 | | | | | | | | |
| **DCLN R/L 3232 P19** | ● | ● | 32 | 32 | 32 | 170 | 42 | 40 | SCP–5 | | | CNS1906 | BFTX0511N | TRX20(*) | LH040 LH025 | ❷ |
| **DCLN R/L 4040 S19** | ● | ● | 40 | 40 | 40 | 250 | 42 | 50 | | | | | | | | |
| **DCLN R/L 4040 S25** | ● | ● | 40 | 40 | 40 | 250 | 53 | 50 | SCP–6 | | | CNS2509 | BFTX0615N | TRD25(*) | LH060, LH025 | ❸ |

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





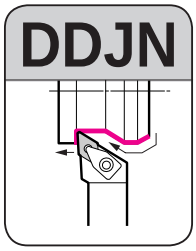
● = Euro stock

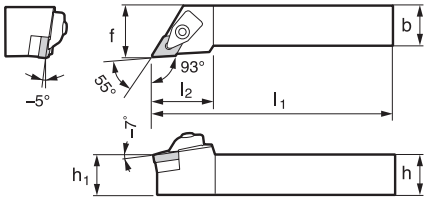
Packing unit and ordering example; 1 pce DCLNR 2020 K12 ( R: right handed )

## General Turning and Copying



### DDJN






#### Inserts

Eg.



N-GU

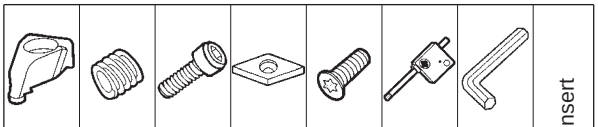
❶ DNMG 150408 N–GU
❷ DNMG 150608 N–GU

#### Holders

Above figures show right hand tools.

| Ordering No. | Stock R | Stock 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 |

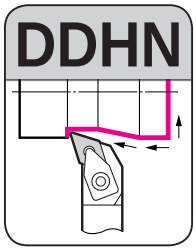
#### Spare Parts

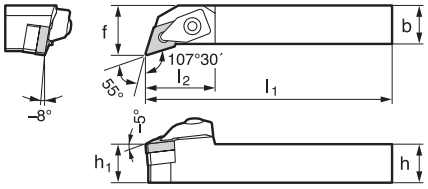


| Clamp | Spring | Clamp bolt | Shim | Shim Screw | Wrench | Wrench | Insert |
|---|---|---|---|---|---|---|---|
| SCP–2 | | | DNS1504 | BFTX0409N | TRX15(*) | LH040 | ❶ |
| | | | DNS1506 | | | | ❷ |
| | | | DNS1504 | | | | ❶ |
| | | | DNS1506 | | | | ❷ |

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

### DDHN






#### Inserts

Eg.



N-GU

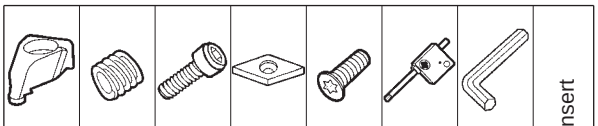
❶ DNMG 150608 N–GU

#### Holders

Above figures show right hand tools.

| Ordering No. | Stock R | Stock L | h | $h_1$ | b | $l_1$ | $l_2$ | f |
|---|---|---|---|---|---|---|---|---|
| DDHN R/L 2020 K15E | ● | ● | 20 | 20 | 20 | 125 | 35 | 25 |
| DDHN R/L 2525 M15E | ● | ● | 25 | 25 | 25 | 150 | 35 | 32 |

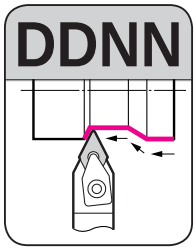
#### Spare Parts

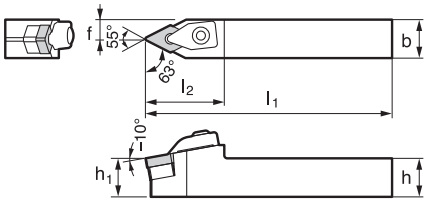


| Clamp | Spring | Clamp bolt | Shim | Shim Screw | Wrench | Wrench | Insert |
|---|---|---|---|---|---|---|---|
| SCP–2 | | | DNS1506 | BFTX0409N | TRX15(*) | LH040 | ❶ |

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

### DDNN






#### Inserts

Eg.



N-GU

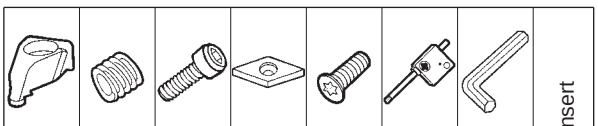
❶ DNMG 150608 N–GU

#### Holders

Above figures show right hand tools.

| Ordering No. | Stock | h | $h_1$ | b | $l_1$ | $l_2$ | f |
|---|---|---|---|---|---|---|---|
| DDNN N 2020 K15E | ● | 20 | 20 | 20 | 125 | 40 | 10,5 |
| DDNN N 2525 M15E | ● | 25 | 25 | 25 | 150 | 40 | 13,0 |

#### Spare Parts



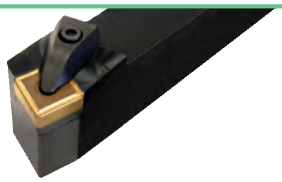
| Clamp | Spring | Clamp bolt | Shim | Shim Screw | Wrench | Wrench | Insert |
|---|---|---|---|---|---|---|---|
| SCP–2 | | | DNS1506 | BFTX0409N | TRX15(*) | LH040 | ❶ |

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

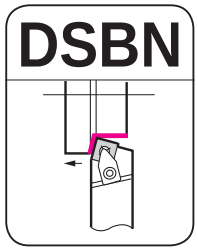
● = Euro stock

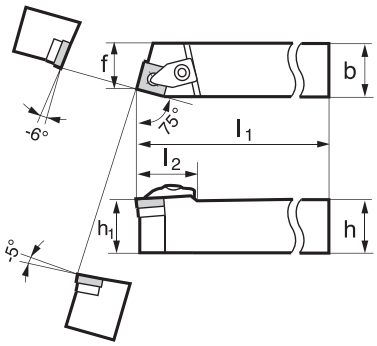
Packing unit and ordering example; 1 pce DDJNR 2020 K15E ( R: right handed )

## General Turning and Facing



### DSBN






#### Holders

Above figures show right hand tools.

| Ordering No. | Stock R | Stock L | h | $h_1$ | b | $l_1$ | $l_2$ | f |
|---|---|---|---|---|---|---|---|---|
| DSBN R/L 3232 P19 | ● | ● | 32 | 32 | 32 | 170 | 45 | 27 |
| DSBN R/L 4040 S2507 | ● | ● | 40 | 40 | 40 | 250 | 58 | 35 |
| DSBN R/L 4040 S2509 | ● | ● | 40 | 40 | 40 | 250 | 58 | 35 |

#### Inserts

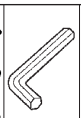
Eg.



N-UZ, N-HU

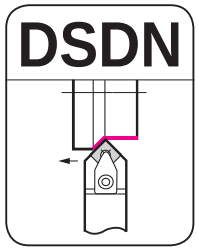
❶ SNMG 190612 N–UZ
❷ SNMM 250724 N–HU
❸ SNMM 250924 N–HU

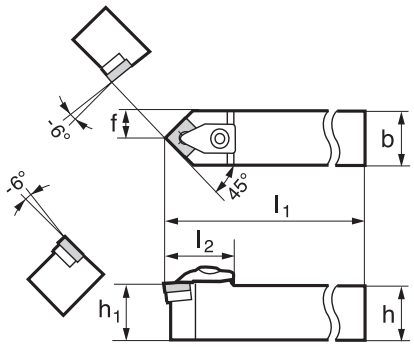
#### Spare Parts

|  Clamp |  Spring |  Clamp bolt |  Shim |  Shim Screw |   Wrench |  Wrench | Insert |
|---|---|---|---|---|---|---|---|
| SCP–5 | | | SNS1906 | BFTX0511N | TRX20(*) | LH040,LH025 | ❶ |
| SCP–6 | | | SNS2507 | BFTX0615N | TRD25(*) | LH060 | ❷ |
| | | | SNS2509 | | | | ❸ |

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

### DSDN






#### Holders

Above figures show right hand tools.

| Ordering No. | Stock | h | $h_1$ | b | $l_1$ | $l_2$ | f |
|---|---|---|---|---|---|---|---|
| DSDN N 3232 P19 | ● | 32 | 32 | 32 | 170 | 50 | 16 |
| DSDN N 4040 S2507 | ● | 40 | 40 | 40 | 250 | 63 | 20 |
| DSDN N 4040 S2509 | ● | 40 | 40 | 40 | 250 | 63 | 20 |

#### Inserts

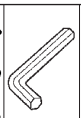
Eg.



N-UZ, N-HU

❶ SNMG 190612 N–UZ
❷ SNMM 250724 N–HU
❸ SNMM 250924 N–HU

#### Spare Parts

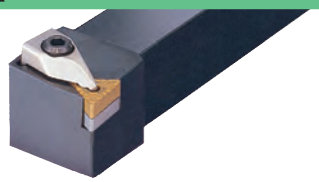
|  Clamp |  Spring |  Clamp bolt |  Shim |  Shim Screw |   Wrench |  Wrench | Insert |
|---|---|---|---|---|---|---|---|
| SCP–5 | | | SNS1906 | BFTX0511N | TRX20(*) | LH040,LH025 | ❶ |
| SCP–6 | | | SNS2507 | BFTX0615N | TRD25(*) | LH060 | ❷ |
| | | | SNS2509 | | | | ❸ |

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



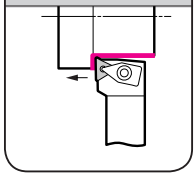
● = Euro stock  Packing unit and ordering example; 1 pce DSBN-R 3232 P19 ( R: right handed )

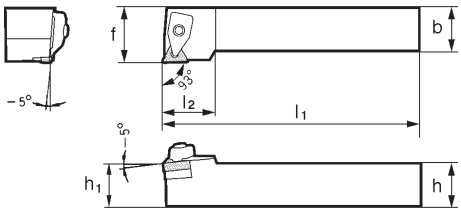
# External Tool Holders
# D Type (Double Clamp)



## General Turning and Facing

## DTJN






### Holders

Above figures show right hand tools.

| Ordering No. | Stock R | Stock L | h | $h_1$ | b | $l_1$ | $l_2$ | f |
|---|---|---|---|---|---|---|---|---|
| **DTJN R/L 2020 K16** | ● | ● | 20 | 20 | 20 | 125 | 31 | 25 |
| **DTJN R/L 2525 M16** | ● | ● | 25 | 25 | 25 | 150 | 31 | 32 |

### Inserts

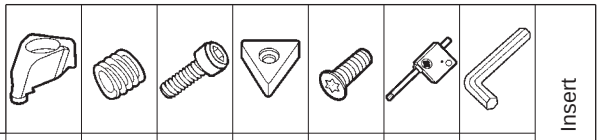
Eg.



N-GU

❶ TNMG 160408 N–GU

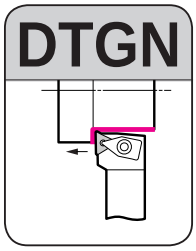
### Spare Parts

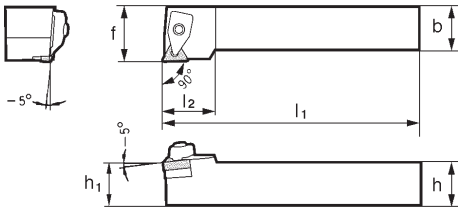


| Clamp | Spring | Clamp bolt | Shim | Shim Screw | Wrench | Wrench | Insert |
|---|---|---|---|---|---|---|---|
| SCP–1 | | | TNS1604 | BFTX0307N | TRX10(*) | LH040 | ❶ |

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

## DTGN






### Holders

Above figures show right hand tools.

| Ordering No. | Stock R | Stock 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

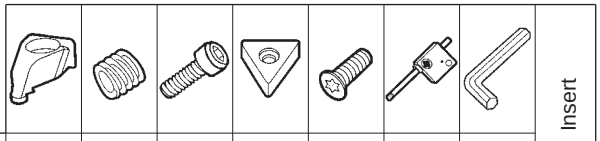
Eg.



N-GU

❶ TNMG 160408 N–GU

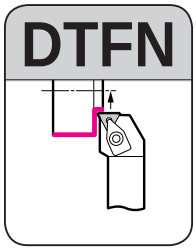
### Spare Parts

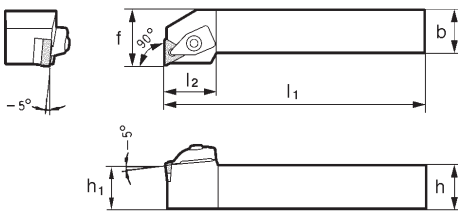


| Clamp | Spring | Clamp bolt | Shim | Shim Screw | Wrench | Wrench | Insert |
|---|---|---|---|---|---|---|---|
| SCP–1 | | | TNS1604 | BFTX0307N | TRX10(*) | LH040 | ❶ |

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

## DTFN






### Holders

Above figures show right hand tools.

| Ordering No. | Stock R | Stock 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

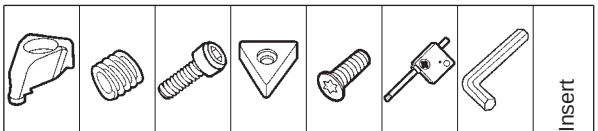
Eg.



N-GU

❶ TNMG 160408 N–GU

### Spare Parts



| Clamp | Spring | Clamp bolt | Shim | Shim Screw | Wrench | Wrench | Insert |
|---|---|---|---|---|---|---|---|
| SCP–1 | | | TNS1604 | BFTX0307N | TRX10(*) | LH040 | ❶ |

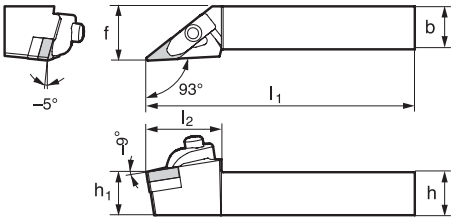
(*) Note: Wrench (TRX) for shim clamp screw is not included.

● = Euro stock  Packing unit and ordering example; 1 pce DTJNR 2016 K16  ( R: right handed )

## General Turning and Copying



# DVJN




### Holders

Above figures show right hand tools.

| Ordering No. | Stock | | Dimensions (mm) | | | | | | Clamp | Spring | Clamp bolt | Shim | Shim Screw | Wrench | Wrench | Insert |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | R | L | h | $h_1$ | b | $l_1$ | $l_2$ | f | | | | | | | | |
| **DVJN R/L 2020 K16** | ● | ● | 20 | 20 | 20 | 125 | 35 | 25 | SCP–4 | | | VNS1604 | BFTX0307N | TRX10(*) | LH040 LH025 | ❶ |
| **DVJN R/L 2525 M16** | ● | ● | 25 | 25 | 25 | 150 | 35 | 32 | | | | | | | | |

### Inserts

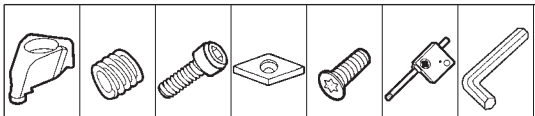
Eg.



❶ VNMG 160408 N–GU

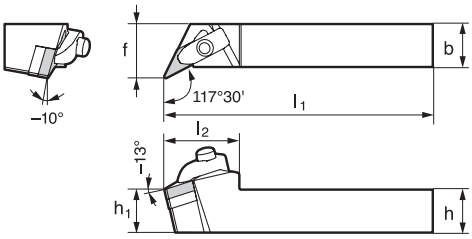
N-GU

### Spare Parts



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

# DVQN




### Holders

Above figures show right hand tools.

| Ordering No. | Stock | | Dimensions (mm) | | | | | | Clamp | Spring | Clamp bolt | Shim | Shim Screw | Wrench | Wrench | Insert |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | R | L | h | $h_1$ | b | $l_1$ | $l_2$ | f | | | | | | | | |
| **DVQN R/L 2020 K16** | ● | ● | 20 | 20 | 20 | 125 | 35 | 25 | SCP–4 | | | VNS1604 | BFTX0307N | TRX10(*) | LH040 LH025 | ❶ |
| **DVQN R/L 2525 M16** | ● | ● | 25 | 25 | 25 | 150 | 35 | 32 | | | | | | | | |

### Inserts

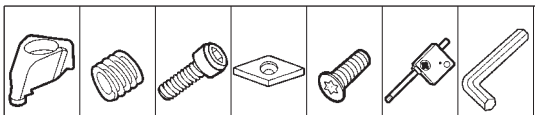
Eg.



❶ VNMG 160408 N–GU

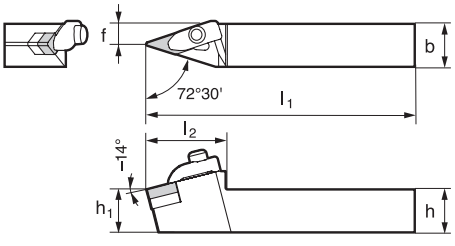
N-GU

### Spare Parts



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

# DVVN




### Holders

Above figures show right hand tools.

| Ordering No. | Stock | Dimensions (mm) | | | | | | Clamp | Spring | Clamp bolt | Shim | Shim Screw | Wrench | Wrench | Insert |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | h | $h_1$ | b | $l_1$ | $l_2$ | f | | | | | | | | |
| **DVVN N 2020 K16** | ● | 20 | 20 | 20 | 125 | 37 | 10,0 | SCP–4 | | | VNS1604 | BFTX0307N | TRX10(*) | LH040 LH025 | ❶ |
| **DVVN N 2525 M16** | ● | 25 | 25 | 25 | 150 | 37 | 12,5 | | | | | | | | |

### Inserts

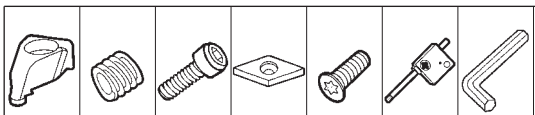
Eg.



❶ VNMG 160408 N–GU

N-GU

### Spare Parts



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



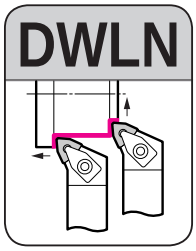


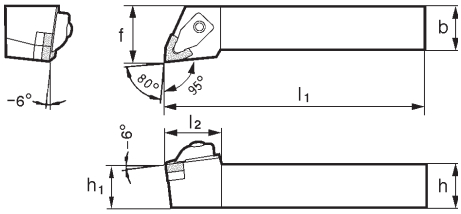
● = Euro stock  Packing unit and ordering example; 1 pce DVJNR 2020 K16 ( R: right handed )

# External Tool Holders
# D Type (Double Clamp)

## General Turning and Facing






## Inserts

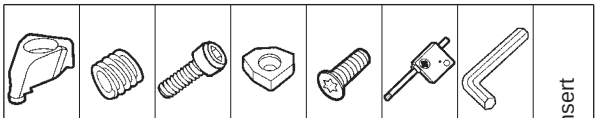



## Holders

Above figures show right hand tools.

| Ordering No. | Stock R | Stock 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 |

## Spare Parts



| Clamp | Spring | Clamp bolt | Shim | Shim Screw | Wrench | Wrench | Insert |
|---|---|---|---|---|---|---|---|
| SCP–2 | | | WNS0804 | BFTX0409N | TRX15(*) | LH040 LH025 | ❶ |

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

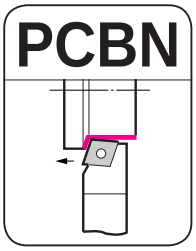


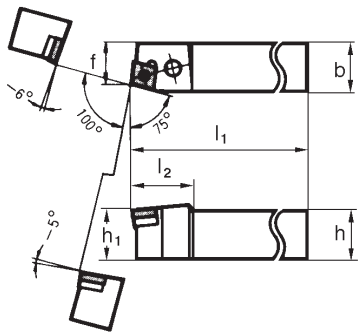
● = Euro stock  Packing unit and ordering example; 1 pce DWLNR 2020 K08 ( R: right handed )

## General Turning and Facing



### PCBN






#### Holders

Above figures show right hand tools.

| Ordering No. | Stock | | Dimensions (mm) | | | | | | Insert |
|---|---|---|---|---|---|---|---|---|---|
| | R | L | h | $h_1$ | b | $l_1$ | $l_2$ | f | |
| **PCBN R/L 2020 K12** | ● | ❍ | 20 | 20 | 20 | 125 | 27 | 17 | ❶ |
| **PCBN R/L 2525 M12** | ● | ● | 25 | 25 | 25 | 150 | 27,7 | 22 | ❶ |
| **PCBN R/L 3225 P12** | ❍ | ● | 32 | 32 | 25 | 170 | 27,7 | 22 | ❶ |
| **PCBN R/L 2525 M16** | ❍ | ● | 25 | 25 | 25 | 150 | 31,7 | 22 | ❷ |
| **PCBN R/L 3225 P16** | ❍ | ● | 32 | 32 | 25 | 170 | 31,7 | 22 | ❷ |
| **PCBN R/L 3232 P19** | ● | ● | 32 | 32 | 32 | 170 | 37,9 | 27 | ❸ |

#### Inserts

Eg.



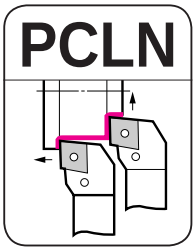
N-GU N-HG

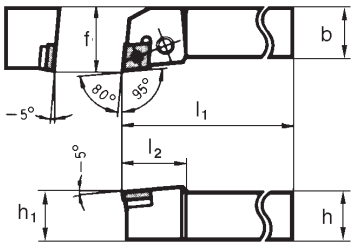
❶ CNMG 120408 N–GU
❷ CNMG 160612 N–GU
❸ CNMM 190612 N–HG

#### Spare Parts

|  |  |  |  |  | Insert |
|---|---|---|---|---|---|
| Lever pin | Clamp bolt | Shim | Shim pin | Wrench | |
| LCL4SD | LCS42BS-SD | LSC42SD | LSP4SD | LH030 | ❶ |
| LCL5SD | LCS5B-SD | LSC53SD | LSP5SD | LH030 | ❷ |
| LCL6SD | LCS6B-SD | LSC63SD | LSP6SD | LH040 | ❸ |

### PCLN






#### Holders

Above figures show right hand tools.

| Ordering No. | Stock | | Dimensions (mm) | | | | | | Insert |
|---|---|---|---|---|---|---|---|---|---|
| | R | L | h | $h_1$ | b | $l_1$ | $l_2$ | f | |
| **PCLN R/L 1616 H09** | ● | ● | 16 | 16 | 16 | 100 | 25,7 | 20 | ❶ |
| **PCLN R/L 2020 K09** | ● | ❍ | 20 | 20 | 20 | 125 | 27 | 25 | ❶ |
| **PCLN R/L 2525 M09** | ❍ | ❍ | 25 | 25 | 25 | 150 | 27 | 32 | ❶ |
| **PCLN R/L 1616 H12** | ● | ● | 16 | 16 | 16 | 100 | 26,1 | 20 | ❷ |
| **PCLN R/L 2020 K12** | ❍ | ❍ | 20 | 20 | 20 | 125 | 27,4 | 25 | ❷ |
| **PCLN R/L 2525 M12** | ❍ | ❍ | 25 | 25 | 25 | 150 | 28 | 32 | ❷ |
| **PCLN R/L 3225 P12** | ● | ● | 32 | 32 | 25 | 170 | 28 | 32 | ❷ |
| **PCLN R/L 2525 M16** | ● | ❍ | 25 | 25 | 25 | 150 | 32,6 | 32 | ❸ |
| **PCLN R/L 3225 P16** | ● | ❍ | 32 | 32 | 25 | 170 | 32,6 | 32 | ❸ |
| **PCLN R/L 3232 P16** | ● | ● | 32 | 32 | 32 | 170 | 32,6 | 40 | ❸ |
| **PCLN R/L 2525 M19** | ● | ❍ | 25 | 25 | 25 | 150 | 37 | 32 | ❹ |
| **PCLN R/L 3225 P19** | ● | ❍ | 32 | 32 | 32 | 170 | 38 | 32 | ❹ |
| **PCLN R/L 3232 P19** | ❍ | ❍ | 32 | 32 | 32 | 170 | 38 | 40 | ❹ |
| **PCLN R/L 4040 S19** | ❍ | ❍ | 40 | 40 | 40 | 250 | 37,8 | 50 | ❹ |

#### Inserts

Eg.



N-GU N-HG

❶ CNMG 090308 N–SU
❷ CNMG 120408 N–GU
❸ CNMG 160612 N–GU
❹ CNMM 190612 N–HG

#### Spare Parts

|  |  |  |  |  | Insert |
|---|---|---|---|---|---|
| Lever pin | Clamp bolt | Shim | Shim pin | Wrench | |
| LCL3SD | LCS3TB-SD | LSC32SD | LSP3SD-S | LH025 | ❶ |
| LCL4SD | LCS 4CA<br>LCS42BS-SD | LSC42SD | LSP4SD | LH030 | ❷ |
| LCL5SD | LCS5B-SD | LSC53SD | LSP5SD | LH030 | ❸ |
| LCL6SD | LCS6B-SD | LSC63SD | LSP6SD | LH040 | ❹ |



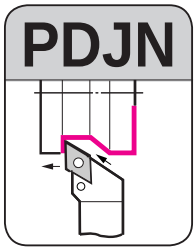


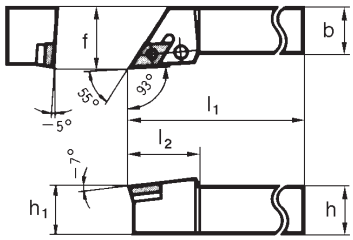
● = Euro stock  Packing unit and ordering example; 1 pce PCBNR 2020 K12 ( R: right handed )

# External Tool Holders
# P Type (Lever Lock)

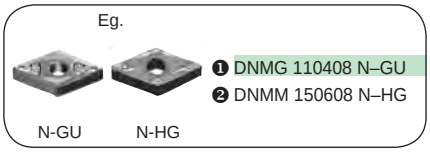


## General Turning and Facing




## 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 | | | | | | |
| **PDJN R/L 1616 H11** | ● | ● | 16 | 16 | 16 | 100 | 30 | 20 | LCL3D-SD | LCS3TB-SD | LSD32SD | LSP3SD | LH025 | ❶ |
| **PDJN R/L 2020 K11** | ● | ● | 20 | 20 | 20 | 125 | 30 | 25 | | | | | | |
| **PDJN R/L 2525 M11** | ● | ● | 25 | 25 | 25 | 150 | 30 | 32 | | | | | | |
| **PDJN R/L 2020 K15** | ● | ● | 20 | 20 | 20 | 125 | 34,7 | 25 | LCL4D-SD | LCS5DB-SD | LSD42SD | LSP4SD | LH030 | ❷ |
| **PDJN R/L 2525 M15** | ● | ● | 25 | 25 | 25 | 150 | 34,7 | 32 | | | | | | |
| **PDJN R/L 3225 P15** | ● | ● | 32 | 32 | 25 | 170 | 34,7 | 32 | | | | | | |
| **PDJN R/L 4025 P15** | ❍ | ❍ | 40 | 40 | 25 | 170 | 35 | 28,7 | | | | | | |

## Spare Parts



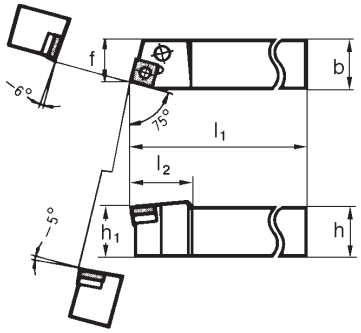
● = Euro stock

Packing unit and ordering example; 1 pce PDJNR 1616 H11 ( R: right handed )

## General Turning and Chamfering



PSBN




### Holders

Above figures show right hand tools.

| Ordering No. | Stock R | Stock L | h | $h_1$ | b | $l_1$ | $l_2$ | f |
|---|---|---|---|---|---|---|---|---|
| **PSBN R/L 2020 K12** | ● | ● | 20 | 20 | 20 | 125 | 27,5 | 17 |
| **PSBN R/L 2525 M12** | ● | ● | 25 | 25 | 25 | 150 | 27,5 | 22 |
| **PSBN R/L 2525 M15** | ● | ● | 25 | 25 | 25 | 150 | 32 | 22 |
| **PSBN R/L 3225 P15** | ● | ● | 32 | 32 | 25 | 170 | 32 | 22 |
| **PSBN R/L 3232 P19** | ● | ● | 32 | 32 | 32 | 170 | 39,2 | 27 |

### Inserts

Eg.

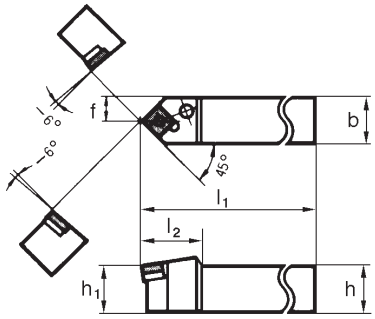



❶ SNMG 120408 N–GU
❷ SNMG 150612 N–GU
❸ SNMM 190612 N–HG

### Spare Parts

|  Lever pin |  Clamp bolt |  Shim |  Shim pin |  Wrench | Insert |
|---|---|---|---|---|---|
| LCL4SD | LCS42BS-SD | LSS42SD | LSP4SD | LH030 | ❶ |
| LCL5SD | LCS5B-SD | LSS53SD | LSP5SD | LH030 | ❷ |
| LCL6SD | LCS6B-SD | LSS63SD | LSP6SD | LH040 | ❸ |

PSDN




### Holders

| Ordering No. | Stock | h | $h_1$ | b | $l_1$ | $l_2$ | f |
|---|---|---|---|---|---|---|---|
| **PSDN N 1616 H09** | ● | 16 | 16 | 16 | 100 | 21 | 8,3 |
| **PSDN N 2020 K12** | ● | 20 | 20 | 20 | 125 | 27,6 | 10,3 |
| **PSDN N 2525 M12** | ● | 25 | 25 | 25 | 150 | 27,6 | 12,8 |
| **PSDN N 3225 P12** | ● | 32 | 32 | 25 | 170 | 27,6 | 12,8 |
| **PSDN N 3225 P19** | ❍ | 32 | 32 | 25 | 170 | 40,6 | 13 |
| **PSDN N 3232 P19** | ● | 32 | 32 | 32 | 170 | 40,6 | 16,5 |

### Inserts

Eg.




❶ SNMG 090308 N–UG
❷ SNMG 120408 N–GU
❸ SNMM 190612 N–HG

### Spare Parts

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



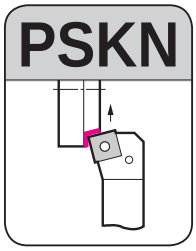


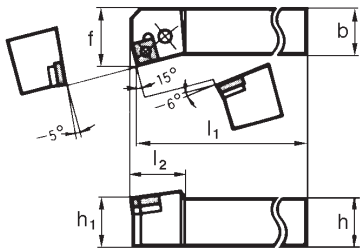
● = Euro stock  Packing unit and ordering example; 1 pce PDJNR 1616 H11 ( R: right handed )

## General Turning and Facing



### PSKN






#### Holders

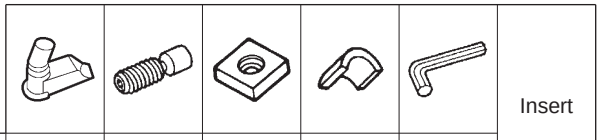
Above figures show right hand tools.

| Ordering No. | Stock R | Stock 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

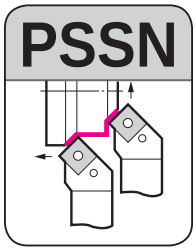


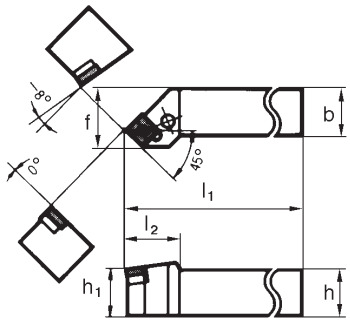

#### Spare Parts



| Lever pin | Clamp bolt | Shim | Shim pin | Wrench | Insert |
|---|---|---|---|---|---|
| LCL4SD | LCS42BS-SD | LSS42SD | LSP4SD | LH030 | ❶ |
| LCL5SD | LCS5B-SD | LSS53SD | LSP5SD | LH030 | ❷ |
| LCL6SD | LCS6B-SD | LSS63SD | LSP6SD | LH040 | ❸ |

### PSSN






#### Holders

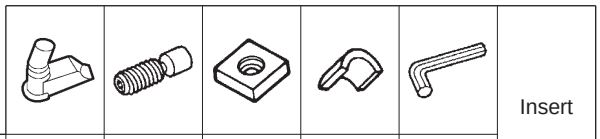
Above figures show right hand tools.

| Ordering No. | Stock R | Stock 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 | ❶ |
| LCL5SD | LCS5B-SD | LSS53SD | LSP5SD | LH030 | ❷ |
| LCL6SD | LCS6B-SD | LSS63SD | LSP6SD | LH040 | ❸ |

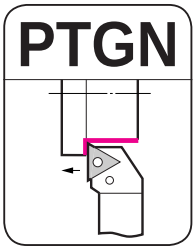


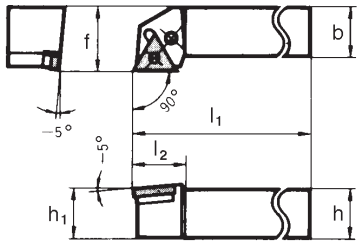
● = Euro stock  Packing unit and ordering example; 1 pce PSKNR 2020 K12 ( R: right handed )

## General Turning and Facing



## PTGN



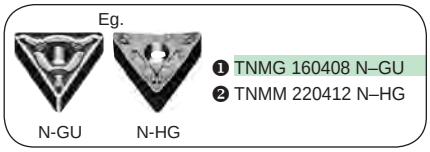



### Holders

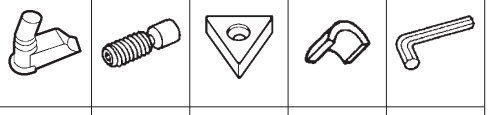
Above figures show right hand tools.

| Ordering No. | Stock | | Dimensions (mm) | | | | | | Spare Parts | | | | | Insert |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | R | L | h | $h_1$ | b | $l_1$ | $l_2$ | f | Lever pin | Clamp bolt | Shim | Shim pin | Wrench | |
| **PTGN R/L 1616 H16** | ● | ● | 16 | 16 | 16 | 100 | 20 | 20 | LCL3SD | LCS3TB-SD | LST317SD | LSP3SD | LH025 | ❶ |
| **PTGN R/L 2020 K16** | ● | ● | 20 | 20 | 20 | 125 | 20 | 25 | | | | | | |
| **PTGN R/L 2525 M16** | ● | ● | 25 | 25 | 25 | 150 | 22,2 | 32 | | | | | | |
| **PTGN R/L 2525 M22** | ● | ● | 25 | 25 | 25 | 150 | 28,7 | 32 | LCL4SD | LCS42BS-SD | LST42SD | LSP4SD | LH030 | ❷ |
| **PTGN R/L 3225 P22** | ● | ❍ | 32 | 32 | 25 | 170 | 28,7 | 32 | | | | | | |
| **PTGN R/L 3232 P22** | ● | ● | 32 | 32 | 32 | 170 | 28,7 | 32 | | | | | | |

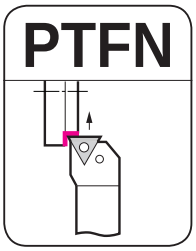
### Inserts

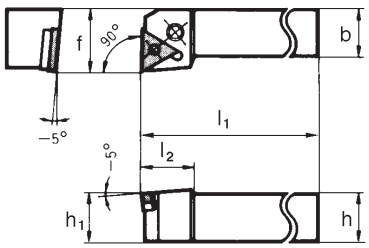



### Spare Parts



## PTFN



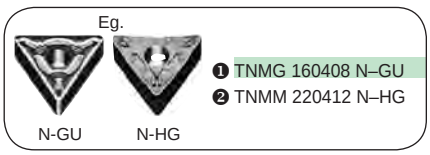



### Holders

Above figures show right hand tools.

| Ordering No. | Stock | | Dimensions (mm) | | | | | | Spare Parts | | | | | Insert |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | R | L | h | $h_1$ | b | $l_1$ | $l_2$ | f | Lever pin | Clamp bolt | Shim | Shim pin | Wrench | |
| **PTFN R/L 1616 H16** | ● | ● | 16 | 16 | 16 | 100 | 19,7 | 20 | LCL3SD | LCS3TB-SD | LST317SD | LSP3SD | LH025 | ❶ |
| **PTFN R/L 2020 K16** | ● | ● | 20 | 20 | 20 | 125 | 20,2 | 25 | | | | | | |
| **PTFN R/L 2525 M16** | ● | ● | 25 | 25 | 25 | 150 | 20,2 | 32 | | | | | | |
| **PTFN R/L 2525 M22** | ● | ❍ | 25 | 25 | 25 | 150 | 25,2 | 32 | LCL4SD | LCS42BS-SD | LST42SD | LSP4SD | LH030 | ❷ |
| **PTFN R/L 3225 P22** | ● | ● | 32 | 32 | 25 | 170 | 25,2 | 32 | | | | | | |

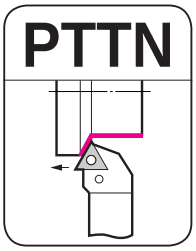
### Inserts

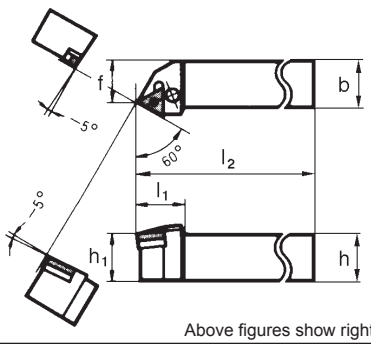



### Spare Parts



## PTTN



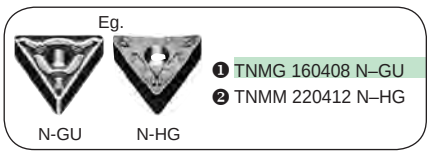



### Holders

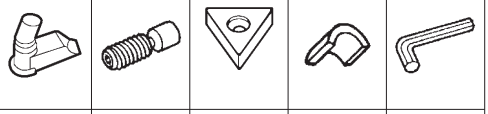
Above figures show right hand tools.

| Ordering No. | Stock | | Dimensions (mm) | | | | | | Spare Parts | | | | | Insert |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | R | L | h | $h_1$ | b | $l_1$ | $l_2$ | f | Lever pin | Clamp bolt | Shim | Shim pin | Wrench | |
| **PTTN R/L 2020 K16** | ❍ | ❍ | 20 | 20 | 20 | 125 | 25,9 | 17 | LCL3SD | LCS3TB-SD | LST317SD | LSP3SD | LH025 | ❶ |
| **PTTN R/L 2525 M16** | ● | ❍ | 25 | 25 | 25 | 150 | 25,9 | 22 | | | | | | |
| **PTTN R/L 2525 M22** | | ❍ | 25 | 25 | 25 | 150 | 31,9 | 22 | LCL4SD | LCS42BS-SD | LST42SD | LSP4SD | LH030 | ❷ |
| **PTTN R/L 3225 P22** | ❍ | ● | 32 | 32 | 25 | 170 | 31,9 | 22 | | | | | | |

### Inserts




### Spare Parts



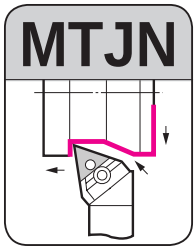


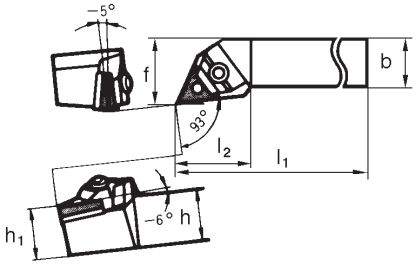
● = Euro stock  Packing unit and ordering example; 1 pce PTGNR 1616 H16 ( R: right handed )

## General Turning and Copying



### MTJN



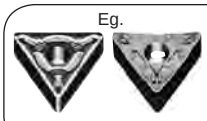



Above figures show right hand tools.

#### Holders

| Ordering No. | Stock R | Stock 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

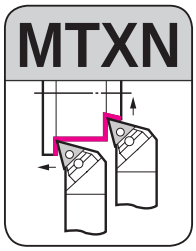


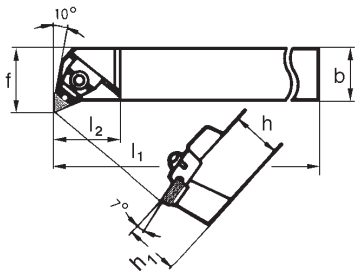

❶ TNMG 160408 N–GU
❷ TNMM 220412 N–HG

#### Spare Parts

| Wedge | Shim pin | Shim | Clamp bold | Nut | Ring | Wrench | Insert |
|---|---|---|---|---|---|---|---|
| MMW30 | MP317 / MP320 | STW323 | BHA0525 | CPM32N | ER04 | LH030 | ❶ |
| MMW40 | MP420 / MP416 | STW434 | BHA0625 | CPM43N | ER05 | LH030 LH040 | ❷ |

### MTXN



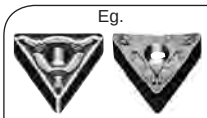



Above figures show right hand tools.

#### Holders

| Ordering No. | Stock R | Stock 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




❶ TNMG 160408 N–GU
❷ TNMM 220412 N–HG

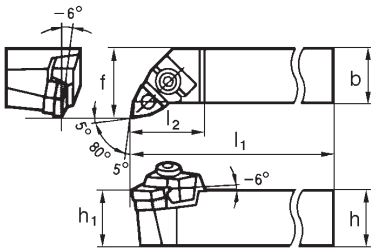
#### Spare Parts

| Wedge | Shim pin | Shim | Clamp bold | Nut | Ring | Wrench | Insert |
|---|---|---|---|---|---|---|---|
| MMW30 | MP317 / MP320 | STW323 | BHA0525 | CPM32N | ER04 | LH030 | ❶ |
| MMW40 | MP420 | STW434 | BHA0625 | CPM43N | ER05 | LH030, 040 | ❷ |

## General Turning and Facing

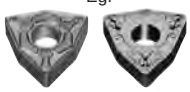


MWLN




### Inserts

Eg.



N-GU N-HG

❶ WNMG 080408 N–GU
❷ WNMM 080412 N–HG

### Spare Parts

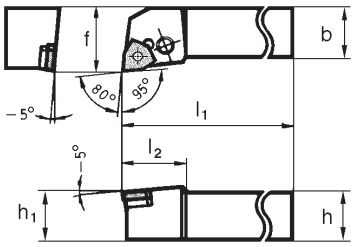
### Holders

Above figures show right hand tools.

| Ordering No. | Stock R | Stock L | Dimensions (mm) h | h1 | b | l1 | l2 | f | Wedge | Shim pin | Shim | Clamp bold | Nut | Ring | Wrench | Insert |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **MWLN R/L 2020-43 (K08)** | | | 20 | 20 | 20 | 125 | 32 | 25 | MWW40 | MP416 | SWW433 | BHA0625 | CPM43S | ER05 | LH030 LH040 | ❶,❷ |
| **MWLN R/L 2525-43 (M08)** | ❍ | ❍ | 25 | 25 | 25 | 150 | 32 | 32 | | MP420 | | | CPM43N | | | |
| **MWLN R/L 3225-43 (P08)** | ❍ | ❍ | 32 | 32 | 25 | 170 | 32 | 32 | | | | | | | | |
| **MWLN R/L 2525-54 (M10)** | | | 25 | 25 | 25 | 150 | 37 | 32 | MWW50 | MP531 | SWW544 | BHA0834 | CPM54N | ER07 | LH040 LH050 | |
| **MWLN R/L 3225-54 (P10)** | | | 32 | 32 | 25 | 170 | 37 | 32 | | MP534 | | | | | | |

## P Type Lever Lock Holders

PWLN




### Inserts

Eg.



N-SU

❶ WNMG 060408 N–SU

### Spare Parts

### Holders

Above figures show right hand tools.

| Ordering No. | Stock R | Stock L | Dimensions (mm) h | h1 | b | l1 | l2 | f | Lever pin | Clamp bolt | Shim | Shim pin | Wrench | Insert |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PWLN R/L 2020 K06** (PWLN R/L 2020 -33 ) | ❍ | ❍ | 20 | 20 | 20 | 125 | 27 | 25 | LCL3SD | LCS3TB-SD | LSW317 | LSP3SD | LH025 | ❶ |
| **PWLN R/L 2525 M06** (PWLN R/L 2525 -33) | ❍ | ❍ | 25 | 25 | 25 | 150 | 27 | 32 | | | | | | |



● = Euro stock  Packing unit and ordering example; 1 pce PWLNR 2020 K06 ( R: right handed )



## C Type Top Clamp Holders

### CCLN

Fig.1

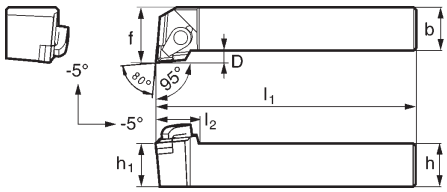
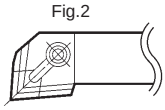



Fig.2



#### Inserts



❶ CNGN0903**
❷ CNGN1203 **
❸ CNGN1204 **

#### Spare Parts

#### Holders

Above figures show right hand tools.

| Ordering No. | Stock R | Stock L | h=$h_1$ | b | $l_1$ | $l_2$ | f | D | Fig. | Clamp | Insert protector | Clamp bolt | Shim | Shim pin | Wrench | | Insert |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CCLN R/L 2525 M09** | ❍ | | 25 | 25 | 150 | 25 | 32 | 7 | 1 | CCM8UL | CBC0903 | WB8-22T | SCN0903 | SPP3 | LT27 | | ❶ |
| **CCLN R/L 2525 M12-03** | ❍ | | 25 | 25 | 150 | 30 | 32 | 7 | 1 | | CBC4 | | SCND433 | | | | ❷ |
| **CCLN R/L 2525 M12-04** | ❍ | | 25 | 25 | 150 | 30 | 32 | 7 | 2 | CCM8-LONG | CBC4 | WB8-30 | SCND433 | SPP3 | LH040 | | ❸ |

(FCLN R/L 2525-43)

### CSBN

Fig.1

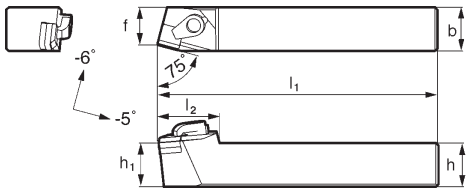
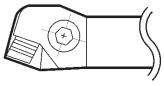



Fig.2



#### Inserts



❶ SNGN0903**
❷ SNGN1203**
❸ SNGN1204**

#### Spare Parts

#### Holders

Above figures show right hand tools.

| Ordering No. | Stock R | Stock L | h=$h_1$ | b | $l_1$ | $l_2$ | f | D | Fig. | Clamp | Insert protector | Clamp bolt | Shim | Shim pin | Spring | Wrench | Insert |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CSBN R/L 2525 N09** | ❍ | | 25 | 25 | 160 | 30 | 21,5 | – | 1 | CCM8UL | CBS13 | WB8-22T | SSN0903 | – | – | LH040 | ❶ |
| **CSBN R/L 2525 N12-03** | ❍ | | 25 | 25 | 160 | 35 | 21,5 | – | 1 | | CBS14 | | SSND423 | | | | ❷ |
| **CSBN R/L 2525 N12-04** | ❍ | | 25 | 25 | 160 | 33 | 21,5 | – | 2 | DC-R/L 1 | CBD 4 R/L | BH 0830 R/L | SSND423 | SPP3 | DSP5 | LH040 | ❸ |

(FN11 R-44A)

### CSKN

Fig.1

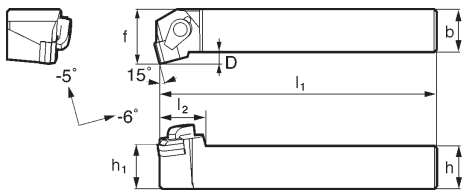
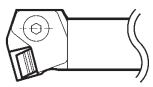



Fig.2



#### Inserts



❶ SNGN0903**
❷ SNGN1203**
❸ SNGN1204**

#### Spare Parts

#### Holders

Above figures show right hand tools.

| Ordering No. | Stock R | Stock L | h=$h_1$ | b | $l_1$ | $l_2$ | f | D | Fig. | Clamp | Insert protector | Clamp bolt | Shim | Shim pin | Spring | Wrench | Insert |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CSKN R/L 2525 N09** | ❍ | | 25 | 25 | 160 | 25 | 32 | 7 | 1 | CCM8UL | CBS13 | WB8-22T | SSN0903 | – | – | LH040 | ❶ |
| **CSKN R/L 2525 N12-03** | ❍ | | 25 | 25 | 160 | 25 | 32 | 7 | 1 | | CBS14 | | SSND423 | | | | ❷ |
| **CSKN R/L 2525 N12-04** | ❍ | | 25 | 25 | 160 | 21 | 32 | 7 | 2 | DC-L/R 1 | CBD 4 L/R | BH 0830 L/R | SSND423 | SPP3 | DSP5 | LH040 | ❸ |

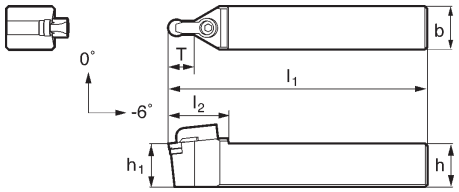
(FN15 R/L-44A)

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

## C Type Top Clamp Holders



### CRDN




#### Inserts



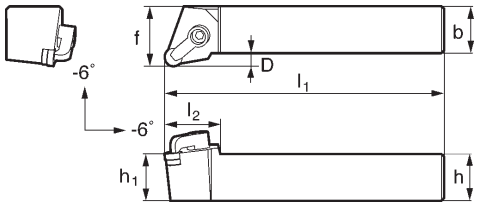
❶ RNGN0903**
❷ RNGN1203 **
❸ RNGN1204 **

#### Spare Parts

#### 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 | WB8-22T | SRND32 | SPP3 | LT27 | ❶ |
| CRDNN 2525 M12-03 | ● | 25 | 25 | 25 | 150 | 35 | – | 20 | | | SRND42 | | | ❷ |
| CRDNN 2525 M12-04 | ● | 25 | 25 | 25 | 150 | 35 | – | 20 | | | | | | ❸ |

### CRSN




#### Inserts



❶ RNGN0903**
❷ RNGN1203 **
❸ RNGN1204 **

#### Spare Parts

#### 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 | D | | | | | | |
| CRSN R/L 2525 M09 | ● | ● | 25 | 25 | 25 | 150 | 30 | 32 | 7 | CCM8-LONG | WB8-22T | SRND32 | SPP3 | LT27 | ❶ |
| CRSN R/L 2525 M12-03 | ● | ● | 25 | 25 | 25 | 150 | 30 | 32 | 7 | | | SRND42 | | | ❷ |
| CRSN R/L 2525 M12-04 | ● | ● | 25 | 25 | 25 | 150 | 30 | 32 | 7 | | | | | | ❸ |





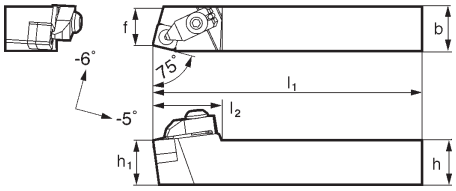
● = Euro stock

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

# X Type Dimple Lock Holders



## XSBN




### Inserts



❶ SNGX1204 **

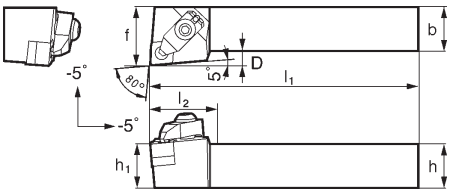
### Spare Parts

### 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 | | ❶ |

## XCLN




### Inserts



❶ CNGX1204 **

### Spare Parts

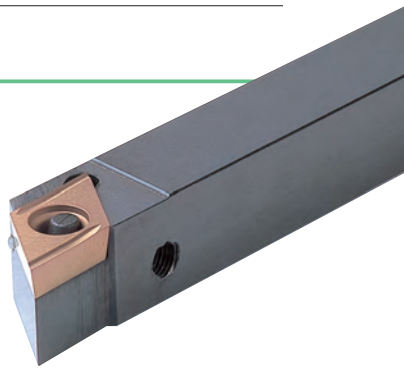
### Holders

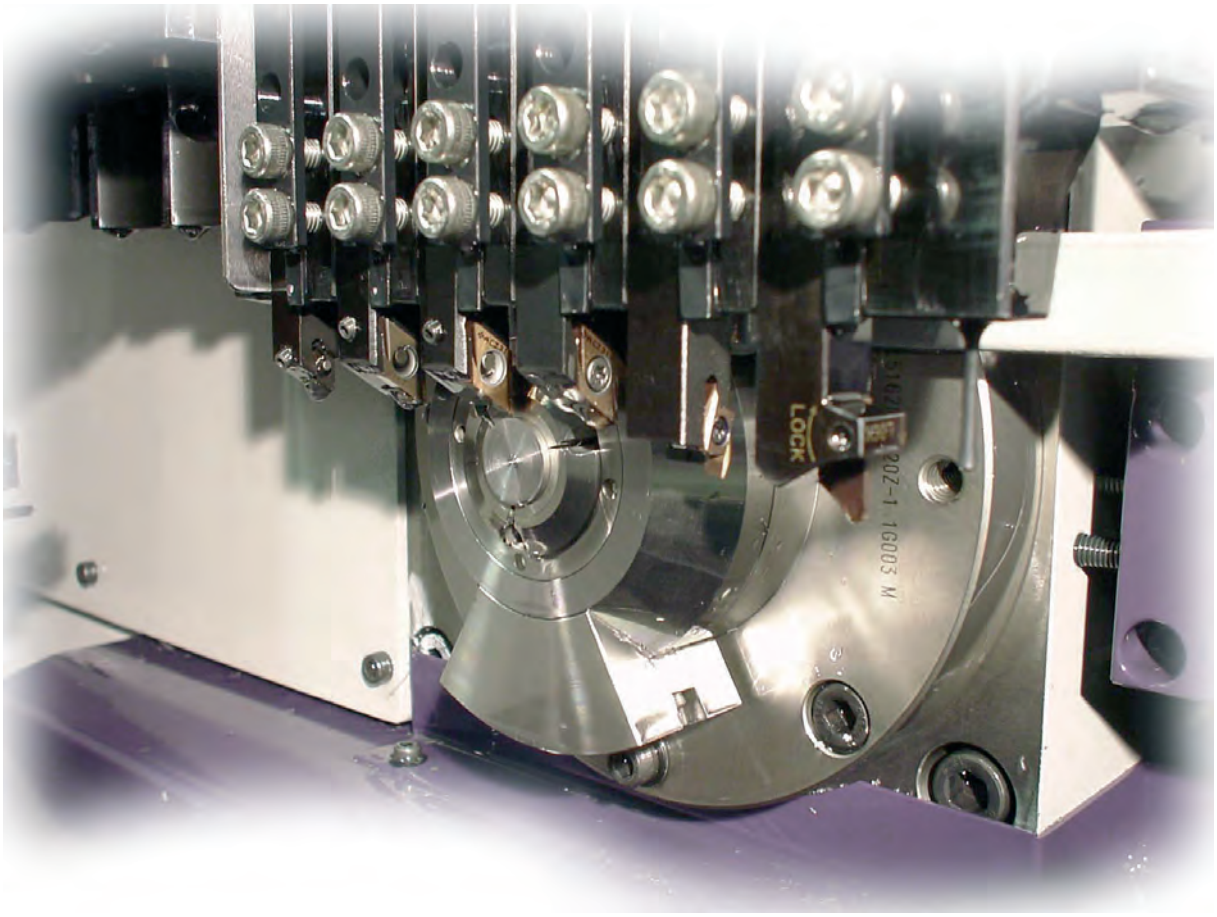
Above figures show right hand tools.

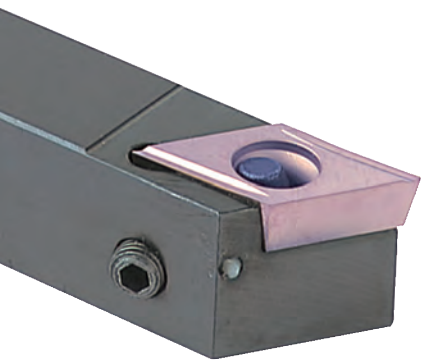
| Ordering No. | Stock | | Dimensions (mm) | | | | | | | Clamp | Clamp bolt | Shim | Shim pin | Spring | Wrench | | Insert |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | R | L | h | $h_1$ | b | $l_1$ | $l_2$ | f | D | | | | | | | | |
| **XCLN R/L 2525 M12** | ● | | 25 | 25 | 25 | 150 | 33 | 32 | 7 | DSLX8 | BH0825 | SCND433 | SPP3 | GSP10 | LH050 | | ❶ |

# External Mini Holders

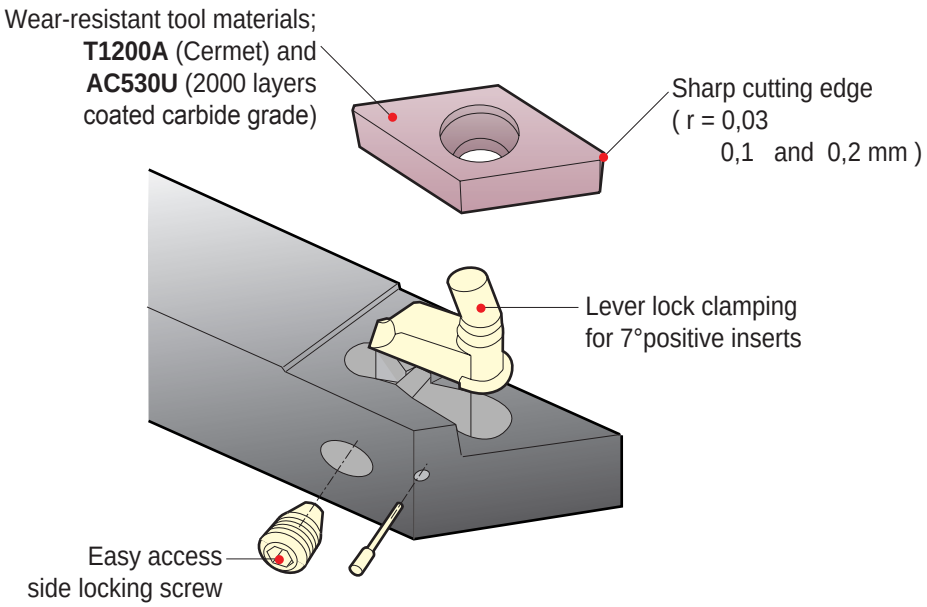




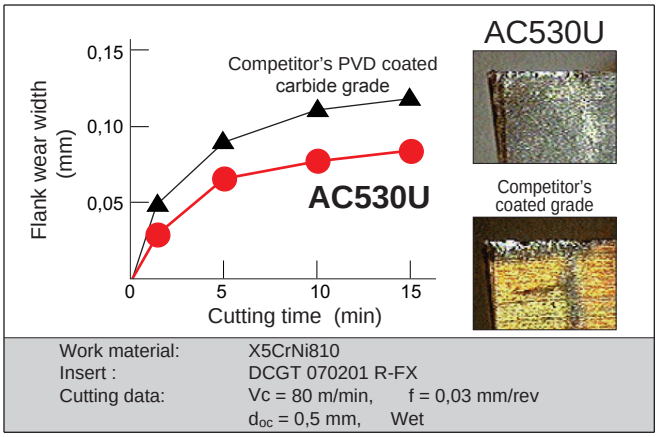




PDJCR type
lever lock holder

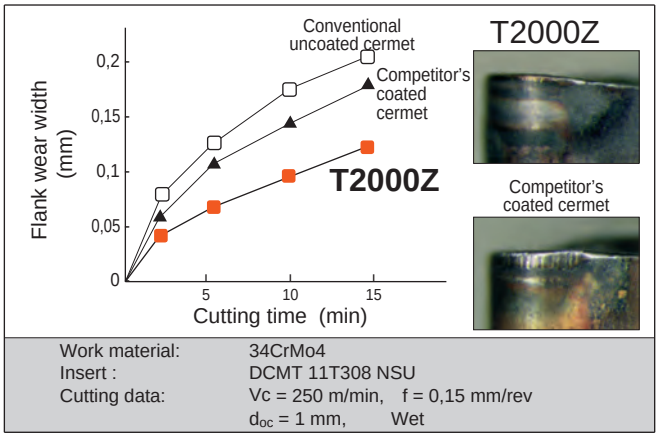


## Wear resistance of ZX coated grade AC530U




| | |
|---|---|
| Work material: | X5CrNi810 |
| Insert : | DCGT 070201 R-FX |
| Cutting data: | Vc = 80 m/min, f = 0,03 mm/rev |
| | $d_{oc}$ = 0,5 mm, Wet |

## Wear resistance of tough ZX coated Cermet

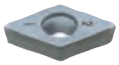



| | |
|---|---|
| Work material: | 34CrMo4 |
| Insert : | DCMT 11T308 NSU |
| Cutting data: | Vc = 250 m/min, f = 0,15 mm/rev |
| | $d_{oc}$ = 1 mm, Wet |

## High performance of coated CBN grades BNC160 and BNC200

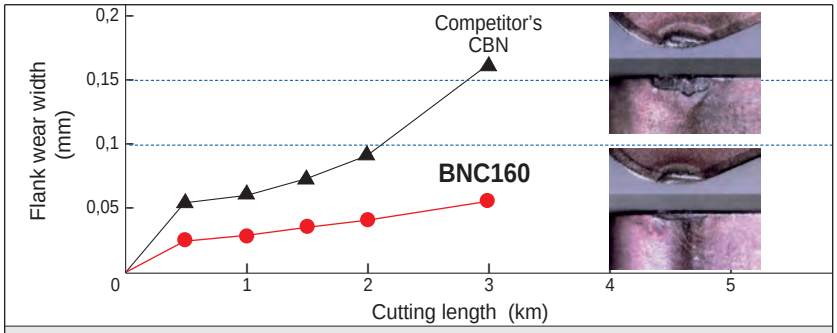


**BNC200**



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

TiN coated CBN grade **BNC160** for high precision hard turning




| | | | |
|---|---|---|---|
| Work material: | 15CrMo5 ($H_RC$58-62) | | |
| Cutting data: | Vc = 200 m/min, f = 0,08 mm/rev, | $d_{oc}$ = 0,1 mm | Development of flank and notch wear |
| Insert type: | CNGA 120408 NC-4 | Dry | |

## Recommended grades

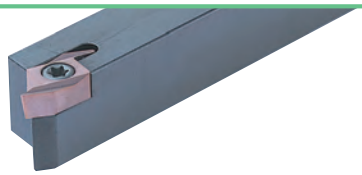
| Cutting material | Application: Finishing | Application: Roughing |
|---|---|---|
| Coated carbide | AC530U, AC820P, AC830P | |
| Uncoated carbide | | H1 |
| Coated Cermet | T2000Z, T3000Z | |
| Uncoated Cermet | T1500A | |
| Coated CBN | BNC100, BNC160, BNC200 | BNC300 |
| Uncoated CBN | BN2000, BNX20, BN700 | |
| PCD SUMIDIA | DA1000 | |

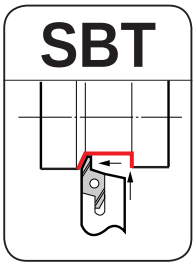
## Recommended cutting conditions

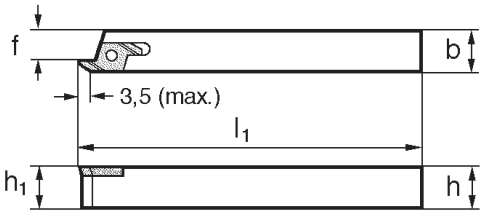
| Workpiece material | Sumitomo grade | Cutting speed $v_c$ (m/min) | Feed rate f (mm/rev) |
|---|---|---|---|
| General steel, Free-cutting steel | AC530U | 50–180 | 0,05–0,2 |
| | AC820P | 100–250 | 0,05–0,2 |
| | AC830P | 80–200 | 0,05–0,2 |
| | T2000Z | 100–300 | 0,05–0,2 |
| | T1500A | 100–250 | 0,05–0,2 |
| Stainless steel | AC530U | 40–120 | 0,02–0,2 |
| Hardened steel | BN2000 | 40–200 | 0,02–0,2 |
| | BNC100 | 150–300 | 0,02–0,2 |
| | BNC160 | 150–220 | 0,02–0,2 |
| | BNC200 | 100–200 | 0,02–0,2 |
| | BNC300 | 50–150 | 0,02–0,2 |
| Exotic materials | BN700 | 50–170 | 0,02–0,15 |
| Non-ferrous metals | DA1000 | 400–3000 | 0,02–0,15 |
| | H1 | 200–2500 | 0,05–0,5 |

# SBT Type

## Special Mini Holders for Back Facing






## Holders

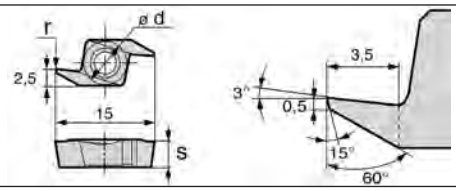
Above figures show right hand tools.

| Ordering No. | Stock | Dimensions (mm) | | | | | | | Spare Parts | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | h | $h_1$ | b | $l_1$ | f | | | Screw | Wrench | | | Insert |
| **SBT 35-R 1010** | ● | 10 | 10 | 10 | 120 | 7,5 | | | BFTX0307N | TRX10 | | | BTR 35_ _ |
| **SBT 35-R 1212** | ● | 12 | 12 | 12 | 120 | 9,5 | | | | | | | |
| **SBT 35-R 1616** | ● | 16 | 16 | 16 | 120 | 13,5 | | | | | | | |

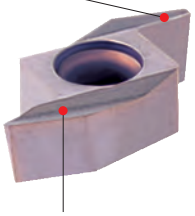
## INSERTS

Coated carbide  Uncoated Cermet

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

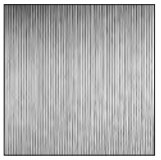


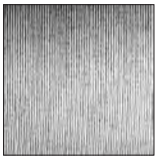

Sharp cutting edge with 15° rake angle



Wide groove breaker for smooth chip evacuation

### ● Surface roughness comparision


**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 |

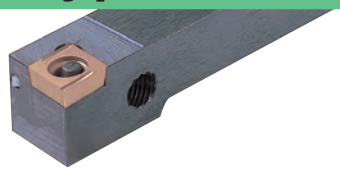
(ACZ310 & T1200A)





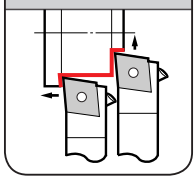
● = Euro stock  Packing unit and ordering example; 1 pce SBT 35 R 1010  ( R: right handed )

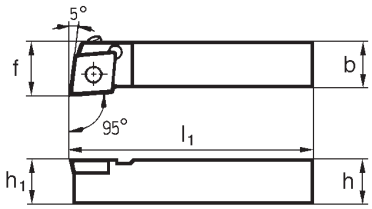
# External Mini Tool Holders
# PC/SC Type



## P Type Lever Lock Holders

**PCLC**






### Inserts

Eg.



❶ CCGT 060202 R-FX
❷ CCMT 09T304 N-SU

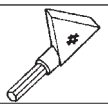
R-FX N-SU

### Holders

Above figures show right hand tools.

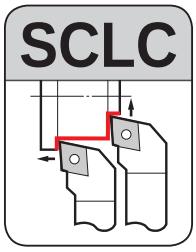
| Ordering No. | Stock R | Stock L | h | $h_1$ | b | $l_1$ | f |
|---|---|---|---|---|---|---|---|
| **PCLC R/L 0810 K06** | ❍ | ❍ | 8 | 8 | 10 | 125 | 10,5 |
| **PCLC R/L 1010 K06** | ● | ❍ | 10 | 10 | 10 | 125 | 10,5 |
| **PCLC R/L 1212 M09** | ● | ● | 12 | 12 | 12 | 150 | 12,5 |
| **PCLC R/L 1616 M09** | ● | | 16 | 16 | 16 | 150 | 16,5 |

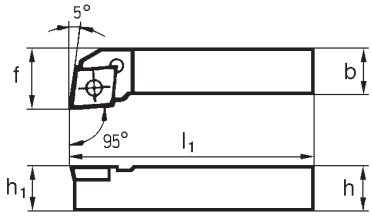
### Spare Parts

|  Lever pin |  Clamp screw |  Side pin |  Wrench | Insert |
|---|---|---|---|---|
| LCL 06 | BTT 0407 | LP 07 | TH 020 | ❶ |
| LCL 09 | BTT 0411 | LP 06 | | ❷ |

## S Type Screw Lock Holders

**SCLC**






### Inserts

Eg.



❶ CCGT 060202 R-FX
❷ CCMT 09T304 N-SU
❸ CCMT 120408 N-SU

R-FX N-SU

### Holders

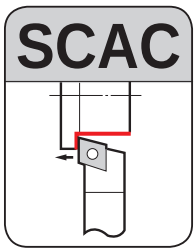
Above figures show right hand tools.

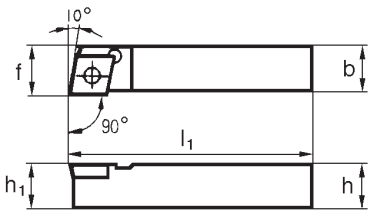
| Ordering No. | Stock R | Stock L | h | $h_1$ | b | $l_1$ | f |
|---|---|---|---|---|---|---|---|
| **SCLC R/L 0808 D06** | ● | ● | 8 | 8 | 8 | 60 | 10 |
| **SCLC R/L 1010 E06** | ● | ● | 10 | 10 | 10 | 70 | 12 |
| **SCLC R/L 1212 F09** | ● | ● | 12 | 12 | 12 | 80 | 16 |
| **SCLC R/L 1616 H09** | ● | ● | 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 |
| **SCLC R/L 2525 M12** | ● | ● | 20 | 25 | 25 | 150 | 32 |

### Spare Parts

|  Screw |  Wrench | | | Insert |
|---|---|---|---|---|
| BFTX02506N | TRX08 | | | ❶ |
| BFTX0409N | TRX15 | | | ❷ |
| BFTX0511N | TRX20 | | | ❸ |

**SCAC**






### Inserts

Eg.



❶ CCGT 060202 R-FX
❷ CCMT 09T304 N-SU

R-FX N-SU

### Holders

Above figures show right hand tools.

| Ordering No. | Stock R | Stock L | h | $h_1$ | b | $l_1$ | f |
|---|---|---|---|---|---|---|---|
| **SCAC R/L 0808 D06** | ● | ❍ | 8 | 8 | 8 | 60 | 8,5 |
| **SCAC R/L 1010 E06** | ● | ❍ | 10 | 10 | 10 | 70 | 10,5 |
| **SCAC R/L 1212 F09** | ● | ❍ | 12 | 12 | 12 | 80 | 12,5 |

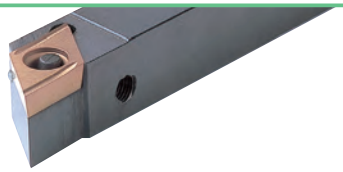
### Spare Parts

|  Screw |  Wrench | | | Insert |
|---|---|---|---|---|
| BFTX02506N | TRX08 | | | ❶ |
| BFTX0409N | TRX15 | | | ❷ |

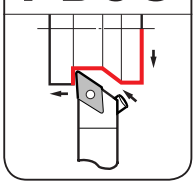
● = Euro stock

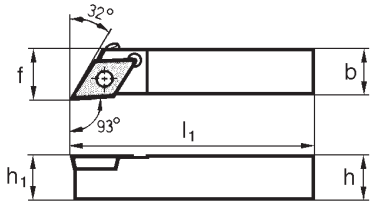
Packing unit and ordering example; 1 pce PCLCR 0810 K06 ( R: right handed )

## P Type Lever Lock Holders



**PDJC**






### Inserts

Eg.



R-FX N-SU

❶ DCGT 070202 R-FX
❷ DCMT 11T304 N-SU

### Spare Parts

### Holders

Above figures show right hand tools.

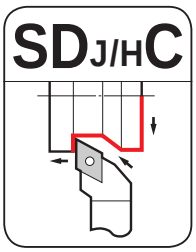
| Ordering No. | Stock | | Dimensions (mm) | | | | | Lever pin | Clamp screw | Side pin | Wrench | Insert |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | R | L | h | $h_1$ | b | $l_1$ | f | | | | | |
| **PDJC R/L 0810 K07** | ● | ❍ | 8 | 8 | 10 | 125 | 10,5 | LCL 06 | BTT 0407 | LP 04 | TH 020 | ❶ |
| **PDJC R/L 1010 K07** | ● | ● | 10 | 10 | 10 | 125 | 10,5 | | | | | |
| **PDJC R/L 1212 M11** | ● | ● | 12 | 12 | 12 | 150 | 12,5 | LCL 09 | | LP 07 | | ❷ |
| **PDJC R/L 1616 M11** | ● | ❍ | 16 | 16 | 16 | 150 | 16,5 | | BTT 0411 | | | |

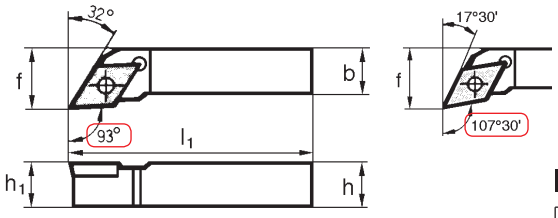
## S Type Screw Lock Holders

**SDJC** R/L

**SDHC** R/L

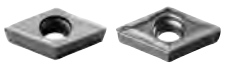
**SDJ/HC**






### Inserts

Eg.



R-FX N-SU

❶ DCGT 070202 R-FX
❷ DCMT 11T304 N-SU

### 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 | | | ❶ |
| **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 | | | ❷ |
| **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 | BFTX0409N | TRX15 | | | ❷ |
| **SDHC R/L 2020 K11** | ● | ● | 20 | 20 | 20 | 125 | 25 | | | | | |
| **SDHC R/L 2525 M11** | ● | ● | 25 | 25 | 25 | 150 | 32 | | | | | |



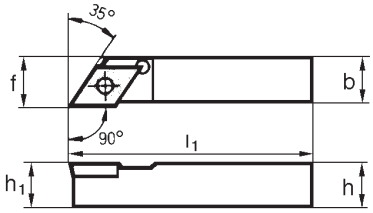
● = Euro stock

Packing unit and ordering example; 1 pce PDJCR 0810 K07 ( R: right handed )



## S Type Screw Lock Holders

SDAC




### Inserts

Eg.



❶ DCGT 070202 R-FX
❷ DCMT 11T304 N-SU

R-FX N-SU

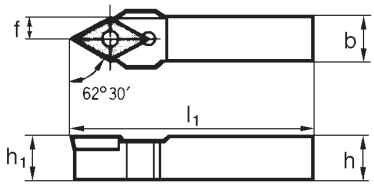
### Holders

Above figures show right hand tools.

### Spare Parts

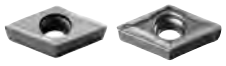
| Ordering No. | Stock | | Dimensions (mm) | | | | | Screw | Wrench | | | Insert |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | R | L | h | $h_1$ | b | $l_1$ | f | | | | | |
| **SDAC R/L 0808 D07** | ❍ | ● | 8 | 8 | 8 | 60 | 8,5 | BFTX02506N | TRX08 | | | ❶ |
| **SDAC R/L 1010 E07** | ● | ● | 10 | 10 | 10 | 70 | 10,5 | | | | | |
| **SDAC R/L 1212 F11** | ● | ● | 12 | 12 | 12 | 80 | 12,5 | BFTX0409N | TRX15 | | | ❷ |

SDNC




### Inserts

Eg.



❶ DCGT 070202 R-FX
❷ DCMT 11T304 N-SU

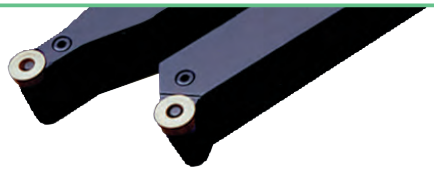
R-FX N-SU

### Spare Parts

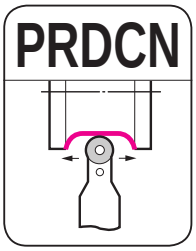
### Holders

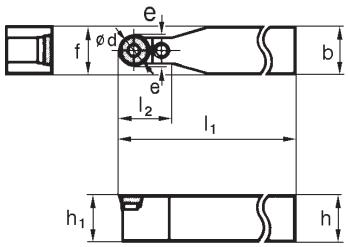
| Ordering No. | Stock | Dimensions (mm) | | | | | Screw | Wrench | | | Insert |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | h | $h_1$ | b | $l_1$ | f | | | | | |
| **SDNCN 0808 D07** | ● | 8 | 8 | 8 | 60 | 4,2 | BFTX02506N | TRX08 | | | ❶ |
| **SDNCN 1010 E07** | ● | 10 | 10 | 10 | 70 | 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 | | | ❷ |
| **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 | | | | | |

## P Type Lever Lock Holders



### PRDCN






#### Inserts

Eg.



N-RP

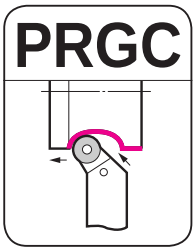
❶ RCOO 0906M0
❷ RCOO 1003M0 N–RO
❸ RCOO 1204M0 N–RO
❹ RCOO 1606M0 N–RO
❺ RCOO 2006M0 N–RO

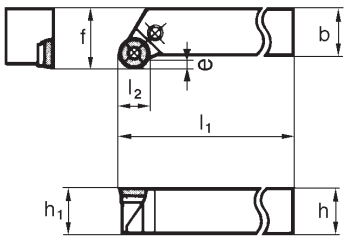
#### Spare Parts

#### Holders

| Ordering No. | Stock | Dimensions (mm) | | | | | | | Lever pin | Clamp screw | Shim | Shim pin | Wrench | Insert |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | h | $h_1$ | b | $l_1$ | $l_2$ | f | e | | | | | | |
| **PRDC N 3225 P9** | ❍ | 32 | 32 | 25 | 170 | 25 | 12,5 | 0,5 | LCL3S | LCS 3 | LSR817 | LSP3D | LH025 | ❶ |
| **PRDC N 2020 M10** | ● | 20 | 20 | 20 | 150 | 22 | 15,0 | 1,0 | LCL10 | LCS10 | LSR10 | LSP10 | LH020 | ❷ |
| **PRDC N 2525 M10** | ● | 25 | 25 | 25 | 150 | 22 | 17,5 | 1,0 | | | | | | |
| **PRDC N 2525 M12** | ● | 25 | 25 | 25 | 150 | 24 | 18,5 | 1,2 | LCL12 | LCS12 | LSR12 | LSP10 | LH025 | ❸ |
| **PRDC N 3225 Q12** | ● | 32 | 32 | 25 | 180 | 24 | 18,5 | 1,2 | | | | | | |
| **PRDC N 3225 Q16** | ● | 32 | 32 | 25 | 180 | 28 | 20,5 | 1,5 | LCL16 | LCS16 | LSR16 | LSP16 | LH025 | ❹ |
| **PRDC N 3232 Q20** | ● | 32 | 32 | 32 | 180 | 32 | 26,0 | 1,7 | LCL20 | LCS20 | LSR20 | LSP20 | LH030 | ❺ |

### PRGC






#### Inserts

Eg.



N-RP

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

#### Spare Parts

#### 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 | 10 | 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 | | | | | | |
| **PRGC R/L 2020 K12** | ● | ❍ | 20 | 20 | 20 | 125 | - | 25 | 2,5 | LCL12 | LCS12 | LSR12 | LSP10 | LH025 | ❸ |
| **PRGC R/L 2525 M12** | ❍ | ● | 25 | 25 | 25 | 150 | - | 32 | 2,5 | | | | | | |
| **PRGC R/L 3225 P12** | ❍ | ❍ | 32 | 32 | 25 | 170 | - | 32 | 2,5 | | | | | | |
| **PRGC R/L 2525 M16** | ● | ❍ | 25 | 25 | 25 | 150 | - | 32 | 3 | LCL16 | LCS16 | LSR16 | LSP16 | LH025 | ❹ |
| **PRGC R/L 3225 P16** | ● | ❍ | 32 | 32 | 25 | 170 | - | 32 | 3 | | | | | | |
| **PRGC R/L 3232 P20** | ● | ❍ | 32 | 32 | 32 | 170 | - | 40 | 4 | LCL20 | LCS20 | LSR20 | LSP20 | LH030 | ❺ |





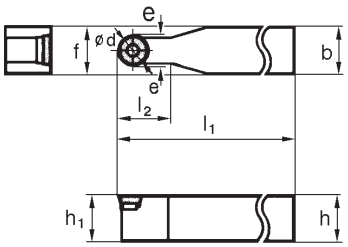
● = Euro stock

Packing unit and ordering example; 1 pce PRGCR 2020 M10 ( R: right handed )



## S Type Screw Lock Holders

SRDCN




### Inserts

Eg.



N-RX

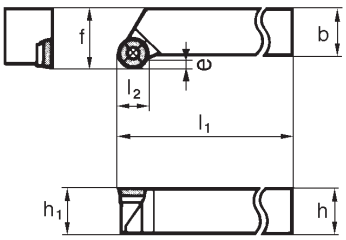
- RCOO 1003M0
- ❶ RCOO 10T3M0 N–RO
- ❷ RCOO 1204M0 N–RO
- ❸ RCOO 1606M0 N–RO
- ❹ RCOO 2006M0 N–RO

### Spare Parts

### Holders

| Ordering No. | Stock | Dimensions (mm) | | | | | | | Screw | Shim | Screw | Wrench | Wrench | Insert |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | h | $h_1$ | b | $l_1$ | $l_2$ | f | e | | | | | | |
| **SRDC N 2020 K10T3** | ● | 20 | 20 | 20 | 125 | 25 | 15,0 | 1,0 | BFTX 03510-SD | SRNS 103-SD | BW 0508F-SD | TRX 15 IP-35 | LH 035 | ❶ |
| **SRDC N 2525 M10T3** | ● | 25 | 25 | 25 | 150 | 25 | 17,5 | 1,0 | | | | | | |
| **SRDC N 2525 M12** | ● | 25 | 25 | 25 | 150 | 28 | 18,5 | 1,2 | BFTX 03512-SD | SRNS 123-SD | | | | ❷ |
| **SRDC N 3225 P12** | ● | 32 | 32 | 25 | 170 | 28 | 18,5 | 1,2 | | | | | | |
| **SRDC N 2525 M16** | ❍ | 25 | 25 | 25 | 150 | 35 | 20,5 | 1,5 | BFTX 0517-SD | SRNS 164-SD | BW 0810F-SD | LT 20 IP | LH 050 | ❸ |
| **SRDC N 3225 P16** | ● | 32 | 32 | 25 | 170 | 35 | 20,5 | 1,5 | | | | | | |
| **SRDC N 3232 P16** | ❍ | 32 | 32 | 32 | 170 | 35 | 20,5 | 1,5 | | | | | | |
| **SRDC N 3232 P20** | ● | 32 | 32 | 32 | 170 | 40 | 26,0 | 1,7 | BFTX 0618-SD | SRNS 204-SD | BW 0912F-SD | LT 25 IP | LH 060 | ❹ |

SRSC




### Inserts

Eg.



N-RX

- RCOO 1003M0
- ❶ RCOO 10T3M0 N–RO
- ❷ RCOO 1204M0 N–RO
- ❸ RCOO 1606M0 N–RO
- ❹ RCOO 2006M0 N–RO

### Spare Parts

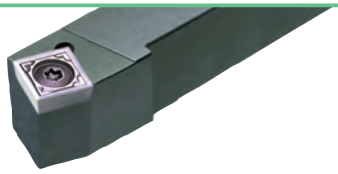
### Holders

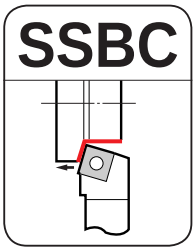
| Ordering No. | Stock | | Dimensions (mm) | | | | | | | Screw | Shim | Screw | Wrench | Wrench | Insert |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | R | L | h | $h_1$ | b | $l_1$ | $l_2$ | f | e | | | | | | |
| **SRSC R/L 2020 K10T3** | ● | ● | 20 | 20 | 20 | 125 | – | 25 | 1,5 | BFTX 03510-SD | SRNS 103-SD | BW 0508F-SD | TRX 15 IP-35 | LH 035 | ❶ |
| **SRSC R/L 2525 M10T3** | ● | ● | 25 | 25 | 25 | 150 | – | 32 | 1,5 | | | | | | |
| **SRSC R/L 2525 M12** | ● | ● | 25 | 25 | 25 | 150 | – | 32 | 2,5 | BFTX 03512-SD | SRNS 123-SD | | | | ❷ |
| **SRSC R/L 3225 P12** | ● | ● | 32 | 32 | 25 | 170 | – | 32 | 2,5 | | | | | | |
| **SRSC R/L 2525 M16** | ❍ | ❍ | 25 | 25 | 25 | 150 | – | 32 | 3,0 | BFTX 0517-SD | SRNS 164-SD | BW 0810F-SD | LT 20 IP | LH 050 | ❸ |
| **SRSC R/L 3225 P16** | ● | ● | 32 | 32 | 25 | 170 | – | 32 | 3,0 | | | | | | |
| **SRSC R/L 3232 P16** | ❍ | ❍ | 32 | 32 | 32 | 170 | – | 40 | 3,0 | | | | | | |
| **SRSC R/L 3232 P20** | ● | ● | 32 | 32 | 32 | 170 | – | 40 | 4,0 | BFTX 0618-SD | SRNS 204-SD | BW 0912F-SD | LT 25 IP | LH 060 | ❹ |

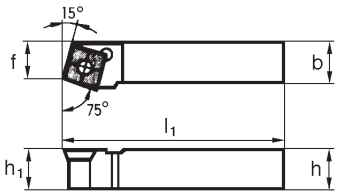


● = Euro stock  Packing unit and ordering example; 1 pce SRSCR 2020 K10 ( R: right handed )

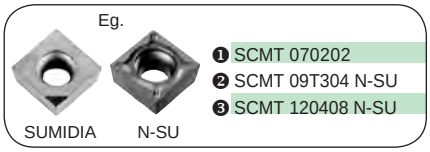
## S Type Screw Lock Holders






### Inserts




### Spare Parts

### Holders

Above figures show right hand tools.

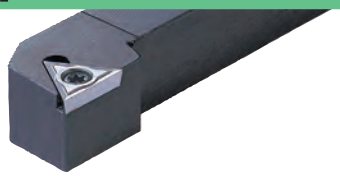
| Ordering No. | Stock | | Dimensions (mm) | | | | | | | Screw | Wrench | | | Insert |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | R | L | h | $h_1$ | b | $l_1$ | f | | | | | | | |
| **SSBC R/L 1010 E07** | ❍ | ❍ | 10 | 10 | 10 | 70 | 9 | | | BFTX0307N | TRX10 | | | ❶ |
| **SSBC R/L 1212 F09** | ❍ | ● | 12 | 12 | 12 | 80 | 11 | | | BFTX0409N | TRX15 | | | ❷ |
| **SSBC R/L 1616 H09** | ● | ● | 16 | 16 | 16 | 100 | 13 | | | | | | | |
| **SSBC R/L 2020 K12** | ❍ | ❍ | 20 | 20 | 20 | 125 | 17 | | | BFTX0511N | TRX20 | | | ❸ |
| **SSBC R/L 2525 M12** | ❍ | ❍ | 25 | 25 | 25 | 150 | 22 | | | | | | | |



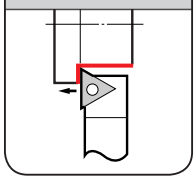


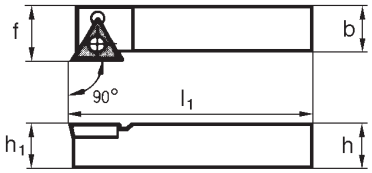
● = Euro stock  Packing unit and ordering example; 1 pce SSBCR 1212 F09 ( R: right handed )

## S Type Screw Lock Holders



### STAC






#### Inserts

Eg.


N-FP


N-SU

❶ TCMT 090202 N-FP
❷ TCMT 110204 N-SU

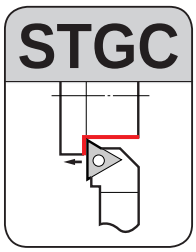
#### Spare Parts

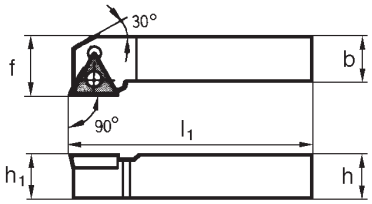
#### Holders

Above figures show right hand tools.

| Ordering No. | Stock | | Dimensions (mm) | | | | | Screw | Wrench | | | Insert |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | R | L | h | $h_1$ | b | $l_1$ | f | | | | | |
| **STAC R/L 0808 D09** | ● | | 8 | 8 | 8 | 60 | 8,5 | BFTX02206N | TRX06 | | | ❶ |
| **STAC R/L 1010 E09** | | | 10 | 10 | 10 | 70 | 10,5 | | | | | |
| **STAC R/L 1212 F11** | ● | ❍ | 12 | 12 | 12 | 80 | 12,5 | BFTX02506N | TRX08 | | | ❷ |

### STGC






#### Inserts

Eg.


N-FP


N-SU

❶ TCMT 090202 N-FP
❷ TCMT 110204 N-SU
❸ TCMT 16T308 N-SU

#### Spare Parts

#### Holders

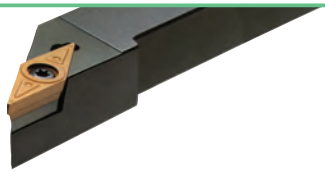
Above figures show right hand tools.

| Ordering No. | Stock | | Dimensions (mm) | | | | | Screw | Wrench | | | Insert |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | R | L | h | $h_1$ | b | $l_1$ | f | | | | | |
| **STGC R/L 0808 D09** | ❍ | | 8 | 8 | 8 | 60 | 10 | BFTX02206N | TRX06 | | | ❶ |
| **STGC R/L 1010 E09** | ● | ● | 10 | 10 | 10 | 70 | 12 | | | | | |
| **STGC R/L 1212 F11** | ● | ● | 12 | 12 | 12 | 80 | 16 | BFTX02506N | TRX08 | | | ❷ |
| **STGC R/L 1616 H11** | ● | ● | 16 | 16 | 16 | 100 | 20 | | | | | |
| **STGC R/L 1616 H16** | ● | ● | 16 | 16 | 16 | 100 | 20 | BFTX0409N | TRX15 | | | ❸ |
| **STGC R/L 2020 K16** | ● | ● | 20 | 20 | 20 | 125 | 25 | | | | | |
| **STGC R/L 2525 M16** | ❍ | ❍ | 25 | 25 | 25 | 150 | 32 | | | | | |

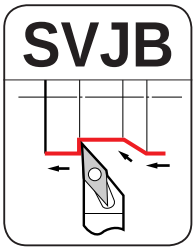


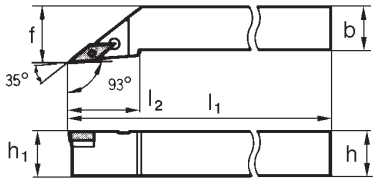
● = Euro stock  Packing unit and ordering example; 1 pce STACR 0808 D09 ( R: right handed )

## S Type Screw Lock Holders



### SVJB





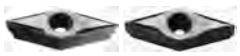

#### Holders

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 | ❶ |
| **SVJB R/L 1616 H11** | ● | ● | 16 | 16 | 16 | 100 | 25 | 20 | | | | | | | |
| **SVJB R/L 2020 K16** | ● | ● | 20 | 20 | 20 | 125 | 41 | 25 | VP20 | CPV33N | SVP32 | LH025 | BFTX 03508 | TRX10 | ❷ |
| **SVJB R/L 2525 M16** | ● | ● | 25 | 25 | 25 | 150 | 41 | 32 | VP25 | | | | | | |
| **SVJB R/L 3225 P16** | ● | ● | 32 | 32 | 25 | 170 | 41 | 32 | VP32 | | | | | | |

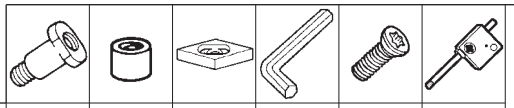
#### Inserts

Eg.

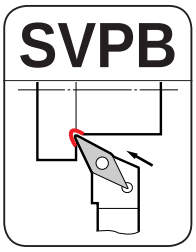


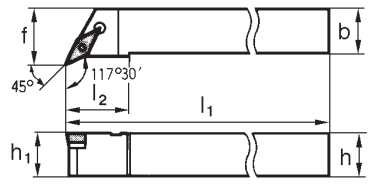
❶ VBMT 110202 N-FP
❷ VBMT 160404 N-SU

#### Spare Parts



### SVPB





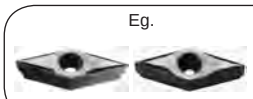

#### Holders

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 | ❶ |
| **SVPB R/L 1616 H11** | ● | ● | 16 | 16 | 16 | 100 | 25 | 20 | | | | | | | |
| **SVPB R/L 2020 K16** | ● | ● | 20 | 20 | 20 | 125 | 36 | 25 | VP20 | CPV33N | SVP32 | LH025 | BFTX 03508 | TRX10 | ❷ |
| **SVPB R/L 2525 M16** | ● | ● | 25 | 25 | 25 | 150 | 36 | 32 | VP25 | | | | | | |
| **SVPB R/L 3225 P16** | ● | ● | 32 | 32 | 25 | 170 | 36 | 32 | VP32 | | | | | | |

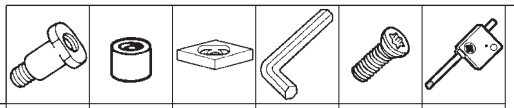
#### Inserts

Eg.

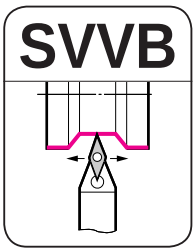


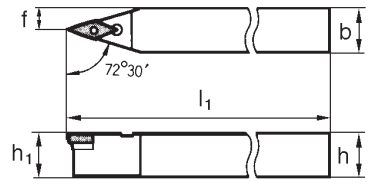
❶ VBMT 110202 N-FP
❷ VBMT 160404 N-SU

#### Spare Parts



### SVVB



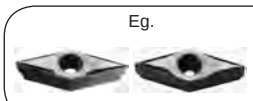



#### Holders

| 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 | ❶ |
| **SVVB N 1616 H11** | ● | 16 | 16 | 16 | 100 | - | 8 | | | | | | | |
| **SVVB N 2020 K16** | ● | 20 | 20 | 20 | 125 | - | 10 | VP20 | CPV33N | SVP32 | LH025 | BFTX 03508 | TRX10 | ❷ |
| **SVVB N 2525 M16** | ● | 25 | 25 | 25 | 150 | - | 12,5 | VP25 | | | | | | |
| **SVVB N 3225 P16** | ● | 32 | 32 | 25 | 170 | - | 12,5 | VP32 | | | | | | |

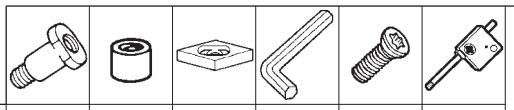
#### Inserts

Eg.



❶ VBMT 110202 N-FP
❷ VBMT 160404 N-SU

#### Spare Parts



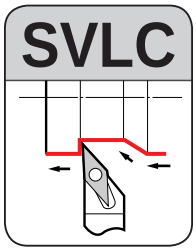


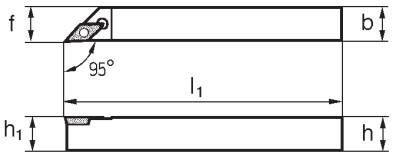
● = Euro stock  Packing unit and ordering example; 1 pce SVJBR 1212 F11 ( R: right handed )



## S Type Screw Lock Holders

### SVLC






#### Inserts

Eg.



R-FX

❶ VCGT 110302 R-FX

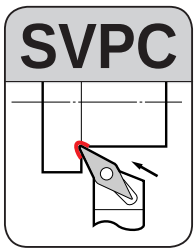
#### Spare Parts

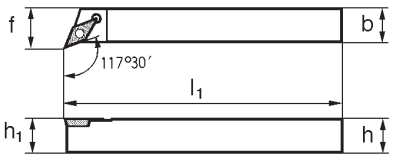
#### Holders

Above figures show right hand tools.

| Ordering No. | Stock | | Dimensions (mm) | | | | | | | Screw | Wrench | | | Insert |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | R | L | h | $h_1$ | b | $l_1$ | f | | | | | | | |
| **SVLC R/L 1010 H11** | ● | ● | 10 | 10 | 10 | 100 | 10,5 | | | BFTX02506N | TRX08 | | | ❶ |
| **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 | | | | | | | |

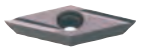
### SVPC






#### Inserts

Eg.



R-FX

❶ VCGT 110302 R-FX

#### 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 | | | | | | | |
| **SVPC R/L 1010 H11** | ❍ | ❍ | 10 | 10 | 10 | 100 | 14,5 | | | BFTX02506N | TRX08 | | | ❶ |
| **SVPC R/L 1212 H11** | ● | ● | 12 | 12 | 12 | 100 | 16,5 | | | | | | | |
| **SVPC R/L 1616 H11** | ● | ● | 16 | 16 | 16 | 100 | 20,5 | | | | | | | |

# Boring Bars

E1 ~ E24









| | | |
|---|---|---|
| Selection | Boring Tool Selection Table | E2 - 4 |
| ISO | Boring Tool Identification Table | E5 |
| Features | Boring Tool Series | E6 - 7 |

Boring Bars for Negative Insert Type :

| | | |
|---|---|---|
| CN_ _: | **D…DCLN / S…PCLN** | E8 |
| DN_ _: | **D…DDUN / S…PDUN** | E9 |
| SN_ _: | **S…PSKN** | E10 |
| **SumiTurn T-Rex** | **S…DTR** | E11 |
| TN_ _: | **D…DTFN / S…PTFN** | E12 |
| WN_ _: | **D…DWLN / S…WMLN** | E13 |

Boring Bars for Positive Insert Type :

| | | |
|---|---|---|
| **X-Bar** for CC_ _: | **B/D…SCLC** | E14 |
| CC_ _: | **S … SCLC** | E14 |
| CP_ _: | **S/C…SCLP** | E15 |
| **X-Bar** for DC_ _: | **B/D…SDUC / SDQC** | E16-17 |
| DC_ _: | **S … SDQC / SDUC** | E16-17 |
| SP_ _: | **S/C…SSKP** | E18 |
| TC_ _: | **S … STFC** | E19 |
| **X-Bar** for TP_ _: | **B/D…STUP** | E20 |
| TP_ _: | **S/C…STUP** | E20 |
| **X-Bar** for VB_ _: | **D … SVUB / SVZB** | E21 |
| VB_ _: | **S … SVQB / SVUB / SVZB** | E22 |
| WB_ _: | **S/C…SWUB** | E23 |

| | | |
|---|---|---|
| Very Small Dia. Boring | **BXBR**…R(-NB) New | E24 |

# Boring Tools Selection

## According to Applications / Boring - øD

### BORING TOOLS

Coloured boxes indicate available size.

| Application | Type | Boring Depth (L/D) Shank: Steel | Shank: Carbide | Shank: X-Bar (Steel) | Applicable Insert | Tooling | Min. Boring øD (mm) (Min. cutting diameter is shown when not matched in this table.) |
|---|---|---|---|---|---|---|---|
| Very Small Dia. Boring | BXBR New ⇨ E24 | | ~ 5 | | Special boring bar | | ○ 2 ○ 2,5 ○ 3 ○ 3,5 ○ 4 ○ 4,5 ○ 5 |
| Very Small Dia. Boring | DABB ⇨ M29 | | ~ 2 | | Sumidia brazed | | ● 3 ● 4 ● 5 ● 6 |
| Stop Boring | BNBB ⇨ M24 | | ~ 5 | | Sumiboron brazed | | ● 3,5 ● 4,5 ● 5,5 ● 6,5 ● 8,5 |
| Stop Boring | BNB ⇨ M25 | | ~ 4 | | Sumiboron insert | | ● 10 ● 12 ● 14 ● 16 ● 18 ● 22 |
| Stop Boring | S/C-SWUB ⇨ E23 | ~ 3 | ~ 8 | | Trigon Type 5° Pos. | | ● 5,5 |
| Stop Boring | S-STFC ⇨ E19 | ~ 3 | | | Triangle Type 5° & 11° Pos. | | ● 13 ● 16 ● 20 ● 25 ● 32 ● 40 ● 50 |
| Stop Boring | B/D-STUP ⇨ E20 | | | ~ 6 | | | ● 10 ● 12 ● 14 ● 18 ● 22 ● 25 ● 40 |
| Stop Boring | S-STUP(B) ⇨ E20 | ~ 3 | | | | | ● 8 ● 10 ● 12 ● 16 ● 20 ● 25 ● 28 |
| Stop Boring | C-STUP ⇨ E20 | | ~ 8 | | | | ● 8 ● 10 ● 12 ● 14 ● 16 ● 18 ● 20 ● 22 ● 25 |
| Stop Boring | CTFP ⇨ Stock in Japan | ~ 3 | | | Triangle 11° Pos. | | ○ 16 ○ 20 ○ 25 ○ 32 |
| Stop Boring | D-DTFN ⇨ E12 | ~ 3 | | ~ 6 | Triangle Neg. Type | | ● 32 ● 40 ● 50 |
| Stop Boring | S-PTFN ⇨ E12 | | | | | | ● 32 ● 40 ● 50 |
| Bottom Facing | BNZ ⇨ M25 | | ~ 5 | | Sumiboron insert | | ● 7 ● 9 ● 10 ● 11 ● 12 ● 17 ● 21 |
| Bottom Facing | S-SCLP ⇨ E15 | ~ 3 | | | 80 ° Diamond 11° Pos. Type | | ● 12 ● 16 ● 20 ● 25 ● 28 |
| Bottom Facing | B-SCLP ⇨ Stock in Japan | | | ~ 6 | | | ○ 14 ○ 16 ○ 18 ○ 22 |
| Bottom Facing | C-SCLP ⇨ E15 | | ~ 8 | | | | ● 12 ● 16 ● 20 |
| Bottom Facing | B/D-SCLC ⇨ E14 | | | ~ 6 | 80 ° Diamond 7° Pos. Type | | ● 10 ● 11 ● 14 ● 16 ● 18 ● 22 ● 32 ● 40 |
| Bottom Facing | S-SCLC ⇨ E14 | ~ 3 | | | | | ● 13 ● 16 ● 20 ● 25 ● 32 ● 40 ● 50 |
| Bottom Facing | C-SCLC ⇨ Stock in Japan | | ~ 8 | | | | ○ 5 ○ 6 ○ 7 ○ 8 ○ 10 ○ 12 ○ 13 ○ 14 ○ 16 ○ 20 ○ 25 |
| Bottom Facing | D-DCLN ⇨ E8 | | | ~ 6 | 80 ° Diamond Neg. Type | | ● 32 ● 40 ● 50 |
| Bottom Facing | S-PCLN ⇨ E8 | ~ 3 | | | | | ● 25 ● 30 ● 32 ● 40 ● 50 ○ 63 |
| Bottom Facing | D-DWLN ⇨ E13 | | | ~ 6 | Trigon Neg. Type | | ● 32 ● 40 ● 50 |
| Bottom Facing | S-MWLN ⇨ E13 | ~ 3 | | | | | ● 32 ● 40 ● 50 |

2 2,5 3 3,5 4 4,5 5 6 7 8 10 12 13 14 16 18 20 22 25 28 35 44 54 70

● = Euro stock
○ = Stock item in Japan

## BORING TOOLS

Coloured boxes indicate available size.

| Application | Type | Boring Depth (L/D) Shank: Steel | Carbide | X-Bar (Steel) | Applicable Insert | Tooling | Min. Boring øD (mm) 6 | 8 | 10 | 12 | 13 | 14 | 16 | 18 | 20 | 22 | 25 | 28 | 32 | 34 | 35 | 40 | 44 | 50 | 54 | 70 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Copying | B/D-SDUC ⇨ E16 | | | ~ 6 | 55 ° Diamond 7° Pos. Type | | | | | | ● | | ● | | ● | | ● | | ● | | | ● | | | | |
| | S-SDUC ⇨ E16 | ~ 3 | | | | | | | | | ● | | ● | | ● | | ● | | ● | | | ● | | | | |
| | C-SDUC ⇨ Stock in Japan | | ~ 8 | | | | | | | | ○ | | ○ | | ○ | | ○ | | | | | | | | | |
| | B/D-SDQC ⇨ E17 | | | ~ 6 | | | | | | | ● | | ● | | ● | | ● | | ● | | | ● | | | | |
| | S-SDQC ⇨ E17 | ~ 3 | | | | | | | | | ● | | ● | | ● | | ● | | ● | | | | | | | |
| | D-SVUB ⇨ E21 | | | ~ 6 | 35 ° Diamond Type 5° & 7° Pos. | | | | | | | | | | | ● | | ● 27 | | | ● | ● | | | | |
| | S-SVUB ⇨ E22 | ~ 3 | | | | | | | | | | | | | | ● | | ● 27 | | | ● | ● | | | | |
| | S-SVQB ⇨ E22 | ~ 3 | | | | | | | | | | | | | | ● | | ● 27 | | | ● | ● | | | | |
| | B/C-SVQB ⇨ Stock in Japan | | ~ 8 | ~ 6 | | | | | | | | | | | ○ | | ○ | | | | | | | | | |
| | D-SVZB ⇨ E21 | | | ~ 6 | | | | | | | | | | | | ● | | ● 27 | | | ● | ● | | | | |
| | S-SVZB ⇨ E22 | | | | | | | | | | | | | | | ● | | ● 27 | | | ● | ● | | | | |
| | D-DDUN ⇨ E9 | | | ~ 6 | 55 ° Diamond Neg. Type | | | | | | | | | | | | | | ● | | | ● | | | | |
| | S-PDUN ⇨ E9 | ~ 3 | | | | | | | | | | | | | | | | | ● | | | ● | | ● | | ○ 63 |
| Through Boring | S-SSKP ⇨ E18 | ~ 3 | | | 55 ° Diamond Neg. Type | | | | | | | | ● | | ● | | ● | ● | | | | | | | | |
| | C-SSKP ⇨ E18 | | ~ 8 | | | | | | | | | | ● | | ● | | | | | | | | | | | |
| | SSKC ⇨ Stock in Japan | ~ 3 | | | Square Type 7° Pos. | | | | | | | | | | ○ | | ○ | | ○ | | | ○ | | | | |
| | CSKP ⇨ Stock in Japan | ~ 3 | | | Square Type 11° Pos. | | | | | | | | | | ○ | | ○ | | | | | | | | | |
| | S-PSKN ⇨ E10 | ~ 3 | | | Square Neg. Type | | | | | | | | | | | | | | ● | | | ● | | ● | | ● 63 |

● = Euro stock
○ = Stock item in Japan

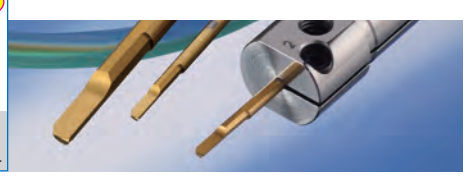


# Boring Tool Series



## TOOLING SELECTION

| Application | | Stop Boring | | Bottom Facing | | Trough Boring | Copying | | |
|---|---|---|---|---|---|---|---|---|---|
| Insert Type / System | | Triangle | Poligon / Others | 80° Diamond | | Square | 55° T-REX | 55° Diamond | 35° Diamond |
| Screw Lock | Steel | S-STFC ⇨E19<br>S-STUP(B)⇨E20 | S-SWUB ⇨ E23 | S-SCLC ⇨ E14 | S-SCLP ⇨ E15 | S-SSKP ⇨ E18 | – | S-SDUC ⇨E16<br>S-SDQC ⇨E17 | S-SVUB (S-SVQB / S-SVZB) ⇨ E22 |
| | Anti-vibration | B-STUP ⇨ E20 | – | B-SCLC ⇨ E14 | – | | – | B-SDUC ⇨E16<br>B-SDQC ⇨E17 | – |
| | Anti-vibration with Oil Hole | D-STUP ⇨ E20 | – | D-SCLC ⇨ E14 | | | – | D-SDUC ⇨E16<br>D-SDQC ⇨E17 | D-SVUB ⇨E21<br>D-SVZB ⇨E21 |
| | Carbide | C-STUP (C-STUB) ⇨ E20 | C-SWUB ⇨ E23 | – | C-SCLP ⇨ E15 | C-SSKP ⇨ E18 | – | – | – |
| Lever Lock | Steel | S-PTFN ⇨ E12 | – | S-PCLN ⇨ E8 | – | S-PSKN ⇨ E10 | – | S-PDUN ⇨ E9 | – |
| Top Clamp | Anti-vibration with Oil Hole | D-DTFN ⇨ E12 | D-DWLN ⇨ E13 | D-DCLN ⇨ E8 | | | – | D-DDUN ⇨ E9 | – |
| | Steel | – | S-MWLN ⇨ E13 | – | – | – | S-DTR ⇨ E11 | – | – |
| CBN | Carbide | BNB ⇨ M25 | BNBB ⇨ M24 | BNZ ⇨ M25 | | | | | |
| Carbide | | | | | | New BXBR ⇨ E24 | | | |



## ■ Catalogue Classification System For Boring Holders

**S 16 R – S T U P R 11 03 - 18**

| ① | ② | | ③ | ④ | ⑤ | ⑥ | ⑦ | | | ※ |
|---|---|---|---|---|---|---|---|---|---|---|
| Shank Material (Chart 1) | Shank Length (Chart 2) | Shank Diameter (mm) | Clamping System (Chart 3) | Insert Shape (Chart 4) | Holder Style (Chart 5) | Seat Clearance Angle (Chart 6) | Feed Direction (Chart 7) | Insert Cutting Edge Length (mm) | ※ Insert Thickness (mm) | Min. Bore Diameter (mm) |

※ This code may only be included in some of the catalogue nos.

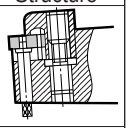
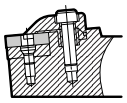
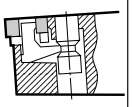
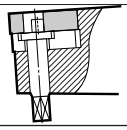
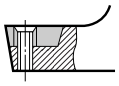
### ① Chart 1

| 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 |  |

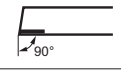
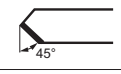
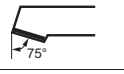
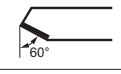
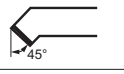
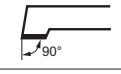
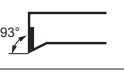
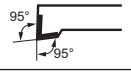
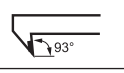
### ⑦ Chart 7

| 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 | Parallellogram 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 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.

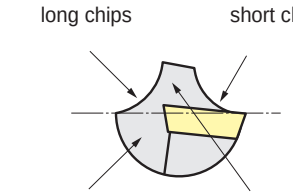
## Features

- Wide selection for various boring operations
- Minimum bore diameter from ø5,5mm onwards
- New anti-vibration boring bars, SumiTurn X-Bar.
- High rigidity head-design for small boring bars
- Wide selection of grades and chipbreakers available for various processes and work materials

XXX

## Series SumiTurn X Bar

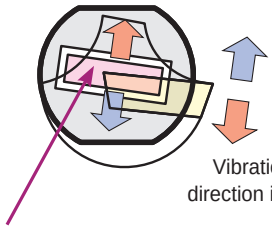
**Good Chip Evacuation**
from new head design





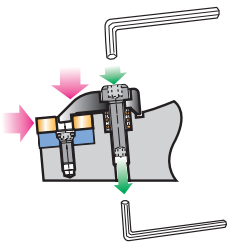

**Chatter Killer System**
- Eliminates Vibration

Unique structure of X-Bar head



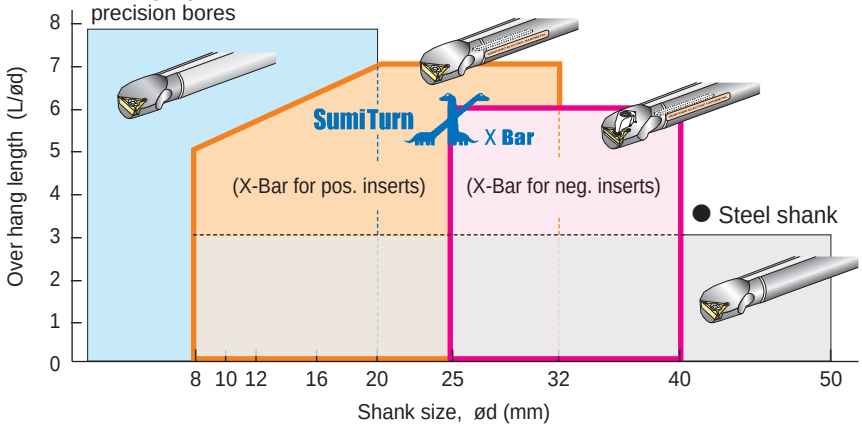

The damper resists vibration

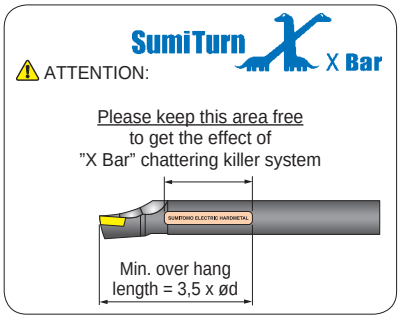
- New negative type "X Bar" with high performance double clamping system



## Application Guide

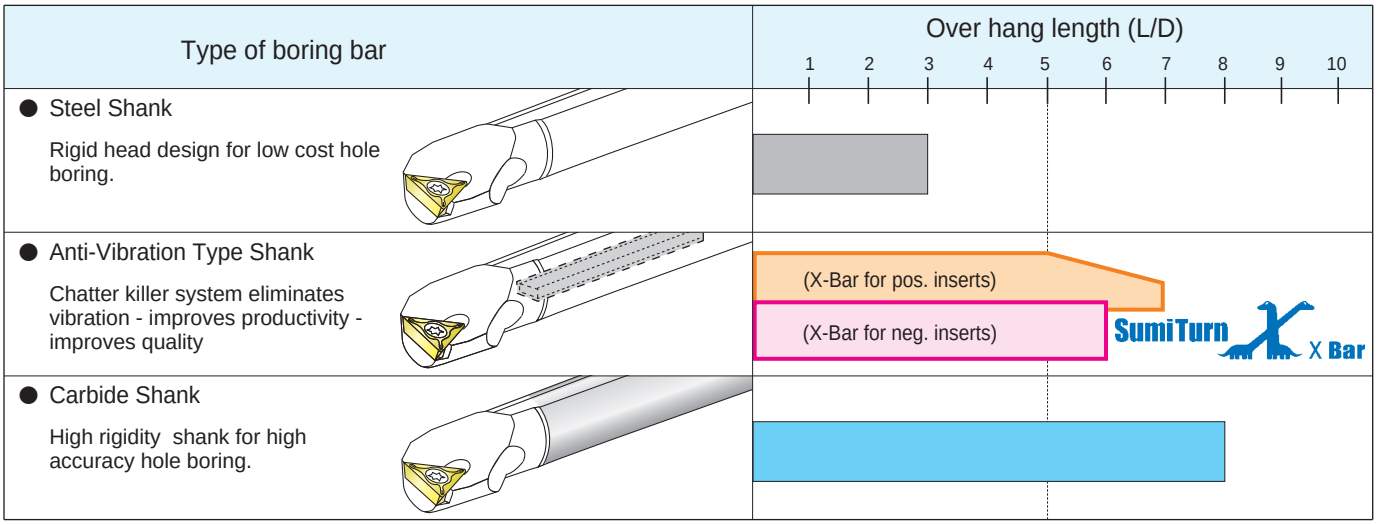
- Carbide shank
  Rigid shank for long high precision bores
- Anti-Vibration Steel Shank
  Low cost solution for long precision bores - eliminates chatter - improves productivity and surface finish



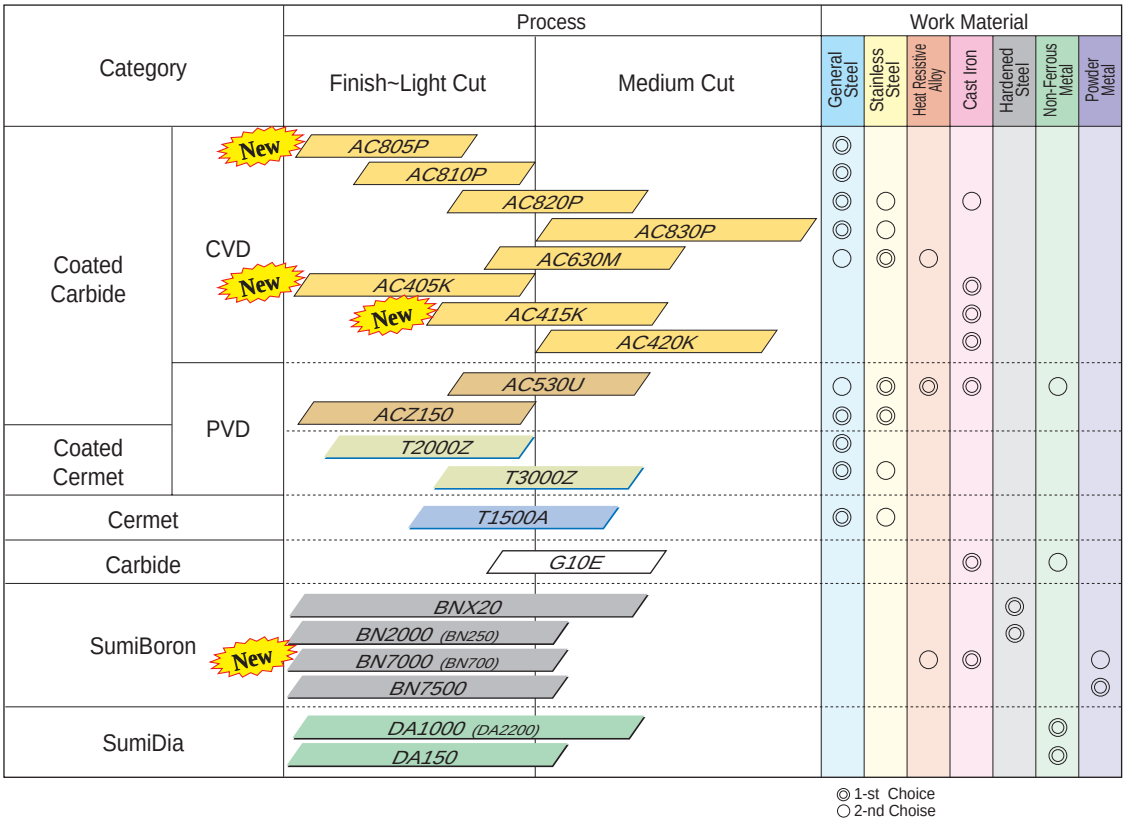



# Boring Tool Series

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

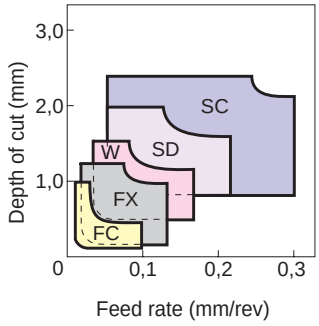



## ■ Grades

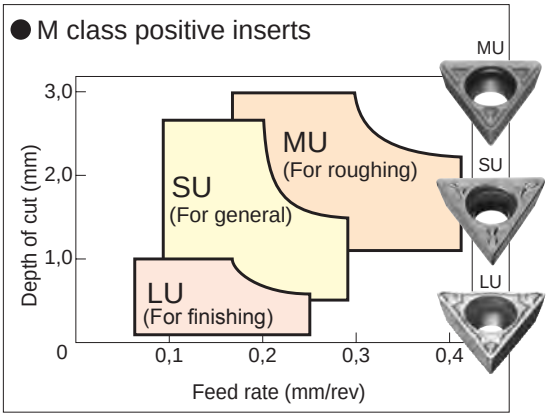



## ■ Recommended Chip Breakers

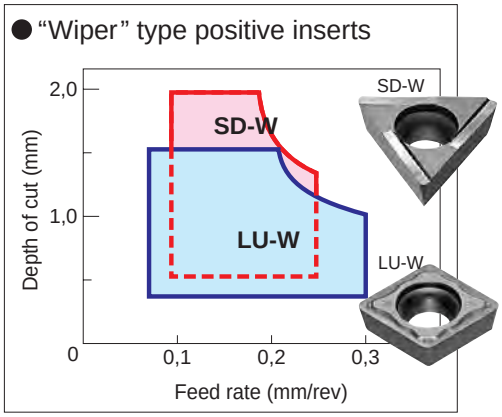
● G class positive inserts



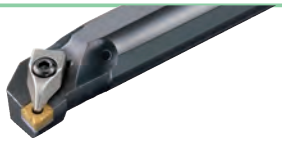

● M class positive inserts




● "Wiper" type positive inserts

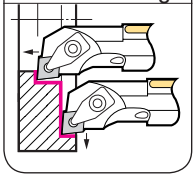


# D...DCLN / S...PCLN Type

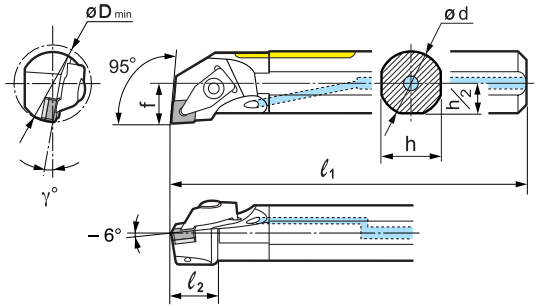




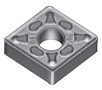

**D-DCLN**
Bottom facing



Anti-vibration D type with oil hole

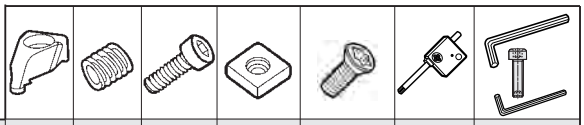



Insert (eg.)



N-GU

## Spare Parts



## Holders

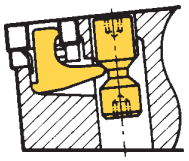
Above figures show right hand tools.

| Ordering No. | Stock R | Stock L | øD min | Dimensions (mm) ød | h | $\ell_1$ | $\ell_2$ | f | γ | Insert (eg.) | Clamp | Spring | Clamp bolt | Shim | Shim screw | Wrench | Wrench | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| D25T - DCLN R/L 1204-32 | ● | ● | 32 | 25 | 23 | 300 | 26 | 17 | -12° | CN□□1204○○ | SCP-2 | | | CNS1203B | BFTX0307N | TRX10(*) | LH040 | LH025 |
| D32T - DCLN R/L 1204-40 | ● | ● | 40 | 32 | 30 | 300 | 26 | 22 | -10° | | | | | CNS1204B | BFTX0409N | TRX15(*) | | |
| D40U - DCLN R/L 1204-50 | ● | ● | 50 | 40 | 37 | 350 | 26 | 27 | -10° | | | | | | | | | |

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

Remarks: Right handed tool holders are applicable with left handed or neutral inserts.
Left handed tool holders are applicable with right handed or neutral inserts.

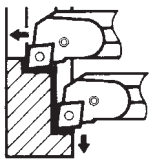
## Holders

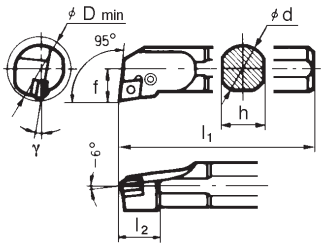


Tool holders (P type) with lever-lock system



**S - PCLN** R/L






| Ordering No. | Stock R | Stock L | øD min | d | h | $l_1$ | $l_2$ | f | γ | |
|---|---|---|---|---|---|---|---|---|---|---|
| S20S - PCLN R/L09 | ● | ● | 25 | 20 | 18 | 250 | 29 | 13 | -11° | CN_ _ 0903_ _ |
| S25T - PCLN R/L09 | ● | ● | 30 | 25 | 23 | 300 | 33 | 17 | -10° | |
| | | | | | | | | | | |
| S25T - PCLN R/L12 | ● | ● | 32 | 25 | 23 | 300 | 42 | 17 | -10° | CN_ _ 1204_ _ |
| S32U - PCLN R/L12 | ● | ● | 40 | 32 | 30 | 350 | 49 | 22 | -11° | |
| S40V - PCLN R/L12 | ● | ● | 50 | 40 | 37 | 400 | 56 | 27 | -10° | |
| | | | | | | | | | | |
| S32U - PCLN R/L16 | ● | ● | 40 | 32 | 30 | 350 | 56 | 22 | -11° | CN_ _ 1606_ _ |
| S40V - PCLN R/L16 | ● | ● | 50 | 40 | 37 | 400 | 56 | 27 | -10° | |
| S50W - PCLN R/L16 | ❍ | ❍ | 63 | 50 | 47 | 450 | 56 | 35 | -11° | |
| | | | | | | | | | | |
| S50W - PCLN R/L19 | ❍ | ❍ | 63 | 50 | 47 | 450 | 63 | 35 | -11° | CN_ _ 1906_ _ |

All figures show right hand tools.

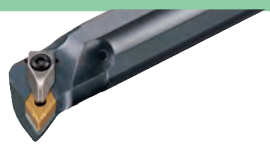
## Applicable Inserts

| Holder | Carbides, Cermets: Double sided | Carbides, Cermets: One sided | CBN, PCD | Lever pin | Clamp bolt | Shim | Shim pin | Wrench | |
|---|---|---|---|---|---|---|---|---|---|
| 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 | |

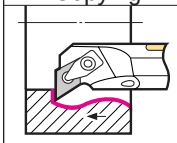
● = Euro stock

Packing unit and ordering example; 1 pce D25T-DCLNR 1204-32 ( R: right handed )

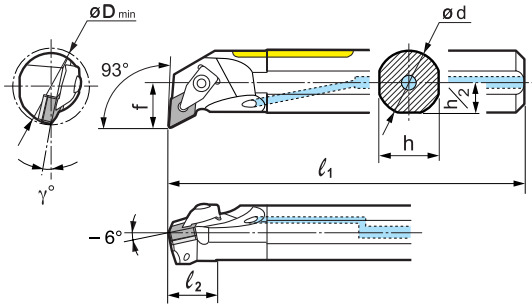
# Boring Bars
# D...DDUN / S...PDUN Type



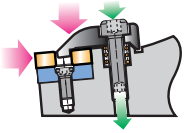
**D-DDUN**
Copying



Anti-vibration D type
with oil hole




SumiTurn X Bar

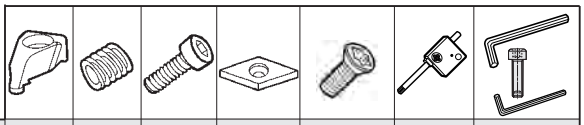


Insert (eg.)



N-GU

## Spare Parts



## Holders

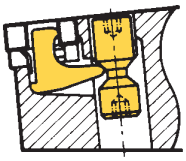
Above figures show right hand tools.

| Ordering No. | Stock R | Stock L | øDmin | Dimensions (mm) ød | h | ℓ1 | ℓ2 | f | γ | Insert (eg.) | Clamp | Spring | Clamp bolt | Shim | Shim Screw | Wrench | Wrench | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **D32T - DDUN R/L 1104-40** | ● | ● | 40 | 32 | 30 | 300 | 26 | 22 | -10° | DN□□1104○○ | SCP-1 | | | DNS1104B | BFTX0307N | TRX10 (*) | LH040 | LH025 |
| **D32T - DDUN R/L 1506-40** | ● | ● | 40 | 32 | 30 | 300 | 26 | 22 | -12° | DN□□1506○○ | SCP-2 | | | DNS1506B | BFTX0409N | TRX15 (*) | | |
| **D40U - DDUN R/L 1506-50** | ● | ● | 50 | 40 | 37 | 350 | 26 | 27 | -12° | | | | | | | | | |

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

Remarks: Right handed tool holders are applicable with left handed or neutral inserts.
Left handed tool holders are applicable with right handed or neutral inserts.

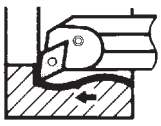
## Holders

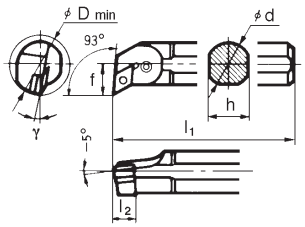


Tool holders (P type)
with lever-lock system



**S - PDUN** R/L

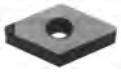




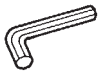

| Ordering No. | Stock R | Stock L | øDmin | Dimensions (mm) d | h | l1 | l2 | f | γ | |
|---|---|---|---|---|---|---|---|---|---|---|
| S25T - PDUN R/L 11 | ● | ● | 32 | 25 | 23 | 300 | 35 | 17 | -11° | DN_ _ 1104_ _ |
| S32U - PDUN R/L 15 04 | ● | ● | 40 | 32 | 30 | 350 | 40 | 22 | -11° | DN_ _ 1504_ _ |
| 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° | |

All figures show right hand tools.

## Applicable Inserts

| Holder | Carbides, Cermets: Double sided | Carbides, Cermets: One sided | CBN, PCD |
|---|---|---|---|
| **S - PDUN R/L** |  |  |  |
| S25T ....11 | DNMG 1104_ _ NGU | - | DNGA 1104_ _ |
| S32U ....15 04 | DNMG 1504_ _ NGU | DNMM 1504_ _ NMP | DNGA 1504_ _ |
| S40V ....15 | DNMG 1506_ _ NGU | DNMM 1506_ _ NMP | DNGA 1506_ _ |
| S50W....15 | DNMG 1506_ _ NGU | DNMM 1506_ _ NMP | DNGA 1506_ _ |

## Spare Parts

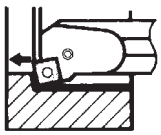
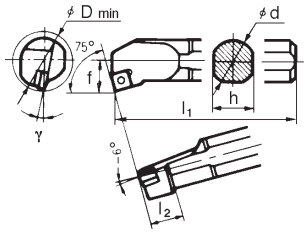
| Lever pin | Clamp bolt | Shim | Shim pin | Wrench | |
|---|---|---|---|---|---|
|  |  |  |  |  | |
| LCL3DB-SD | LCS3DB-SD | – | – | LH020 | |
| LCL4D-SD | LCS5DB-SD | LSD42SD | LSP4SD | LH030 | |
| LCL4D-SD | LCS5DB-SD | LSD42SD | LSP4SD | LH030 | |
| LCL4D-SD | LCS5DB-SD | LSD42SD | LSP4SD | LH030 | |

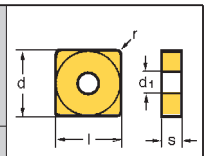
● = Euro stock

Packing unit and ordering example; 1 pce D32T-DDUNR 1104-40 ( R: right handed )



## Holders

| | Tool holders (P type) with lever-lock system | Ordering No. | Stock | | Dimensions (mm) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | R | L | øD$_{min}$ | 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_ _ |
| | | | | | | | | | | | | |



All figures show right hand tools.



## Applicable Inserts

| Holder | Carbides, Cermets | | CBN |
|---|---|---|---|
| | Double sided | One sided | |
| **S - PSKN R/L**  |  |  | |
| S25T....12 | SNMG 0903_ _ NGU | - | - |
| S32U....12 | SNMG 1204_ _ NGU | SNMM 1204_ _ NMP | SNGA 1204_ _ |
| S40V....12 | SNMG 1204_ _ NGU | SNMM 1204_ _ NMP | SNGA 1204_ _ |
| S....15 | SNMG 1506_ _ NGU | SNMM 1506_ _ NMP | - |
| S....19 | SNMG 1906_ _ NGU | SNMM 1906_ _ NMP | - |

## Spare Parts

| Holder | Lever pin | Clamp bolt | Shim | Shim pin | Wrench | |
|---|---|---|---|---|---|---|
| **S - PSKN R/L**  | | | | | | |
| S25T....12 | LCL4C-SD | LCS4B-SD | – | – | LH025 | |
| S32U....12 | LCL4T-SD | LCS41BS-SD | LSS42SD | LSP4SD | LH030 | |
| S40V....12 | LCL4SD | LCS42BS-SD | LSS42SD | LSP4SD | LH030 | |
| S....15 | LCL5SD | LCS5B-SD | LSS53SD | LSP5SD | LH030 | |
| S....19 | LCL5C-SD | LCS6B-SD | LSS63SD | LSP6SD | LH040 | |

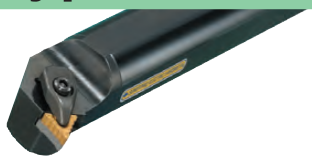


● = Euro stock  Packing unit and ordering example; 1 pce S25T - PSKNR 12 ( R: right handed )

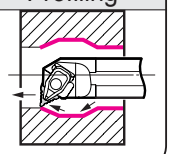
# Boring Bars
# "T-REX" Type

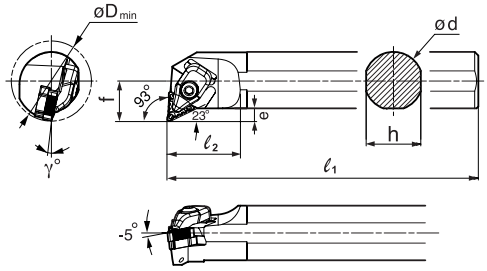
## Internal Turning & Copying

SumiTurn T-REX

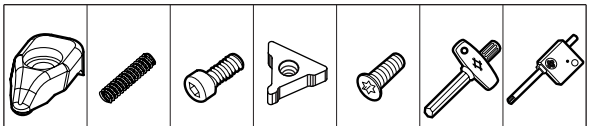


## S-DTR
Profiling






## 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.

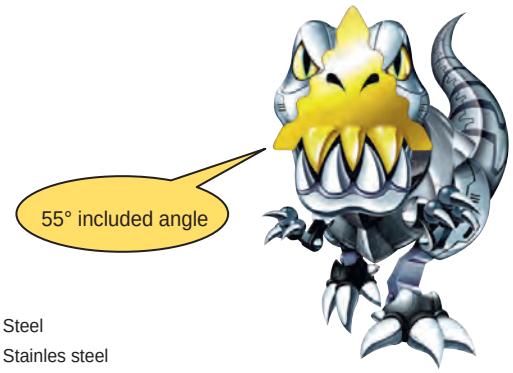
| Ordering No. | Stock R | Stock L | Dimensions (mm) øDmin | ød | h | ℓ1 | ℓ2 | f | γ | e |
|---|---|---|---|---|---|---|---|---|---|---|
| S32S-DTR55C R/L-17 | ● | ○ | 44 | 32 | 30 | 250 | 40 | 22 | -12° | 7 |
| S40T-DTR55C R/L-17 | ● | ○ | 50 | 40 | 37 | 300 | 40 | 25 | -10° | 6,2 |

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

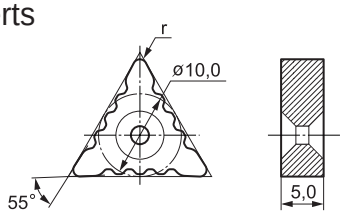
## Advantages

**● 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.



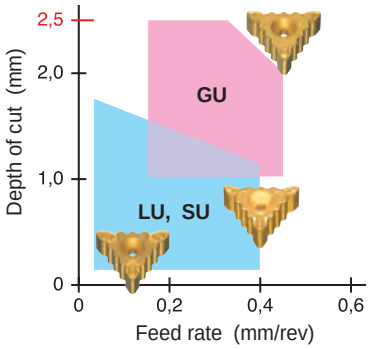

## Inserts




Application P Steel
M Stainles steel

| | Shape | Ordering No. | r | Coated Carbide AC700G | AC810P | AC820P | AC830P | AC2000 | AC3000 | AC610M | AC630M | Coated Cermet T2000Z | T3000Z |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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

Cutting speed (m/min)

| Grade | | Coated Carbide AC700G | AC810P | AC820P (AC2000) | AC830P (AC3000) | AC610M | AC630M | Coated Cermet T2000Z | T3000Z |
|---|---|---|---|---|---|---|---|---|---|
| Work materials | Low carbon steel | 200 400 | 200 400 | 150 280 | 90 250 | | | 100 400 | 100 350 |
| | Alloy steel | 150 300 | 150 300 | 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

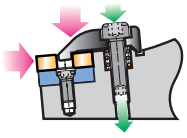
● = Euro stock
○ = Delivery on request

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

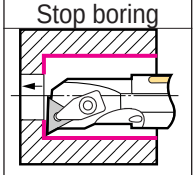
For Negative TN_ _- Inserts ( α = 0°)



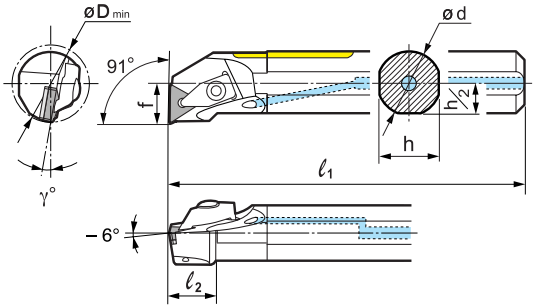
SumiTurn X Bar



**D-DTFN**
Stop boring



Anti-vibration D type with oil hole




Insert (eg.)

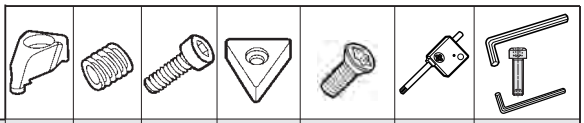


N-GU

## Holders

Above figures show right hand tools.

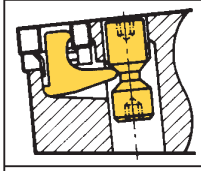
## Spare Parts



| Ordering No. | Stock R | Stock L | øD min | Dimensions (mm) ød | h | $\ell_1$ | $\ell_2$ | f | γ | Insert (eg.) | Clamp | Spring | Clamp bolt | Shim | Shim Screw | Wrench | Wrench | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| D25T - DTFN R/L 1604-32 | ● | ● | 32 | 25 | 23 | 300 | 21 | 17 | -12° | TN□□1604○○ | SCP-1 | | | TNS1603B | BFTX0307N | TRX10 (*) | LH040 | LH025 |
| D32T - DTFN R/L 1604-40 | ● | ● | 40 | 32 | 30 | 300 | 26 | 22 | -10° | | | | | TNS1604B | | | | |
| D40U - DTFN R/L 1604-50 | ● | ● | 50 | 40 | 37 | 350 | 26 | 27 | -10° | | | | | | | | | |

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

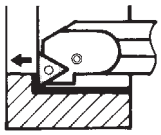
## Holders

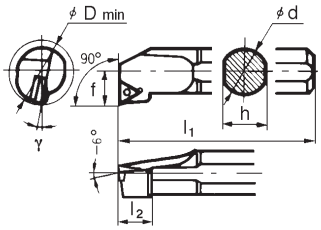


Tool holders (P type) with lever-lock system



**S - PTFN** R/L






| Ordering No. | Stock R | Stock L | øD min | d | h | $l_1$ | $l_2$ | f | γ | |
|---|---|---|---|---|---|---|---|---|---|---|
| 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° | |
| S40V - PTFN R/L 22 | ● | ● | 50 | 40 | 37 | 400 | 59 | 27 | -11° | TN_ _ 2204_ _ |
| S50W - PTFN R/L 22 | ❍ | ❍ | 63 | 50 | 47 | 450 | 66 | 35 | -10° | |

All figures show right hand tools.

## Applicable Inserts

## Spare Parts

| Holder | Carbides, Cermets: Double sided | Carbides, Cermets: One sided | CBN | Lever pin | Clamp bolt | Shim | Shim pin | Wrench | |
|---|---|---|---|---|---|---|---|---|---|
| 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 | |



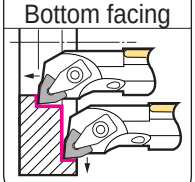
● = Euro stock

Packing unit and ordering example; 1 pce D25T-DTFNR 1604-32 ( R: right handed )

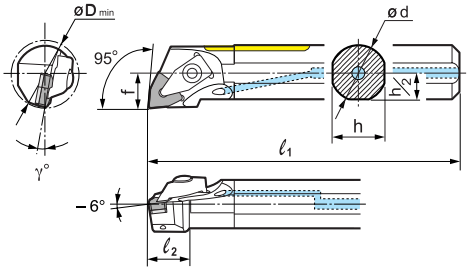
# Boring Bars
# D...DWLN / S...MWLN Type



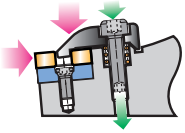
## D-DWLN
Bottom facing



Anti-vibration D type
with oil hole




SumiTurn X Bar



Insert (eg.)

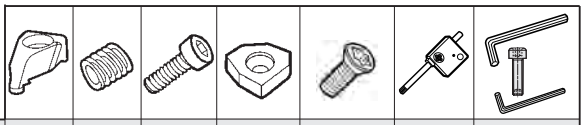


N-GU

## Holders

Above figures show right hand tools.

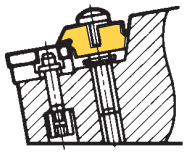
## Spare Parts



| Ordering No. | Stock R | Stock L | øD min | Dimensions (mm) ød | h | $\ell_1$ | $\ell_2$ | f | γ | Insert (eg.) | Clamp | Spring | Clamp bolt | Shim | Shim Screw | Wrench | Wrench | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| D25T - DWLN R/L 0804-32 | ● | ● | 32 | 25 | 23 | 300 | 26 | 17 | -12° | WN□□0804○○ | SCP-2 | | | WNS0803B | BFTX0307N | TRX10 (*) | LH040 | LH025 |
| D32T - DWLN R/L 0804-40 | ● | ● | 40 | 32 | 30 | 300 | 26 | 22 | -10° | | | | | WNS0804B | BFTX0409N | TRX15 (*) | | |
| D40U - DWLN R/L 0804-50 | ● | ● | 50 | 40 | 37 | 350 | 26 | 27 | -10° | | | | | | | | | |

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

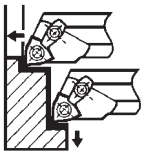
## Holders

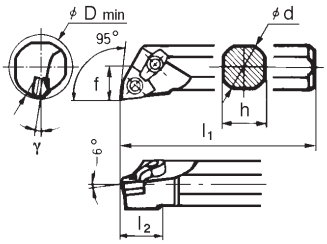


Tool holders (M type)
with wedge clamp system



**S - MWLN** R/L






| Ordering No. | Stock R | Stock L | øD min | Dimensions (mm) d | h | $l_1$ | $l_2$ | f | γ | |
|---|---|---|---|---|---|---|---|---|---|---|
| S25R - MWLN R/L 08 | ● | ● | 32 | 25 | 23 | 200 | 28 | 17 | -15° | WNMG 0804_ _ |
| S32S - MWLN R/L 08 | ● | ● | 40 | 32 | 30 | 250 | 28 | 22 | -14° | |
| S40T - MWLN R/L 08 | ● | ● | 50 | 40 | 37 | 300 | 28 | 27 | -12° | |

All figures show right hand tools.

## Applicable Inserts

| Holder | Carbides, Cermets: Double sided | Carbides, Cermets: One sided | |
|---|---|---|---|
| S - MWLN R/L |  |  | |
| S....08 | WNMG 0804_ _ NGU | WNMM 0804_ _ NMP | |

## Spare Parts

| Clamp | Double screw | Clamp | Pin | Shim | Wrench |
|---|---|---|---|---|---|
|  |  | |  |  |  |
| HE060011W | WB 6-16 | | HE060011P | HE060011E | LH025,LH030 |
| Spare parts (conventional type) | |  |  |  |  |
| S....08 | | BCH05R | HE060011P | HE060011E | LH025 |

● = Euro stock

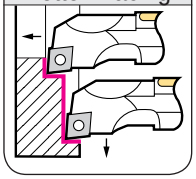
Packing unit and ordering example; 1 pce D25T-DWLNR 0804-32 ( R: right handed )

For Positive CC _ _ - Inserts ( α = 7°)

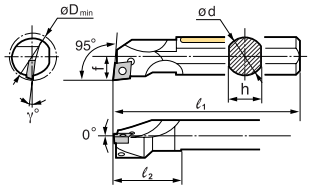


SumiTurn X Bar

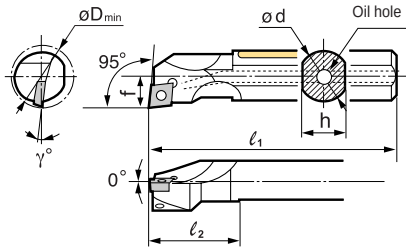
**B/D-SCLC**
Bottom facing



***B* Type** (Fig.1)
Min. Bore Dia.




***D* Type** (Fig.2)




Insert (ex.)



## Spare Parts



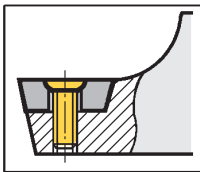

## Holders

| Steel shank | Ordering No. | Stock R | Stock L | øDmin | ød | h | ℓ1 | f | ℓ2 | γ | Fig. | Insert (ex.) | Screw | Wrench |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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° | | | BFTX02506N | |
| 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° | | | | |
| | D25T - SCLC R/L 1204-32 | ● | ● | 32 | 25 | 23 | 300 | 17 | 38 | -6° | | CC□T 1204○○ | BFTX0511N | TRX20 |
| | D32T - SCLC R/L 1204-40 | ● | ● | 40 | 32 | 30 | 300 | 20 | 53 | -6° | | | | |

All figures show right hand tools.

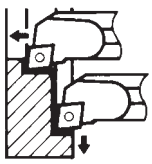
Remarks: Right handed tool holders are applicable with left handed or neutral inserts.
Left handed tool holders are applicable with right handed or neutral inserts.

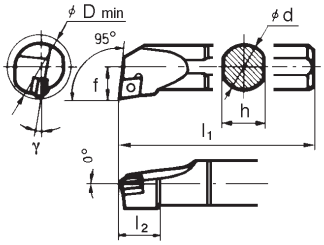
## Holders



Tool holders (S type)
with screw-lock system

**S - SCLC** R/L






| | R | L | øDmin | d | h | l1 | l2 | 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° | |

All figures show right hand tools.

## Applicable Inserts

| Holder | Carbides, Cermets | | | Screw | Wrench | | | | |
|---|---|---|---|---|---|---|---|---|---|
| S - SCLC R/L |  |  | |  |  | | | | |
| S.....06 | CCMT 0602_ _ NFP | CCGW 0602_ _ | - | BFTX02505N | TRX08 | | | | |
| S16R.....09 | CCMT 09T3_ _ NFP | CCGW 09T3_ _ | - | BFTX0407N | TRX15 | | | | |
| S20S.....09 | CCMT 09T3_ _ NFP | CCGW 09T3_ _ | - | BFTX0409N | TRX15 | | | | |
| S.....12 | CCMT 1204_ _ NFP | CCGW 1204_ _ | - | BFTX0511N | TRX20 | | | | |

## Spare Parts

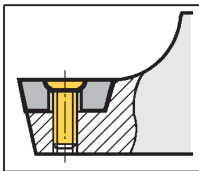
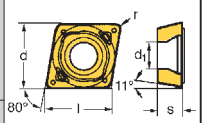
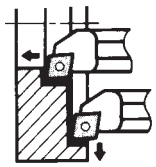
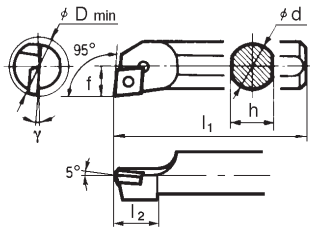
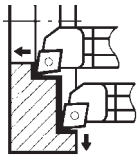
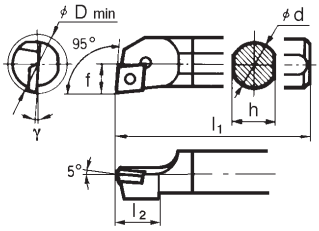
● = Euro stock

Packing unit and ordering example; 1 pce B08H-SCLCR 0602-10 ( R: right handed )

# Boring Bars
# S/C...SCLP Type



## Holders

|  | Tool holders (S type) with screw-lock system | Ordering No. | Stock | | Dimensions (mm) | | | | | | |  |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | R | L | øD$_{min}$ | d | h | $l_1$ | $l_2$ | f | γ | |
| **S - SCLP** R/L<br>Steel shank<br>  |  | 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<br>Carbide shank<br>  |  | C10Q - SCLP R/L 08 | ● | ❍ | 12 | 10 | 9 | 180 | 15 | 6 | -5° | CP_ T 0802_ _ |
| | | C12R - SCLP R/L 08 | ❍ | ❍ | 16 | 12 | 11 | 200 | 15 | 8 | -2° | |
| | | C16S - SCLP R/L 09 | ● | ❍ | 20 | 16 | 15 | 250 | 15 | 10 | -2° | CP_ T 0903_ _ |

All figures show right hand tools.

## Applicable Inserts

| Holder | Carbides, Cermets | CBN | |
|---|---|---|---|
| **S/C-SCLP** R/L |  |  | |
| S/C 10.....08 | CPGT 0802_ _ NSD | CPMW 0802_ _ | |
| S/C 12.....08 | CPGT 0802_ _ NSD | CPMW 0802_ _ | |
| S/C 16.....09 | CPGT 0903_ _ NSD | CPMW 0903_ _ | |
| S 20.....09 | CPGT 0903_ _ NSD | CPMW 0903_ _ | |
| S 25.....12 | CPGT 1204_ _ NSD | - | |

## Spare Parts

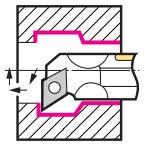
| Screw | Wrench | | | | |
|---|---|---|---|---|---|
|  |  | | | | |
| BFTX 0305 A | TRX 10 | | | | |
| BFTX 0305 A | TRX 10 | | | | |
| BFTX 0407 A | TRX 15 | | | | |
| BFTX 0407 A | TRX 15 | | | | |
| BFTX 0509 A | TRX 20 | | | | |

● = Euro stock  Packing unit and ordering example; 1 pce S10K - SCLPR 08 ( R: right handed )

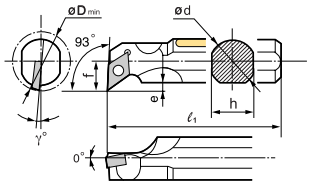


SumiTurn X Bar

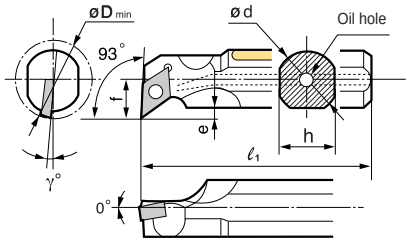
**B/D-SDUC**
Copying



***B Type*** (Fig.1)
Min. Bore Dia.




***D Type*** (Fig.2)




Insert (ex.)



## ■ Spare Parts



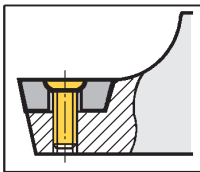

## ■ Holders

| Steel shank | Ordering No. | Stock R | Stock L | øDmin | Dimensions (mm) ød | h | ℓ1 | f | e | γ | Fig. | Insert (ex.) | Screw | Wrench |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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/L 0702-16** | ● | ● | 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° | | DC□T 11T3○○ | BFTX0409N | TRX15 |
| | **D25S - SDUC R/L 11T3-32** | ● | ● | 32 | 25 | 22 | 250 | 17 | 7,0 | -6° | | | | |
| | **D32T - SDUC R/L 11T3-40** | ● | ● | 40 | 32 | 30 | 300 | 22 | 8,0 | -6° | | | | |

All figures show right hand tools.

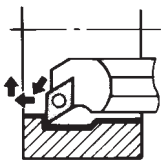
Remarks: Right handed tool holders are applicable with left handed or neutral inserts.
Left handed tool holders are applicable with right handed or neutral inserts.

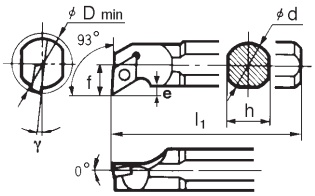
## ■ Holders



Tool holders (S type)
with screw-lock system

**S - SDUC** R/L






| Ordering No. | Stock R | Stock L | øDmin | Dimensions (mm) d | h | l1 | f | e | γ | |
|---|---|---|---|---|---|---|---|---|---|---|
| S10K - SDUC R/L 07 | ● | ● | 13 | 10 | 9 | 125 | 7 | 2,5 | -8° | DC_ _ 0702_ _ |
| S12M - SDUC R/L 07 | ● | ● | 16 | 12 | 11 | 150 | 9 | 3,5 | -8° | |
| S16R - SDUC R/L 07 | ● | ● | 20 | 16 | 15 | 200 | 11 | 4 | -6° | |
| | | | | | | | | | | |
| S20S - SDUC R/L 11 | ● | ● | 25 | 20 | 18 | 250 | 13 | 4,5 | -6° | DC_ _ 11T3_ _ |
| S25T - SDUC R/L 11 | ● | ● | 32 | 25 | 22 | 300 | 17 | 7,5 | -6° | |
| S32U - SDUC R/L 11 | ● | ● | 40 | 32 | 30 | 350 | 22 | 11 | -6° | |

All figures show right hand tools.

## ■ Applicable Inserts

## ■ Spare Parts

| Holder | Carbides, Cermets | | CBN, PCD | Screw | Wrench |
|---|---|---|---|---|---|
| **S - SDUC R/L**<br>**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 | TRX15 |





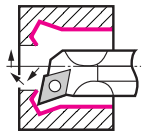
● = Euro stock  Packing unit and ordering example; 1 pce D12M-SDUCR 0702-16 ( R: right handed )

# Boring Bars
# B/D/S...SDQC Type

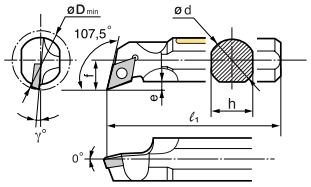


SumiTurn X Bar

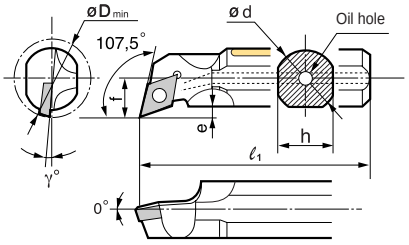
**B/D-SDQC**
Copying



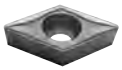
***B Type*** (Fig.1)
Min. Bore Dia.




***D Type*** (Fig.2)




Insert (ex.)



## ■ Spare Parts



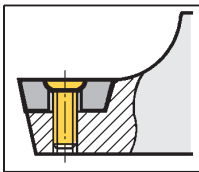

## ■ Holders

| Steel shank | Ordering No. | Stock R | Stock L | øDmin | Dimensions (mm) ød | h | ℓ1 | f | e | γ | Fig. | Insert (ex.) | Screw | Wrench |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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° | | DC□T 11T3○○ | BFTX0409N | TRX15 |
| | **D32T - SDQC R/L 11T3-40** | ● | ● | 40 | 32 | 30 | 300 | 22 | 7,0 | -10° | | | | |

All figures show right hand tools.

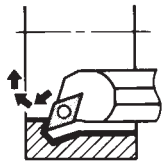
Remarks: Right handed tool holders are applicable with left handed or neutral inserts.
Left handed tool holders are applicable with right handed or neutral inserts.

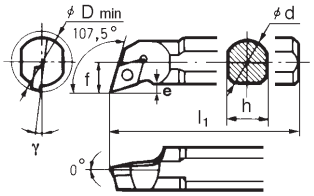
## ■ Holders



Tool holders (S type)
with screw-lock system

**S - SDQC** R/L






| Ordering No. | Stock R | Stock L | øDmin | Dimensions (mm) d | h | l1 | f | e | γ | |
|---|---|---|---|---|---|---|---|---|---|---|
| S10K - SDQC R/L-07 | ● | ● | 13 | 10 | 9 | 125 | 7 | 2,5 | -8° | DC_ _ 0702_ _ |
| S12M - SDQC R/L-07 | ● | ● | 16 | 12 | 11 | 150 | 9 | 3,5 | -8° | |
| S16R - SDQC R/L-07 | ● | ● | 20 | 16 | 15 | 200 | 11 | 4 | -6° | |
| S20S - SDQC R/L-11 | ● | ● | 25 | 20 | 18 | 250 | 13 | 4,5 | -6° | DC_ _ 11T3_ _ |
| S25T - SDQC R/L-11 | ● | ● | 32 | 25 | 22 | 300 | 17 | 7 | -6° | |

All figures show right hand tools.

## ■ Applicable Inserts

## ■ Spare Parts

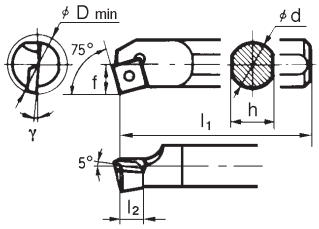
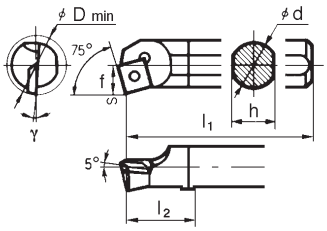
| Holder | Carbides, Cermets | | CBN, PCD | Screw | Wrench |
|---|---|---|---|---|---|
| S - SDUC R/L<br>S - SDQC R/L |  |  |  |  |  |
| S10K.....07 | DCMT 0702_ _ NFP | DCMT 0702_ _ NSK | DCGW 0702_ _ | BFTX02506N | TRX08 |
| S12M.....07 | DCMT 0702_ _ NFP | DCMT 0702_ _ NSK | DCGW 0702_ _ | BFTX02506N | TRX08 |
| S16R.....07 | DCMT 0702_ _ NFP | DCMT 0702_ _ NSK | DCGW 0702_ _ | BFTX02506N | TRX08 |
| S.....11 | DCMT 11T3_ _ NFP | DCMT 11T3_ _ NSK | DCGW 11T3_ _ | BFTX0409N | TRX15 |

● = Euro stock

Packing unit and ordering example; 1 pce D12M-SDQCR 0702-16 ( R: right handed )



## Holders

| | Tool holders (S type) with screw-lock system | Ordering No. | Stock R | Stock L | Dimensions (mm) øD$_{min}$ | d | h | $l_1$ | $l_2$ | f | γ | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **S - SSKP** R/L<br>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<br>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

| Holder | Carbides, Cermets | CBN | |
|---|---|---|---|
| **S/C-SSKP** R/L |  |  | |
| S/C 12.....09<br>S/C 16.....09<br>S 20.....09<br>S 25.....09 | SPGT 0903_ _ L/R-SD | SPGW 0903_ _ | |

## Spare Parts

| Screw | Wrench | | | | |
|---|---|---|---|---|---|
|  |  | | | | |
| BFTX 0307 A | TRX 10 | | | | |

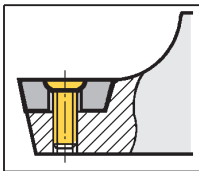


● = Euro stock Packing unit and ordering example; 1 pce S12M - SSKPR 09 ( R: right handed )

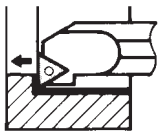
# Boring Bars
# S ...STFC Type



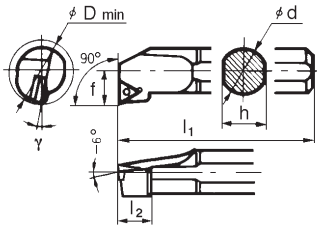
## ■ Holders

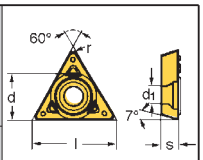


**S - STFC** R/L



Tool holders (S type) with screw-lock system




| Ordering No. | Stock R | Stock L | Dimensions (mm) øD$_{min}$ | d | h | $l_1$ | $l_2$ | f | γ | |
|---|---|---|---|---|---|---|---|---|---|---|
| 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.

## ■ Applicable Inserts

## ■ Spare Parts

| Holder | Carbides, Cermets | | CBN, PCD | Screw | Wrench | | | | |
|---|---|---|---|---|---|---|---|---|---|
| S - STFC R/L |  |  |  |  |  | | | | |
| 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 | TRX15 | | | | |

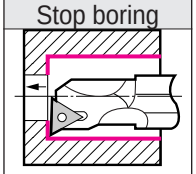
● = Euro stock  Packing unit and ordering example; 1 pce S10K - STFCR 09 ( R: right handed )

For Positive TB / TP _ _- Inserts ( α = 5, 11°)

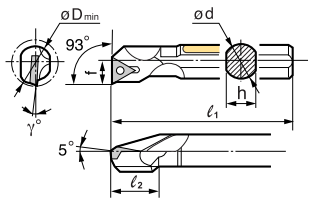


SumiTurn X Bar

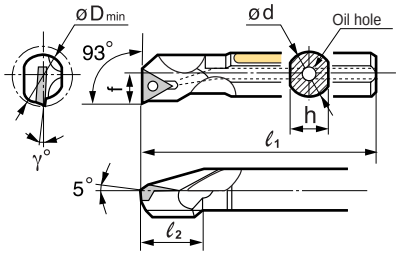
**B/D-STUP**
Stop boring



***B Type*** (Fig.1)
Min. Bore Dia.



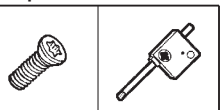

***D Type*** (Fig.2)




Insert (ex.)



## Spare Parts



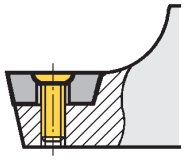
## Holders

| Steel shank | Ordering No. | Stock R | Stock L | øDmin | Dimensions (mm) ød | h | ℓ1 | f | ℓ2 | γ | Fig. | Insert (ex.) | Screw | Wrench |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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° | | | BFTX0307A | |
| | **D25T - STUP R/L 1604-28** | ● | ● | 28 | 25 | 22 | 300 | 14 | 18 | -2° | | TP□T 1604○○ | BFTX0410A | TRX15 |
| | **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.

## Holders



Tool holders (S type)
with screw-lock system

| Ordering No. | Stock R | Stock L | Dimensions (mm) øDmin | d | h | l1 | l2 | 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 - STUP R/L 08-02 | ● | ● | 10 | 8 | 7 | 100 | 13 | 5 | -10° | TP_T 0802_ _ |
| S10K - STUP R/L 11-03 | ● | ● | 12 | 10 | 9 | 125 | 15 | 6 | -8° | TP_T 1103_ _ |
| S12M - STUP R/L 11-03 | ● | ● | 16 | 12 | 11 | 150 | 17 | 8 | -6° | |
| S16R - STUP R/L 11-03 | ● | ● | 20 | 16 | 15 | 200 | 18 | 10 | -2° | |
| S20S - STUP R/L 16 | ● | ● | 25 | 20 | 18 | 250 | 18 | 12,5 | -3° | TP_T 1604_ _ |
| S25T - STUP R/L 16 | ● | ● | 28 | 25 | 22 | 300 | 18 | 14 | -2° | |
| **C - STUP/B R/L** Carbide shank | | | | | | | | | | |
| C08M - STUB R/L 06 | ● | ● | 8 | 8 | 7 | 150 | 50 | 4 | -12° | TB_T 0601_ _ |
| C08M - STUP R/L 08 | ● | ● | 10 | 8 | 7 | 150 | 18 | 5 | -10° | TP_T 0802_ _ |
| C10Q - STUP R/L 11 | ● | ● | 12 | 10 | 9 | 180 | 19 | 6 | -8° | TP_T 1103_ _ |
| C12R - STUP R/L 11 | ● | ❍ | 16 | 12 | 11 | 200 | 25 | 8 | -6° | |
| C16S - STUP R/L 11 | ● | ❍ | 20 | 16 | 15 | 250 | 30 | 10 | -4° | |

## Applicable Inserts

| Holder | Carbides, Cermets | CBN, PCD |
|---|---|---|
| **S/C-STU_** R/L |  |  |
| S/C 08.....06-01 | TBGT 0601_ _L/R-W | - |
| S/C 08.....08-02 | TPGT 0802_ _L/R-W | TPMW 0802_ _ |
| S/C 10.....11-03 | TPGT 1103_ _L/R-W | TPGW 1103_ _ |
| S/C 12/16.....11-03 | TPGT 1103_ _L/R-W | TPGW 1103_ _ |
| S 20/25.....16 | TPGT 1604_ _L/R-W | TPGW 1604_ _ |

## Spare Parts

| Screw | Wrench |
|---|---|
|  |  |
| BFTX 0204 A | TRX 06 |
| BFTX 0204 A | TRX 06 |
| BFTX 0306 A | TRX 10 |
| BFTX 0307 A | TRX 10 |
| BFTX 0410 A | TRX 15 |





● = Euro stock

Packing unit and ordering example; 1 pce B08H-STUPR 0802-10 ( R: right handed )

# Boring Bars
# D...SVUB / SVZB Type

SumiTurn X Bar



Anti-vibration D type with oil hole

**D-SVUB**

Copying

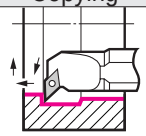


Fig.1

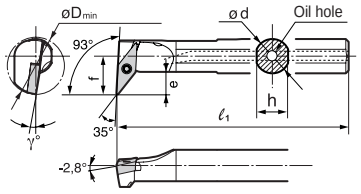
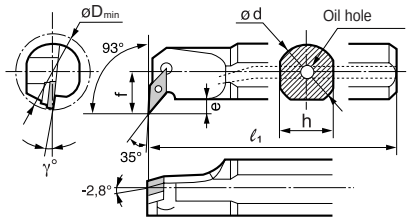


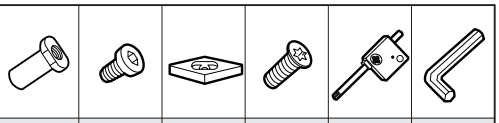

Fig.2




Insert (ex.)



## ■ Spare Parts



## ■ Holders

Above figures show right hand tools.

| Ordering No. | Stock R | Stock L | øDmin | Dimensions (mm) ød | h | ℓ1 | f | e | γ | Fig. | Insert (ex.) | Pin | Clamp screw | Shim | Screw | Wrench | Wrench |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| D16R - SVUB R/L 1103-22 | ● | ● | 22 | 16 | 15 | 200 | 13 | 5 | -7° | 1. | VB□□1103○○ | – | – | – | BFTX 02506 | TRX08 | – |
| D20S - SVUB R/L 1103-27 | ● | ● | 27 | 20 | 18 | 250 | 15 | 5 | -5° | | | | | | | | |
| D25T - SVUB R/L 1604-35 | ● | ● | 35 | 25 | 23 | 300 | 20,5 | 9 | -7,5° | 2. | VB□□1604○○ | VP32B | BH03504 | SVP32 | BFTX 03508 | TRX10 | LH020 |
| D32T - SVUB R/L 1604-40 | ● | ● | 40 | 32 | 30 | 300 | 22 | 9 | -7,5° | | | | | | | | |

Remarks: Right handed tool holders are applicable with left handed or neutral inserts.
Left handed tool holders are applicable with right handed or neutral inserts.

SumiTurn X Bar



Anti-vibration D type with oil hole

**D-SVZB**

Copying

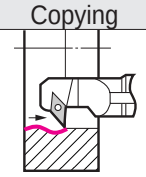


Fig.1

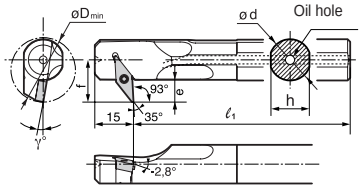
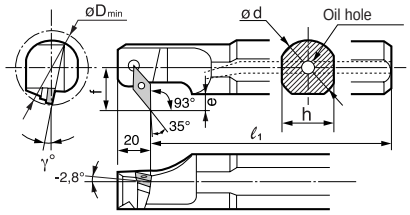


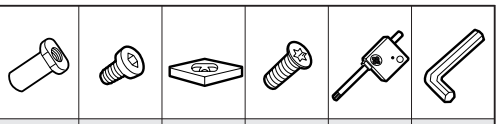

Fig.2




Insert (ex.)



## ■ Spare Parts



## ■ Holders

Above figures show right hand tools.

| Ordering No. | Stock R | Stock L | øDmin | Dimensions (mm) ød | h | ℓ1 | f | e | γ | Fig. | Insert (ex.) | Pin | Clamp screw | Shim | Screw | Wrench | Wrench |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| D16R - SVZB R/L 1103-22 | ● | ● | 22 | 16 | 15 | 200 | 13 | 5 | -7 | 1. | VB□□1103○○ | – | – | – | BFTX 02506 | TRX08 | – |
| D20S - SVZB R/L 1103-27 | ● | ● | 27 | 20 | 18 | 250 | 15 | 5 | -5 | | | | | | | | |
| D25T - SVZB R/L 1604-35 | ● | ● | 35 | 25 | 23 | 300 | 20,5 | 9 | -7,5 | 2. | VB□□1604○○ | VP32B | BH03504 | SVP32 | BFTX 03508 | TRX10 | LH020 |
| D32T - SVZB R/L 1604-40 | ● | ● | 40 | 32 | 30 | 300 | 22 | 9 | -7,5 | | | | | | | | |

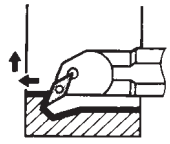
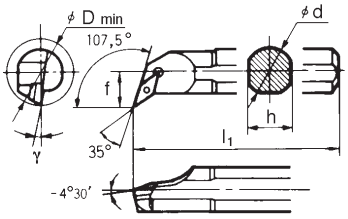
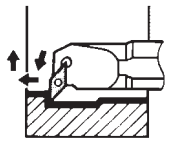
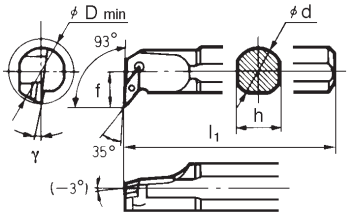
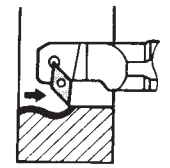
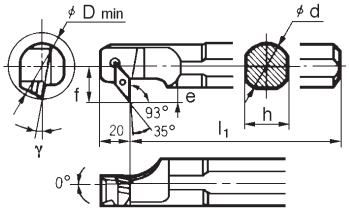


● = Euro stock

Packing unit and ordering example; 1 pce D16R-SVUBR 1103-22 ( R: right handed )



## Holders

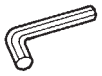
| | Tool holders (S type) with screw-lock system | Ordering No. | Stock R | Stock L | Dimensions (mm) øD$_{min}$ | d | h | $l_1$ | f | γ | e | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **S - SVQB** R/L  |  | S16R - SVQB R/L 11 | ● | ● | 22 | 16 | 15 | 200 | 13 | -6,5° | | VB_ _ 1102_ _ |
| | | 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° | 5 | VB_ _ 1102_ _ |
| | | S20S - SVZB R/L 11 | ● | ● | 27 | 20 | 18 | 250 | 15 | -7,5° | 5 | |
| | | S25T - SVZB R/L 16 | ● | ● | 35 | 25 | 23 | 300 | 20,5 | -7,5° | 9 | VB_ _ 1604_ _ |
| | | S32U - SVZB R/L 16 | ● | ● | 40 | 32 | 30 | 350 | 22 | -7,5° | 9 | |
| | | S40V - SVZB R/L 16 | ❍ | ❍ | 50 | 40 | 37 | 400 | 27 | -7,5° | 10 | |

All figures show right hand tools.

## Applicable Inserts

| Holder | Carbides, Cermets | | CBN |
|---|---|---|---|
| |  |  |  |
| S16R | VBMT 1102_ _ NFP | VBMT 1102_ _ NSK | - |
| S20S | VBMT 1102_ _ NFP | VBMT 1102_ _ NSK | - |
| S25T | VBMT 1604_ _ NFP | VBMT 1604_ _ NSK | VBGW 1604_ _ |
| S32U | VBMT 1604_ _ NFP | VBMT 1604_ _ NSK | VBGW 1604_ _ |
| S40V | VBMT 1604_ _ NFP | VBMT 1604_ _ NSK | VBGW 1604_ _ |

## Spare Parts

| Pin | Clamp bolt | Shim | Screw | Wrench | Wrench |
|---|---|---|---|---|---|
|  |  |  |  |  |  |
| - | - | - | BFTX02506N | TRX08 | - |
| - | - | - | BFTX02506N | TRX08 | - |
| - | - | - | BFTX03508 | TRX10 | - |
| VP32B | BH03504 | SVP32 | BFTX03508 | TRX10 | LH020 |
| VP40B | BH03504 | SVP32 | BFTX03508 | TRX10 | LH020 |



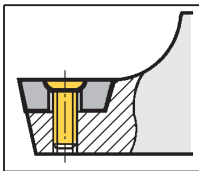
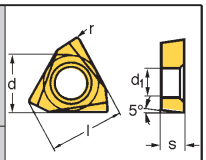
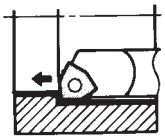
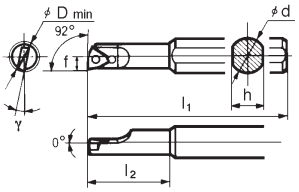
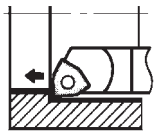
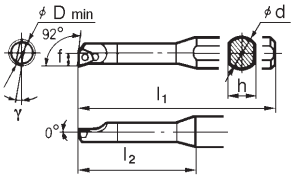
● = Euro stock

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

# Boring Bars
# S/C...SWUB Type



## Holders

|  | Tool holders (S type) with screw-lock system | Ordering No. | Stock | | Dimensions (mm) | | | | | | |  |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | R | L | $\phi D_{min}$ | d | h | $l_1$ | $l_2$ | f | γ | |
| **S - SWUB** R/L<br>Steel shank<br>  |  | S08H - SWUB R/L 06-01 | ● | ● | 5,5 | 8 | 7 | 100 | 18 | 3 | -12° | WBGT 0601_ _ |
| **C - SWUB** R/L<br>Carbide shank<br>  |  | 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.

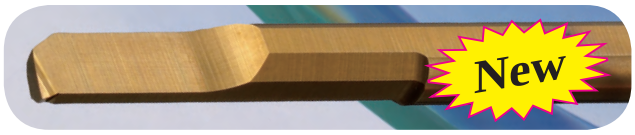
## Applicable Inserts

| Holder | Carbides, Cermets | CBN | |
|---|---|---|---|
| **S/C-SWUB**R/L |  | | |
| S/C 08.....R 06 | WBGT 0601_ _ LW | - | |
| S/C 08.....L 06 | WBGT 0601_ _ RW | - | |

## Spare Parts

| Screw | Wrench | | | | |
|---|---|---|---|---|---|
|  |  | | | | |
| BFTX 0203 A | TRX 06 | | | | |
| BFTX 0203 A | TRX 06 | | | | |

# BXBR Type





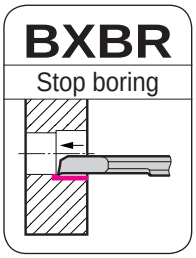

## Characteristics

SumiSmall

- Economical, two-cornered insert.
- Maximum boring depth 5D (5 times the shank diameter)
- Usable at any desired overhang.
- Shank size = min. bore diameter for easy selection. (Available from ø2 mm to ø5 mm in 0,5 mm increments.)
- KBMX Type cutting edge used, no breaker versions also available in stock.

## Small Hole Finishing

**BXBR**
Stop boring



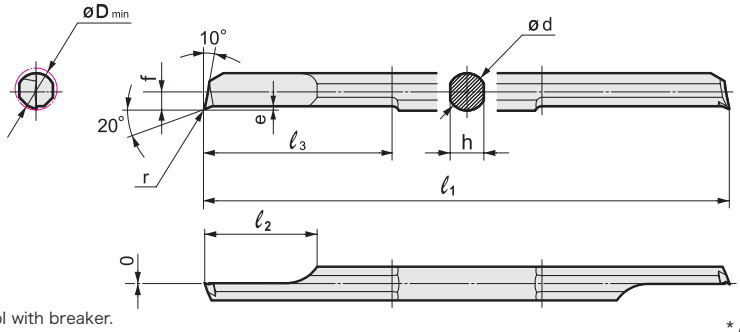


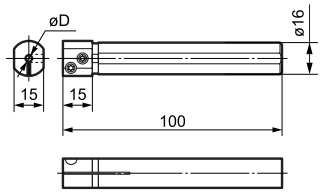

Figure shows tool with breaker.

* $\ell_3$ : Max. depth of boring

## Solid Carbide Bar

| | Cat. No. | Stock ACZ150 | Stock AC530U | øDmin | Dimensions (mm) ød | h | ℓ1 | f | ℓ2 | ℓ3 | e | r | Applicable Sleeve |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| With Breaker | **BXBR 02005 R** | ❍ | | **2,0** | 2,0 | 1,8 | 50 | 0,80 | 6,0 | *10,0* | 0,20 | 0,05 | HBX 2016 |
| | **02020 R** | ❍ | | **2,0** | 2,0 | 1,8 | 50 | 0,80 | 6,0 | *10,0* | 0,20 | 0,20 | HBX 2016 |
| | **BXBR 02505 R** | ❍ | | **2,5** | 2,5 | 2,2 | 50 | 1,05 | 7,5 | *12,5* | 0,20 | 0,05 | HBX 2516 |
| | **02520 R** | ❍ | | **2,5** | 2,5 | 2,2 | 50 | 1,05 | 7,5 | *12,5* | 0,20 | 0,20 | HBX 2516 |
| | **BXBR 03005 R** | ❍ | | **3,0** | 3,0 | 2,7 | 50 | 1,30 | 9,0 | *15,0* | 0,25 | 0,05 | HBX 3016 |
| | **03020 R** | ❍ | | **3,0** | 3,0 | 2,7 | 50 | 1,30 | 9,0 | *15,0* | 0,25 | 0,20 | HBX 3016 |
| | **BXBR 03505 R** | ❍ | | **3,5** | 3,5 | 3,1 | 60 | 1,55 | 10,5 | *17,5* | 0,25 | 0,05 | HBX 3516 |
| | **03520 R** | ❍ | | **3,5** | 3,5 | 3,1 | 60 | 1,55 | 10,5 | *17,5* | 0,25 | 0,20 | HBX 3516 |
| | **BXBR 04005 R** | ❍ | | **4,0** | 4,0 | 3,6 | 60 | 1,80 | 12,0 | *20,0* | 0,35 | 0,05 | HBX 4016 |
| | **04020 R** | ❍ | | **4,0** | 4,0 | 3,6 | 60 | 1,80 | 12,0 | *20,0* | 0,35 | 0,20 | HBX 4016 |
| | **BXBR 04505 R** | ❍ | | **4,5** | 4,5 | 4,1 | 70 | 2,05 | 13,5 | *22,5* | 0,35 | 0,05 | HBX 4516 |
| | **04520 R** | ❍ | | **4,5** | 4,5 | 4,1 | 70 | 2,05 | 13,5 | *22,5* | 0,35 | 0,20 | HBX 4516 |
| | **BXBR 05005 R** | ❍ | | **5,0** | 5,0 | 4,5 | 70 | 2,30 | 15,0 | *25,0* | 0,40 | 0,05 | HBX 5016 |
| | **05020 R** | ❍ | | **5,0** | 5,0 | 4,5 | 70 | 2,30 | 15,0 | *25,0* | 0,40 | 0,20 | HBX 5016 |
| No Breaker | **BXBR 02005 R-NB** | ❍ | | **2,0** | 2,0 | 1,8 | 50 | 0,80 | 6,0 | *10,0* | 0,20 | 0,05 | HBX 2016 |
| | **02020 R-NB** | ❍ | | **2,0** | 2,0 | 1,8 | 50 | 0,80 | 6,0 | *10,0* | 0,20 | 0,20 | HBX 2016 |
| | **BXBR 02505 R-NB** | ❍ | | **2,5** | 2,5 | 2,2 | 50 | 1,05 | 7,5 | *12,5* | 0,20 | 0,05 | HBX 2516 |
| | **02520 R-NB** | ❍ | | **2,5** | 2,5 | 2,2 | 50 | 1,05 | 7,5 | *12,5* | 0,20 | 0,20 | HBX 2516 |
| | **BXBR 03005 R-NB** | ❍ | | **3,0** | 3,0 | 2,7 | 50 | 1,30 | 9,0 | *15,0* | 0,25 | 0,05 | HBX 3016 |
| | **03020 R-NB** | ❍ | | **3,0** | 3,0 | 2,7 | 50 | 1,30 | 9,0 | *15,0* | 0,25 | 0,20 | HBX 3016 |
| | **BXBR 03505 R-NB** | ❍ | | **3,5** | 3,5 | 3,1 | 60 | 1,55 | 10,5 | *17,5* | 0,25 | 0,05 | HBX 3516 |
| | **03520 R-NB** | ❍ | | **3,5** | 3,5 | 3,1 | 60 | 1,55 | 10,5 | *17,5* | 0,25 | 0,20 | HBX 3516 |
| | **BXBR 04005 R-NB** | ❍ | | **4,0** | 4,0 | 3,6 | 60 | 1,80 | 12,0 | *20,0* | 0,35 | 0,05 | HBX 4016 |
| | **04020 R-NB** | ❍ | | **4,0** | 4,0 | 3,6 | 60 | 1,80 | 12,0 | *20,0* | 0,35 | 0,20 | HBX 4016 |
| | **BXBR 04505 R-NB** | ❍ | | **4,5** | 4,5 | 4,1 | 70 | 2,05 | 13,5 | *22,5* | 0,35 | 0,05 | HBX 4516 |
| | **04520 R-NB** | ❍ | | **4,5** | 4,5 | 4,1 | 70 | 2,05 | 13,5 | *22,5* | 0,35 | 0,20 | HBX 4516 |
| | **BXBR 05005 R-NB** | ❍ | | **5,0** | 5,0 | 4,5 | 70 | 2,30 | 15,0 | *25,0* | 0,40 | 0,05 | HBX 5016 |
| | **05020 R-NB** | ❍ | | **5,0** | 5,0 | 4,5 | 70 | 2,30 | 15,0 | *25,0* | 0,40 | 0,20 | HBX 5016 |

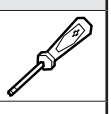
## Adaptor Sleeve (Optional)




| Cat. No. | Stock | øDs (mm) | Applicable Bar |
|---|---|---|---|
| **HBX 2016** | ❍ | 2,0 | BXBR 020○○ R(-NB) |
| **HBX 2516** | ❍ | 2,5 | BXBR 025○○ R(-NB) |
| **HBX 3016** | ❍ | 3,0 | BXBR 030○○ R(-NB) |
| **HBX 3516** | ❍ | 3,5 | BXBR 035○○ R(-NB) |
| **HBX 4016** | ❍ | 4,0 | BXBR 040○○ R(-NB) |
| **HBX 4516** | ❍ | 4,5 | BXBR 045○○ R(-NB) |
| **HBX 5016** | ❍ | 5,0 | BXBR 050○○ R(-NB) |

* BXBR bars can be used with HBB type sleeves. Commercially available sleeves may also be used.

## Spare Parts (For sleeve)

| Screw | Required Torque (N·m) | Setting Screw | Wrench |
|---|---|---|---|
|  | |  |  |
| BFTX 0409 N | **3,4** | BT 06035 T | TRD 15 |

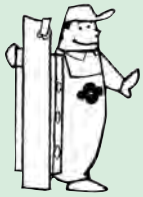


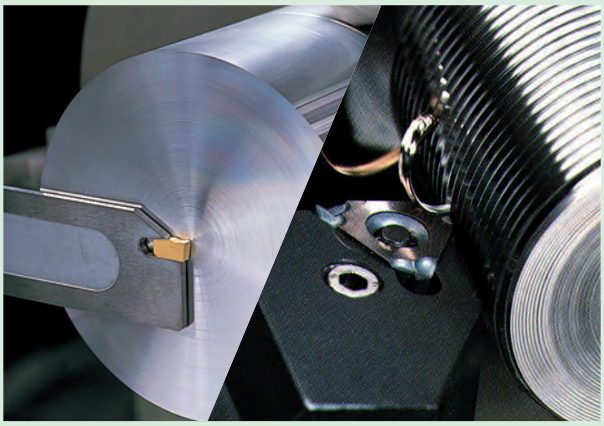
❍ = Stock item in Japan

Packing unit and ordering example; 1 pce BXBR 02005 R, ACZ150 ( R: right handed )

# Grooving & Parting-Off Threading Holders

**F1 ~ F28**






| | | |
|---|---|---|
| GND Type Grooving Tools Selection Guide | **GND** New | F 2-7 |
| External Grooving Holders | **GNDM / GNDMS** New | F 8 |
| | **GNDL / GNDLS** New | F 9 |
| | **GNDF** New | F10 |
| Internal Grooving Holders | **GNDI** New | F11 |
| Grooving Inserts | **GCM** (-N/R/L) New | F12-13 |
| ”SumiTurn B-Groove” Inserts | **TGA-BF** | F14 |
| ”SumiTurn B-Groove” Holders | **GWC / GWCS / GWCI** | F15 |
| Parting-Off Mini Holders | **SCT** | F16 |
| Sumi-Grip Inserts | **WCF** (-N/R/L) | F17 |
| ”Sumi-Grip Jr.” Steel Type | **STFH / STFS** R/L | F18-19 |
| ”Sumi-Grip” Carbide Blade Type | **WCFH / WCFS** R/L | F20-22 |
| Threading Tools Selection Guide | | F23-24 |
| Cutting Conditions | | F25 |
| External Threading Holders | **LTER / STER** | F26 |
| Internal Threading Holders | **STIR** | F27 |

# GND Type




## Characteristics

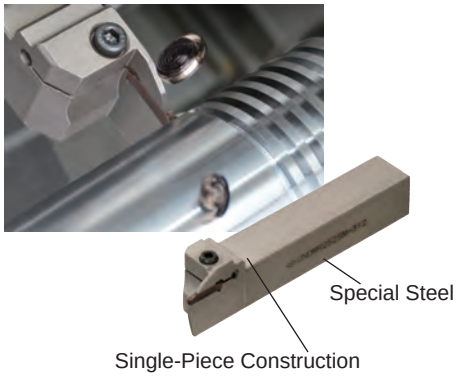
- Wide range of application processes
  Applicable for grooving, turning, copying, facing, boring and cut-off.
- Achieving stable tool life
  An array of chipbreakers improves the efficiency in chip control and prevents unexpected damages caused by chip jamming. The new CG-chipbreaker is ideal for cut-off.
- Achieving smooth cutting and high efficiency machining
  Holders utilizing one-piece body construction made of special steel, reduce vibration by 30% during machining as compared to conventional types.
- Achieving high precision grooving widths with moulded inserts
  Grooving insert width tolerance of ±0,03mm over the entire range

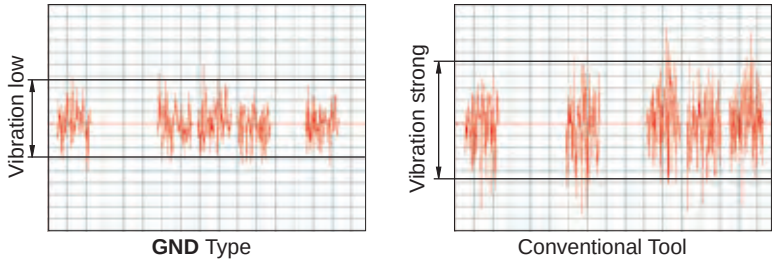
## Product Range – Holders

| Application | | Series | Shape | Grooving Width (mm) 2 | 3 | 4 | 5 | 6 | 7 | 8 | Grooving Depth (mm) | Work Diameter (mm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| External Grooving | | **GNDM** Straight | | | 3 | | | | | | 12 | |
| | | | | | | 4 | 5 | 6 | 7 | 8 | 18 | |
| | | **GNDMS** L-Style | | | 3 | | | | | | 10 / 12 | |
| | | | | | | 4 | 5 | | | | 12 / 14 | |
| | | | | | | | | 6 | | | 14 | |
| | | **GNDL** Straight | | 2 | 3 | | | | | | 20 | |
| | | | | | | 4 | 5 | 6 | 7 | 8 | 25 | |
| | | **GNDLS** L-Style | | 2 | 3 | | | | | | 16 / 18 | |
| | | | | | | 4 | 5 | 6 | | | 23 | |
| Face Grooving | | **GNDF** Straight | | | 3 | | | | | | 12 | Ø35 – Ø55 |
| | | | | | 3 | | | | | | 18 | Ø50 – Ø300 |
| | | | | | | 4 | | | | | 18 | Ø40 – Ø55 |
| | | | | | | 4 | 5 | 6 | | | 23 | Ø35 – Ø1000 |
| Internal Grooving | | **GNDI** Straight | | 2 | 3 | 4 | 5 | | | | 6 | Ø min. 32 |
| | | | | 2 | 3 | 4 | 5 | | | | 10 | Ø min. 40 |
| | | | | | 3 | 4 | 5 | 6 | | | 11 | Ø min. 50 |

## Eliminates Vibration

Stable machining with high rigidity body design reduces vibration by 30% as compared to conventional models.




**GND** Type — Conventional Tool

| | |
|---|---|
| Work Material: | 15CrMo5 |
| Holder: | GNDL R2525M 220 |
| Insert: | GCM N2002 GG |
| Cutting Conditions: | $v_c$=100m/min, f=0,1mm/rev, $a_p$=20mm, wet |

# GND Type

## Inserts




## Chipbreaker Series

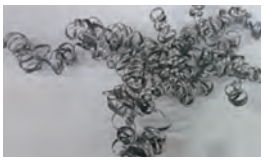
| Grooving/Turning | Grooving/Cut-Off | Cut-Off (Handed) | Copying |
|---|---|---|---|
|  **MG** Type |  **GG** Type |  **CG** Type |  **RG** Type |
|  **ML** Type Low Feed Type |  **GL** Type Low Feed Type | | |

## Excellent Chip Control

**Grooving** ⇨ Stable chip control



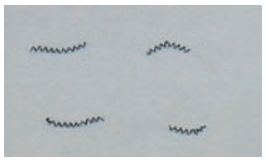
**GND** Type
(**GG** Type Chipbreaker)



Conventional Tool

| | |
|---|---|
| Work Material: | 15CrMo5 |
| Holder: | GNDM R2525M 312 |
| Insert: | GCM N3002 GG (AC530U) |
| Cutting Conditions: | $v_c$=100m/min, f=0,15mm/rev, $a_p$=12,0mm, wet |

**Turning** ⇨ Fine, short chips produced during side turning



**GND** Type
(**ML** Type Chipbreaker)



Conventional Tool

| | |
|---|---|
| Work Material: | 15CrMo5 |
| Holder: | GNDM R2525M 312 |
| Insert: | GCM N3002 ML (AC530U) |
| Cutting Conditions: | $v_c$=100m/min, f=0,1mm/rev, $a_p$=0,5mm, wet |

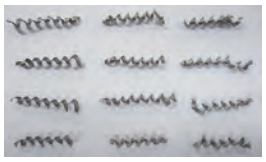


**GND** Type
(**RG** Type Chipbreaker)



Conventional Tool

| | |
|---|---|
| Work Material: | 15CrMo5 |
| Holder: | GNDM R2525M 312 |
| Insert: | GCM N3015 RG (AC530U) |
| Cutting Conditions: | $v_c$=100m/min, f=0,13mm/rev, $a_p$=1,0mm, wet |



**GND** Type
(**RG** Type Chipbreaker)



Conventional Tool

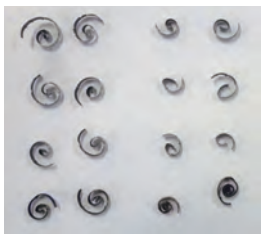
| | |
|---|---|
| Work Material: | 15CrMo5 |
| Holder: | GNDM R2525M 312 |
| Insert: | GCM N3015 RG (AC530) |
| Cutting Conditions: | $v_c$=100m/min, f=0,15mm/rev, $a_p$=0,1mm, wet |

## Improved Machining Precision

Our precision sintering technology delivers ± 0,03mm accuracy for all grooving widths (from 2,0 to 6,0mm).

## Substantially Improved Machining Efficiency

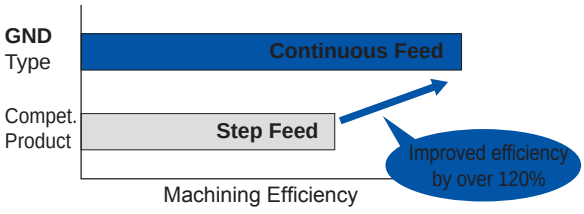
Outstanding chip control performance eliminates necessity of step feed.



**GND** Type
(**GG** Type Chipbreaker)



Conventional Tool



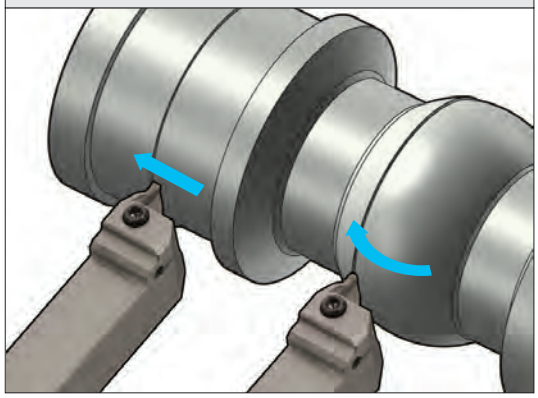

| | |
|---|---|
| Work Material: | 42CrMo4 |
| Holder: | GNDL R2525M 320 |
| Insert: | GCM N3002 GG (AC530U) |
| Cutting Conditions: | $v_c$=90m/min, f=0,1mm/rev, wet |

# GND Type

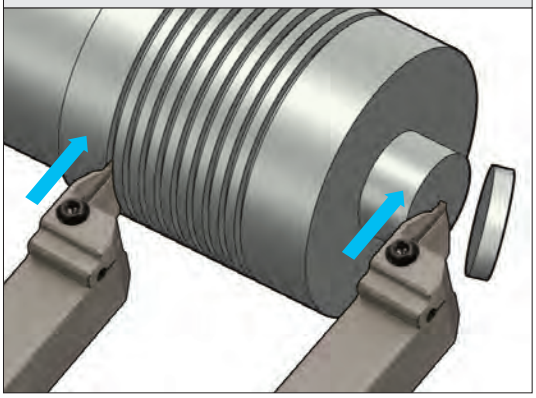
## ■ GND Type Holder Selection Guide

### For External Machining

#### Turning / Copying



#### Grooving / Cut-Off



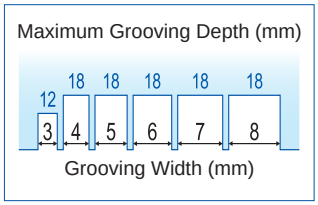
#### Turning / Copying / Grooving

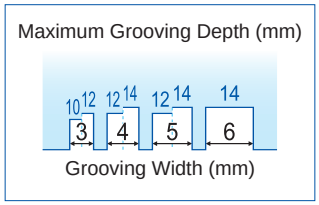


Straight
**GNDM**



L-Style
**GNDMS**




Perfect for turning, copying and grooving.

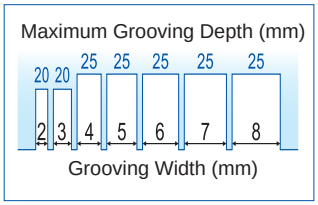
#### Deep Grooving / Cut-Off

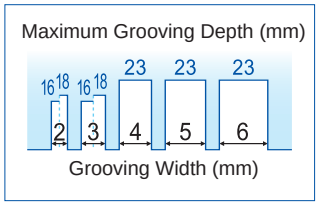


Straight
**GNDL**



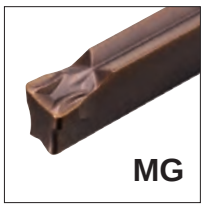
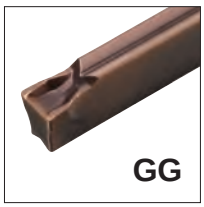
L-Style
**GNDLS**




Perfect for grooving and cut-off applications. Handles deep grooving with ease.

## ■ GND Type Chipbreaker Selection

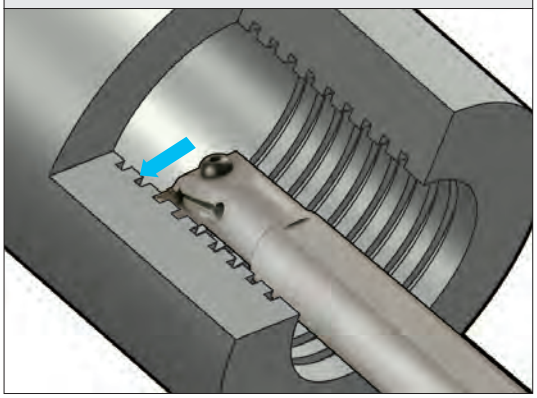
| Turning | | Grooving / Cut-Off | | | Copying |
|---|---|---|---|---|---|
|  **MG** |  **ML** |  **GG** |  **GL** |  **CG** |  **RG** |
| Standard insert for turning | For low-feed chip management | First choice for grooving | For low-feed chip management | Ideal for cut-off applications | Perfect for copying |

If chips are long when using GG and GL chipbreakers for grooving, chip management can be improved by using MG or ML type chipbreakers.

## GND Type Holder Selection Guide

### For Internal Machining

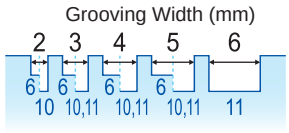
Grooving / Turning / Copying



Turning / Copying / Grooving



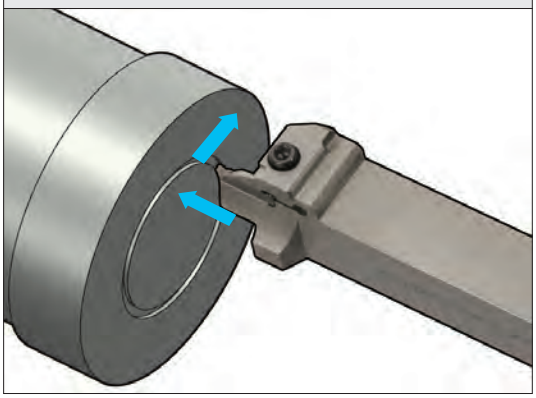
Straight
**GNDI**




One holder for all internal machining processes.

### For Face Machining

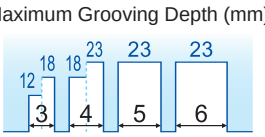
Grooving / Turning / Copying



Turning / Copying / Grooving



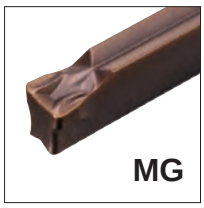

Straight
**GNDF**




Seperate holder for face machining processes.

## GND Type Chipbreaker Selection

### Turning



**MG**

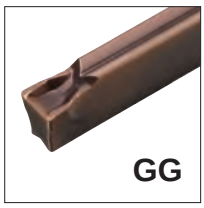
Standard insert for turning



**ML**

For low-feed chip management

### Grooving



**GG**

First choice for grooving



**GL**

For low-feed chip management

### Copying



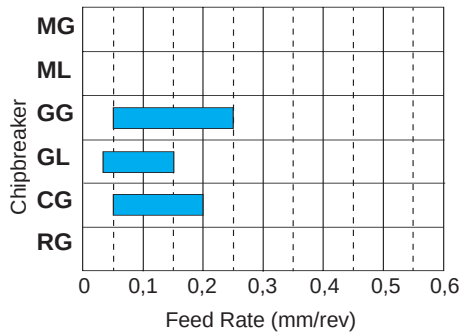
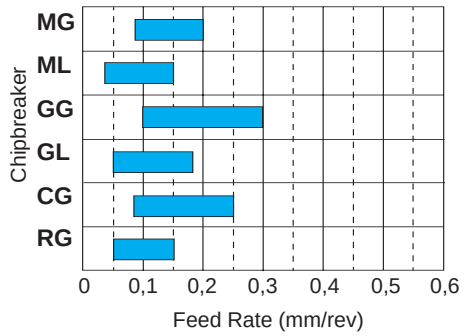
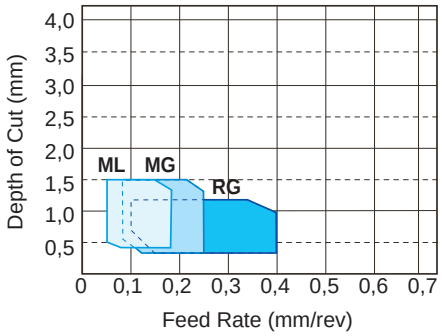
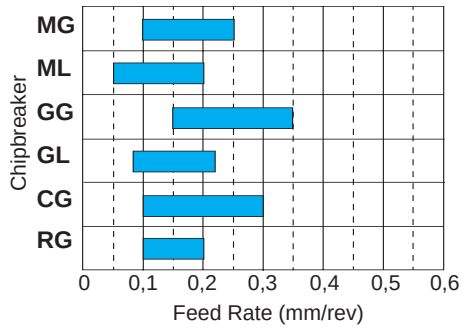
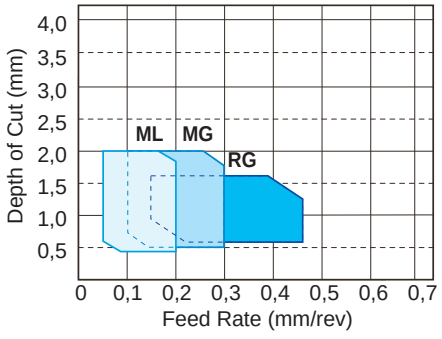
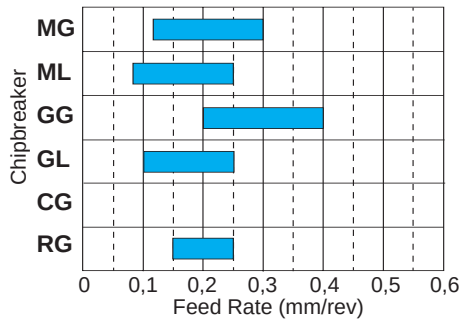
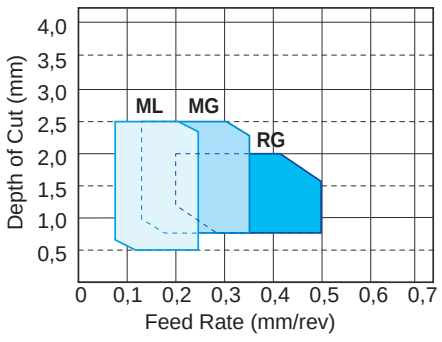
**RG**

Perfect for copying

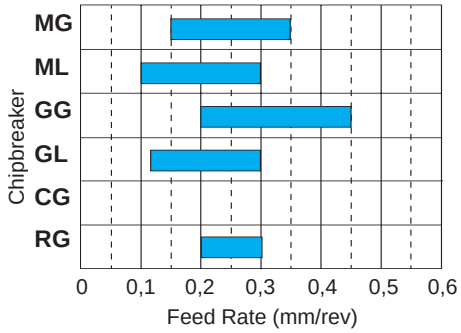
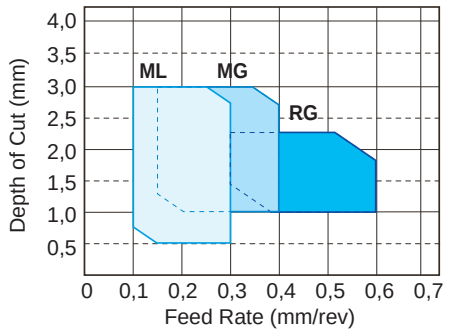
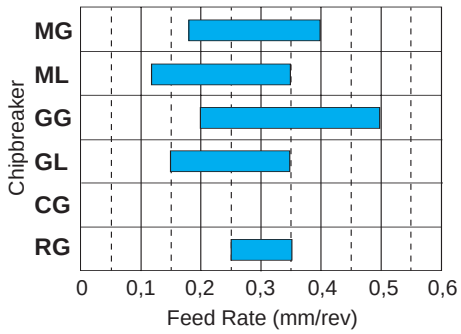
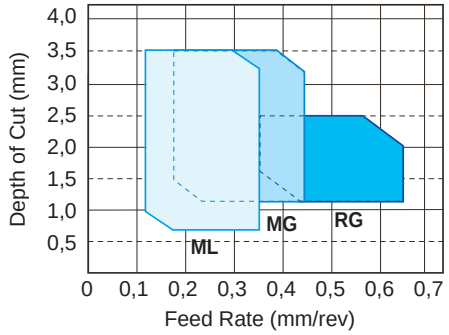
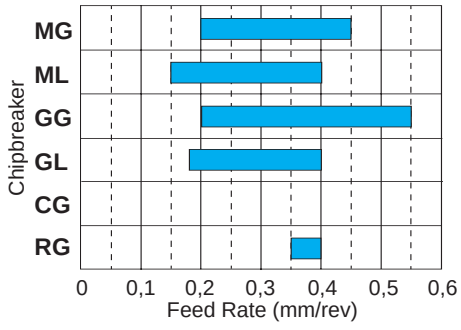
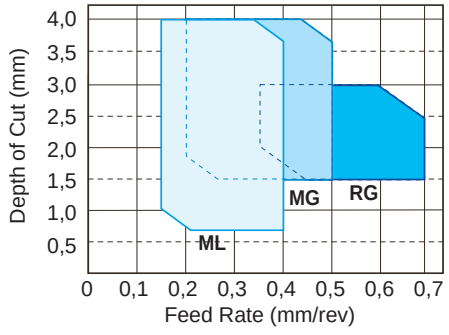
If chips are long when using GG and GL chipbreakers for grooving, chip management can be improved by using MG or ML type chipbreakers.

# GND Type

## ■ Chipbreaker Selection Guide

| Groov. Width (mm) | Recommended Cutting Conditions | | Nose Radius (mm) | Inserts |
|---|---|---|---|---|
| | Grooving | Turning | | |
| 2,0 |  | | 0,2 | GCM N2002 **GG**<br>GCM N2002 **GL**<br>GCM R/L2002 **CG**05 |
| 3,0 |  |  | 0,2 | GCM N3002 **ML**<br>GCM N3002 **GG**<br>GCM N3002 **GL**<br>GCM R/L3002 **CG**05 |
| | | | 0,4 | GCM N3004 **MG**<br>GCM N3004 **GG** |
| | | | 1,5 | GCM N3015 **RG** |
| 4,0 |  |  | 0,2 | GCM N4002 **GG**<br>GCM N4002 **GL**<br>GCM R/L4002 **CG**05 |
| | | | 0,4 | GCM N4004 **ML**<br>GCM N4004 **GG** |
| | | | 0,8 | GGCM N 4008 **MG** |
| | | | 2,0 | GCM N4020 **RG** |
| 5,0 |  |  | 0,2 | GCM N5002 **GG**<br>GCM N5002 **GL** |
| | | | 0,4 | GCM N5004 **ML**<br>GCM N5004 **GG** |
| | | | 0,8 | GCM N5008 **MG** |
| | | | 2,5 | GCM N5025 **RG** |

## Chipbreaker Selection Guide

| Groov. Width (mm) | Recommended Cutting Conditions: Grooving | Recommended Cutting Conditions: Turning | Nose Radius (mm) | Inserts |
|---|---|---|---|---|
| 6,0 |  |  | 0,2 | GCM N6002 **GG**<br>GCM N6002 **GL** |
| | | | 0,4 | GCM N6004 **ML**<br>GCM N6004 **GG** |
| | | | 0,8 | GCM N6008 **MG** |
| | | | 3,0 | GCM N6030 **RG** |
| 7,0 |  |  | 0,2 | GCM N7004 **GL** |
| | | | 0,4 | GCM N7004 **ML**<br>GCM N7004 **GG** |
| | | | 0,8 | GCM N7008 **MG** |
| | | | 3,5 | GCM N7035 **RG** |
| 8,0 |  |  | 0,2 | GCM N8004 **GL** |
| | | | 0,4 | GCM N8004 **ML**<br>GCM N8004 **GG** |
| | | | 0,8 | GCM N8008 **MG** |
| | | | 4,0 | GCM N8040 **RG** |

## Recommended Cutting Conditions

### ● Grooving /Cut-Off

| Breaker | | Feed Rate (mm/rev) | | | | | |
|---|---|---|---|---|---|---|---|
| | | **MG** | **ML** | **GG** | **GL** | **RG** | **CG** |
| Grooving Width (mm) | **2,0** | - | - | 0,05 - 0,25 | 0,03 - 0,15 | - | 0,05 - 0,20 |
| | **3,0** | 0,08 - 0,20 | 0,03 - 0,15 | 0,10 - 0,30 | 0,05 - 0,18 | 0,05 - 0,15 | 0,08 - 0,25 |
| | **4,0** | 0,10 - 0,25 | 0,05 - 0,20 | 0,15 - 0,35 | 0,08 - 0,22 | 0,10 - 0,20 | 0,10 - 0,30 |
| | **5,0** | 0,12 - 0,30 | 0,08 - 0,25 | 0,20 - 0,40 | 0,10 - 0,25 | 0,15 - 0,25 | - |
| | **6,0** | 0,15 - 0,35 | 0,10 - 0,30 | 0,20 - 0,45 | 0,12 - 0,30 | 0,20 - 0,30 | - |
| | **7,0** | 0,18 - 0,40 | 0,12 - 0,35 | 0,20 - 0,50 | 0,15 - 0,35 | 0,25 - 0,35 | - |
| | **8,0** | 0,20 - 0,45 | 0,15 - 0,40 | 0,20 - 0,55 | 0,18 - 0,40 | 0,35 - 0,40 | - |

### ● Turning

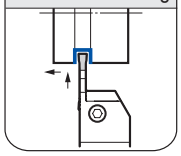
| Breaker | | **MG** | | **ML** | | **RG** | |
|---|---|---|---|---|---|---|---|
| | | Feed Rate (mm/rev) | Depth of Cut* (mm) | Feed Rate (mm/rev) | Depth of Cut* (mm) | Feed Rate (mm/rev) | Depth of Cut* (mm) |
| Grooving Width (mm) | **3,0** | 0,08 - 0,25 | 0,3 - 1,5 | 0,05 - 0,18 | 0,4 - 1,5 | 0,10- 0,40 | 0,3 - 1,2 |
| | **4,0** | 0,10 - 0,30 | 0,5 - 2,0 | 0,05 - 0,20 | 0,4 - 2,0 | 0,15 - 0,45 | 0,6 - 1,6 |
| | **5,0** | 0,12 - 0,35 | 0,8 - 2,5 | 0,08 - 0,25 | 0,5 - 2,5 | 0,20 - 0,50 | 0,8 - 2,0 |
| | **6,0** | 0,15 - 0,40 | 1,0 - 3,0 | 0,10 - 0,30 | 0,5 - 3,0 | 0,30 - 0,60 | 1,0 - 2,2 |
| | **7,0** | 0,18 - 0,45 | 1,2 - 3,5 | 0,12 - 0,35 | 0,7 - 3,5 | 0,35 - 0,65 | 1,2 - 2,5 |
| | **8,0** | 0,20 - 0,50 | 1,5 - 4,0 | 0,15 - 0,40 | 0,7 - 4,0 | 0,35 - 0,70 | 1,5 - 3,0 |

* Depth of cut for turning and profiling

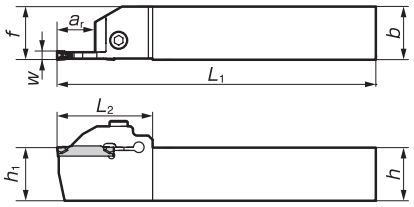
# GND Type

## External Multi-Purpose Type (Grooving, Turning, Copying)

**GNDM**
External Grooving



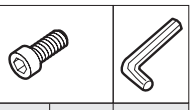
New




Use the multi-purpose copying insert for turning (wide grooves).

Above figures show right hand tools.

### Spare Parts



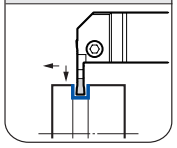
### Holders

| Cat. No. | Stock | | Dimensions (mm) | | | | | | Grooving Width (mm) | Max. Groov. Depth (mm) | Applicable Insert | Cap Screw | Torque (N·m) | Spanner |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | R | L | *h* | *b* | $L_1$ | *f* | $h_1$ | $L_2$ | *w* | $a_r$ | | | | |
| GNDM R/L 2020 K 312 | ● | ● | 20 | 20 | 125 | 20 | 20 | 36,6 | **3,0** | **12** | GCM □30○○-□□ | BX0520 | 5,0 | LH040 |
| GNDM R/L 2020 K 418 | ● | ● | 20 | 20 | 125 | 20 | 20 | 45,0 | **4,0** | **18** | GCM □40○○-□□ | | | |
| GNDM R/L 2020 K 518 | ● | ● | 20 | 20 | 125 | 20 | 20 | 45,0 | **5,0** | **18** | GCM N50○○-□□ | | | |
| GNDM R/L 2020 K 618 | ● | ● | 20 | 20 | 125 | 20 | 20 | 45,0 | **6,0** | **18** | GCM N60○○-□□ | | | |
| GNDM R/L 2525 M 312 | ● | ● | 25 | 25 | 150 | 25 | 25 | 36,6 | **3,0** | **12** | GCM □30○○-□□ | | | |
| GNDM R/L 2525 M 418 | ● | ● | 25 | 25 | 150 | 25 | 25 | 45,0 | **4,0** | **18** | GCM □40○○-□□ | | | |
| GNDM R/L 2525 M 518 | ● | ● | 25 | 25 | 150 | 25 | 25 | 45,0 | **5,0** | **18** | GCM N50○○-□□ | | | |
| GNDM R/L 2525 M 618 | ● | ● | 25 | 25 | 150 | 25 | 25 | 45,0 | **6,0** | **18** | GCM N60○○-□□ | | | |
| GNDM R/L 3225 P 312 | ○ | ○ | 32 | 25 | 170 | 25 | 32 | 36,6 | **3,0** | **12** | GCM □30○○-□□ | | | |
| GNDM R/L 3225 P 418 | ○ | ○ | 32 | 25 | 170 | 25 | 32 | 45,0 | **4,0** | **18** | GCM □40○○-□□ | | | |
| GNDM R/L 3225 P 518 | ○ | ○ | 32 | 25 | 170 | 25 | 32 | 45,0 | **5,0** | **18** | GCM N50○○-□□ | | | |
| GNDM R/L 3225 P 618 | ○ | ○ | 32 | 25 | 170 | 25 | 32 | 45,0 | **6,0** | **18** | GCM N60○○-□□ | | | |
| GNDM R/L 3225 P 718 | ○ | ○ | 32 | 25 | 170 | 25 | 32 | 50,0 | **7,0** | **18** | GCM N70○○-□□ | | | |
| GNDM R/L 3225 P 818 | ○ | ○ | 32 | 25 | 170 | 25 | 32 | 50,0 | **8,0** | **18** | GCM N80○○-□□ | | | |
| GNDM R/L 3232 P 312 | ● | ● | 32 | 32 | 170 | 32 | 32 | 36,6 | **3,0** | **12** | GCM □30○○-□□ | BX0520 | 6,0 | LH050 |
| GNDM R/L 3232 P 418 | ● | ● | 32 | 32 | 170 | 32 | 32 | 45,0 | **4,0** | **18** | GCM □40○○-□□ | | | |
| GNDM R/L 3232 P 518 | ● | ● | 32 | 32 | 170 | 32 | 32 | 45,0 | **5,0** | **18** | GCM N50○○-□□ | | | |
| GNDM R/L 3232 P 618 | ● | ● | 32 | 32 | 170 | 32 | 32 | 45,0 | **6,0** | **18** | GCM N60○○-□□ | | | |
| GNDM R/L 3232 P 718 | ● | ● | 32 | 32 | 170 | 32 | 32 | 50,0 | **7,0** | **18** | GCM N70○○-□□ | | | |
| GNDM R/L 3232 P 818 | ● | ● | 32 | 32 | 170 | 32 | 32 | 50,0 | **8,0** | **18** | GCM N80○○-□□ | | | |

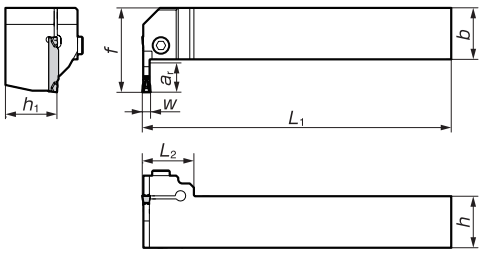
Select holders and inserts with the same grooving width (*w*).

## External L-Styled (Side Cut) Multi-Purpose Type (Grooving, Turning, Copying)

**GNDMS**
External Grooving



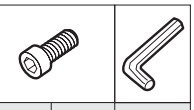
New




Use the multi-purpose copying insert for turning (wide grooves).

Above figures show right hand tools.

### Spare Parts



### Holders

| Cat. No. | Stock | | Dimensions (mm) | | | | | | Grooving Width (mm) | Max. Groov. Depth (mm) | Applicable Insert | Cap Screw | Torque (N·m) | Spanner |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | R | L | *h* | *b* | $L_1$ | *f* | $h_1$ | $L_2$ | *w* | $a_r$ | | | | |
| GNDMS R/L 2020 K 312 | ● | ● | 20 | 20 | 125 | 32 | 20 | 25 | **3,0** | **10** | GCM □30○○-□□ | BX0520 | 5,0 | LH040 |
| GNDMS R/L 2020 K 412 | ● | ● | 20 | 20 | 125 | 34 | 20 | 25 | **4,0** | **12** | GCM □40○○-□□ | | | |
| GNDMS R/L 2020 K 512 | ● | ● | 20 | 20 | 125 | 34 | 20 | 25 | **5,0** | **12** | GCM N50○○-□□ | | | |
| GNDMS R/L 2525 M 312 | ● | ● | 25 | 25 | 150 | 39 | 25 | 25 | **3,0** | **12** | GCM □30○○-□□ | | | |
| GNDMS R/L 2525 M 414 | ● | ● | 25 | 25 | 150 | 41 | 25 | 25 | **4,0** | **14** | GCM □40○○-□□ | | | |
| GNDMS R/L 2525 M 514 | ● | ● | 25 | 25 | 150 | 41 | 25 | 25 | **5,0** | **14** | GCM N50○○-□□ | | | |
| GNDMS R/L 2525 M 614 | ● | ● | 25 | 25 | 150 | 41 | 25 | 25 | **6,0** | **14** | GCM N60○○-□□ | | | |

Select holders and inserts with the same grooving width (*w*).



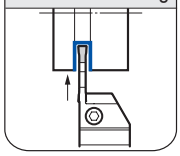


● = Euro stock
○ = Delivery on request

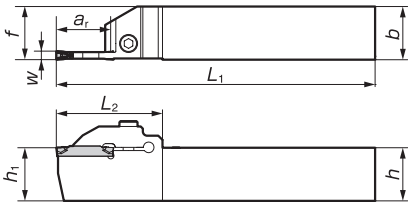
Packing unit and ordering example; 1 pce GNDM-R 2020 K 312 ( R: right handed )

## External Deep Grooving and Cut-Off

**GNDL**
External Grooving



New




Above figures show right hand tools.

### Spare Parts



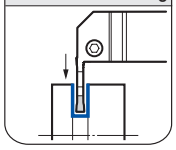

### Holders

| Cat. No. | Stock | | Dimensions (mm) | | | | | | Grooving Width (mm) | Max. Groov. Depth (mm) | Applicable Insert | Cap Screw | Torque (N·m) | Span-ner |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | R | L | *h* | *b* | $L_1$ | *f* | $h_1$ | $L_2$ | *w* | $a_r$ | | | | |
| GNDL R/L 2020 K 220 | ● | ● | 20 | 20 | 125 | 20 | 20 | 44,5 | **2,0** | **20** | GCM □20○○-□□ | BX0520 | 5,0 | LH040 |
| GNDL R/L 2020 K 320 | ● | ● | 20 | 20 | 125 | 20 | 20 | 44,5 | **3,0** | **20**(18) | GCM □30○○-□□ | | | |
| GNDL R/L 2020 K 425 | ● | ● | 20 | 20 | 125 | 20 | 20 | 50,0 | **4,0** | **25**(23) | GCM □40○○-□□ | | | |
| GNDL R/L 2020 K 525 | ● | ● | 20 | 20 | 125 | 20 | 20 | 50,0 | **5,0** | **25**(23) | GCM N50○○-□□ | | | |
| GNDL R/L 2020 K 625 | ● | ● | 20 | 20 | 125 | 20 | 20 | 50,0 | **6,0** | **25**(23) | GCM N60○○-□□ | | | |
| GNDL R/L 2525 M 220 | ● | ● | 25 | 25 | 150 | 25 | 25 | 44,5 | **2,0** | **20** | GCM □20○○-□□ | | | |
| GNDL R/L 2525 M 320 | ● | ● | 25 | 25 | 150 | 25 | 25 | 44,5 | **3,0** | **20**(18) | GCM □30○○-□□ | | | |
| GNDL R/L 2525 M 425 | ● | ● | 25 | 25 | 150 | 25 | 25 | 50,0 | **4,0** | **25**(23) | GCM □40○○-□□ | | | |
| GNDL R/L 2525 M 525 | ● | ● | 25 | 25 | 150 | 25 | 25 | 50,0 | **5,0** | **25**(23) | GCM N50○○-□□ | | | |
| GNDL R/L 2525 M 625 | ● | ● | 25 | 25 | 150 | 25 | 25 | 50,0 | **6,0** | **25**(23) | GCM N60○○-□□ | | | |
| GNDL R/L 3225 P 320 | ○ | ○ | 32 | 25 | 170 | 25 | 32 | 44,5 | **3,0** | **20**(18) | GCM □30○○-□□ | | | |
| GNDL R/L 3225 P 425 | ○ | ○ | 32 | 25 | 170 | 25 | 32 | 50,0 | **4,0** | **25**(23) | GCM □40○○-□□ | | | |
| GNDL R/L 3225 P 525 | ○ | ○ | 32 | 25 | 170 | 25 | 32 | 50,0 | **5,0** | **25**(23) | GCM N50○○-□□ | | | |
| GNDL R/L 3225 P 625 | ○ | ○ | 32 | 25 | 170 | 25 | 32 | 50,0 | **6,0** | **25**(23) | GCM N60○○-□□ | | | |
| GNDL R/L 3225 P 725 | ○ | ○ | 32 | 25 | 170 | 25 | 32 | 50,0 | **7,0** | **25**(23) | GCM N70○○-□□ | | | |
| GNDL R/L 3225 P 825 | ○ | ○ | 32 | 25 | 170 | 25 | 32 | 50,0 | **8,0** | **25**(23) | GCM N80○○-□□ | | | |
| GNDL R/L 3232 P 320 | ● | ● | 32 | 32 | 170 | 32 | 32 | 44,5 | **3,0** | **20**(18) | GCM □30○○-□□ | BX0620 | 6,0 | LH050 |
| GNDL R/L 3232 P 425 | ● | ● | 32 | 32 | 170 | 32 | 32 | 50,0 | **4,0** | **25**(23) | GCM □40○○-□□ | | | |
| GNDL R/L 3232 P 525 | ● | ● | 32 | 32 | 170 | 32 | 32 | 50,0 | **5,0** | **25**(23) | GCM N50○○-□□ | | | |
| GNDL R/L 3232 P 625 | ● | ● | 32 | 32 | 170 | 32 | 32 | 50,0 | **6,0** | **25**(23) | GCM N60○○-□□ | | | |
| GNDL R/L 3232 P 725 | ● | ● | 32 | 32 | 170 | 32 | 32 | 50,0 | **7,0** | **25**(23) | GCM N70○○-□□ | | | |
| GNDL R/L 3232 P 825 | ● | ● | 32 | 32 | 170 | 32 | 32 | 50,0 | **8,0** | **25**(23) | GCM N80○○-□□ | | | |

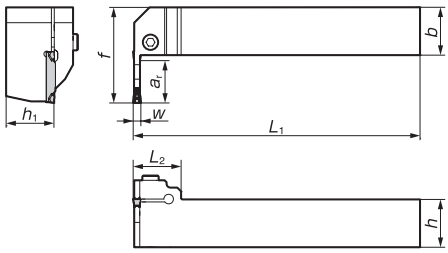
Select holders and inserts with the same grooving width (*w*). Dimensions in parentheses are for applications that use copying inserts (RG type breakers).

## External L-Styled (Side Cut) Grooving

**GNDLS**
External Grooving



New




Above figures show right hand tools.

### Spare Parts




### Holders

| Cat. No. | Stock | | Dimensions (mm) | | | | | | Grooving Width (mm) | Max. Groov. Depth (mm) | Applicable Insert | Cap Screw | Torque (N·m) | Span-ner |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | R | L | *h* | *b* | $L_1$ | *f* | $h_1$ | $L_2$ | *w* | $a_r$ | | | | |
| GNDLS R/L 2020 K 216 | ● | ● | 20 | 20 | 125 | 38 | 20 | 25 | **2,0** | **16** | GCM □20○○-□□ | BX0520 | 5,0 | LH040 |
| GNDLS R/L 2020 K 316 | ● | ● | 20 | 20 | 125 | 38 | 20 | 25 | **3,0** | **16** | GCM □30○○-□□ | | | |
| GNDLS R/L 2525 M 218 | ● | ● | 25 | 25 | 150 | 45 | 25 | 25 | **2,0** | **18** | GCM □20○○-□□ | | | |
| GNDLS R/L 2525 M 318 | ● | ● | 25 | 25 | 150 | 45 | 25 | 25 | **3,0** | **18** | GCM □30○○-□□ | | | |
| GNDLS R/L 2525 M 423 | ● | ● | 25 | 25 | 150 | 50 | 25 | 25 | **4,0** | **23** | GCM □40○○-□□ | | | |
| GNDLS R/L 2525 M 523 | ● | ● | 25 | 25 | 150 | 50 | 25 | 25 | **5,0** | **23** | GCM N50○○-□□ | | | |
| GNDLS R/L 2525 M 623 | ● | ● | 25 | 25 | 150 | 50 | 25 | 25 | **6,0** | **23** | GCM N60○○-□□ | | | |

Select holders and inserts with the same grooving width (*w*).

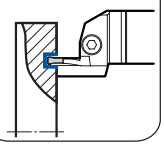
● = Euro stock
○ = Delivery on request

Packing unit and ordering example; 1 pce GNDL-R 2020 K 220 ( R: right handed )

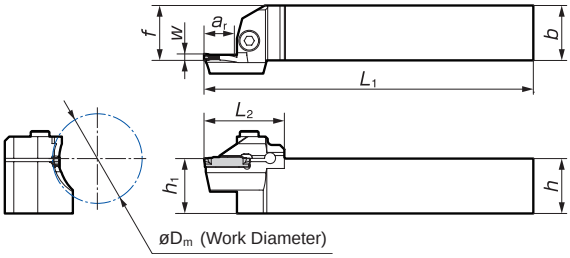
# GND Type

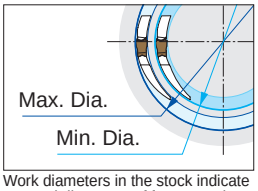
## Face Grooving

**GNDF**
Face Grooving



New




Work diameters in the stock indicate external diameters of face grooving.

Above figures show right hand tools.

## ■ Holders

## ■ Spare Parts




| Cat. No. | Stock | | Dimensions (mm) | | | | | | Work Dia. (mm) | Groov. Width (mm) | Max. Cut-off Dia. (mm) | Applicable Insert | Cap Screw | Tor-que (N·m) | Spanner |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | R | L | *h* | *b* | $L_1$ | *f* | $h_1$ | $L_2$ | ØD$_m$ | *w* | $a_r$ | | | | |
| GNDF R/L 2020 K 312-035 | ● | ● | 20 | 20 | 125 | 20 | 20 | 35,6 | 35 ~ 45 | **3,0** | **12** | GCM N30○○-□□ | BX0520 | 5,0 | LH040 |
| GNDF R/L 2020 K 312-040 | ● | ● | 20 | 20 | 125 | 20 | 20 | 35,6 | 40 ~ 55 | **3,0** | **12** | | | | |
| GNDF R/L 2020 K 318-050 | ● | ● | 20 | 20 | 125 | 20 | 20 | 41,6 | 50 ~ 70 | **3,0** | **18** | | | | |
| GNDF R/L 2020 K 318-065 | ● | ● | 20 | 20 | 125 | 20 | 20 | 41,6 | 65 ~ 100 | **3,0** | **18** | | | | |
| GNDF R/L 2020 K 318-090 | ● | ● | 20 | 20 | 125 | 20 | 20 | 41,6 | 90 ~ 150 | **3,0** | **18** | | | | |
| GNDF R/L 2020 K 318-140 | ● | ● | 20 | 20 | 125 | 20 | 20 | 41,6 | 140 ~ 200 | **3,0** | **18** | | | | |
| GNDF R/L 2020 K 318-180 | ● | ● | 20 | 20 | 125 | 20 | 20 | 41,6 | 180 ~ 300 | **3,0** | **18** | | | | |
| GNDF R/L 2020 K 418-040 | ● | ● | 20 | 20 | 125 | 20 | 20 | 41,6 | 40 ~ 55 | **4,0** | **18** | GCM N40○○-□□ | BX0520 | 5,0 | LH040 |
| GNDF R/L 2020 K 423-050 | ● | ● | 20 | 20 | 125 | 20 | 20 | 46,6 | 50 ~ 70 | **4,0** | **23** | | | | |
| GNDF R/L 2020 K 423-065 | ● | ● | 20 | 20 | 125 | 20 | 20 | 46,6 | 65 ~ 90 | **4,0** | **23** | | | | |
| GNDF R/L 2020 K 423-085 | ● | ● | 20 | 20 | 125 | 20 | 20 | 46,6 | 85 ~ 130 | **4,0** | **23** | | | | |
| GNDF R/L 2020 K 423-125 | ● | ● | 20 | 20 | 125 | 20 | 20 | 46,6 | 125 ~ 200 | **4,0** | **23** | | | | |
| GNDF R/L 2020 K 423-180 | ● | ● | 20 | 20 | 125 | 20 | 20 | 46,6 | 180 ~ 300 | **4,0** | **23** | | | | |
| GNDF R/L 2020 K 423-280 | ● | ● | 20 | 20 | 125 | 20 | 20 | 46,6 | 280 ~ 1000 | **4,0** | **23** | | | | |
| GNDF R/L 2020 K 523-050 | ● | ● | 20 | 20 | 125 | 20 | 20 | 46,6 | 50 ~ 70 | **5,0** | **23** | GCM N50○○-□□ | BX0520 | 5,0 | LH040 |
| GNDF R/L 2020 K 523-065 | ● | ● | 20 | 20 | 125 | 20 | 20 | 46,6 | 65 ~ 90 | **5,0** | **23** | | | | |
| GNDF R/L 2020 K 523-085 | ● | ● | 20 | 20 | 125 | 20 | 20 | 46,6 | 85 ~ 130 | **5,0** | **23** | | | | |
| GNDF R/L 2020 K 523-125 | ● | ● | 20 | 20 | 125 | 20 | 20 | 46,6 | 125 ~ 200 | **5,0** | **23** | | | | |
| GNDF R/L 2020 K 523-180 | ● | ● | 20 | 20 | 125 | 20 | 20 | 46,6 | 180 ~ 300 | **5,0** | **23** | | | | |
| GNDF R/L 2020 K 523-280 | ● | ● | 20 | 20 | 125 | 20 | 20 | 46,6 | 280 ~ 1000 | **5,0** | **23** | | | | |
| GNDF R/L 2020 K 623-050 | ● | ● | 20 | 20 | 125 | 20 | 20 | 46,6 | 50 ~ 75 | **6,0** | **23** | GCM N60○○-□□ | BX0520 | 5,0 | LH040 |
| GNDF R/L 2020 K 623-070 | ● | ● | 20 | 20 | 125 | 20 | 20 | 46,6 | 70 ~ 110 | **6,0** | **23** | | | | |
| GNDF R/L 2020 K 623-100 | ● | ● | 20 | 20 | 125 | 20 | 20 | 46,6 | 100 ~ 200 | **6,0** | **23** | | | | |
| GNDF R/L 2020 K 623-180 | ● | ● | 20 | 20 | 125 | 20 | 20 | 46,6 | 180 ~ 300 | **6,0** | **23** | | | | |
| GNDF R/L 2020 K 623-280 | ● | ● | 20 | 20 | 125 | 20 | 20 | 46,6 | 280 ~ 1000 | **6,0** | **23** | | | | |
| GNDF R/L 2525 M 312-035 | ● | ● | 25 | 25 | 150 | 25 | 25 | 35,6 | 35 ~ 45 | **3,0** | **12** | GCM N30○○-□□ | BX0520 | 5,0 | LH040 |
| GNDF R/L 2525 M 312-040 | ● | ● | 25 | 25 | 150 | 25 | 25 | 35,6 | 40 ~ 55 | **3,0** | **12** | | | | |
| GNDF R/L 2525 M 318-050 | ● | ● | 25 | 25 | 150 | 25 | 25 | 41,6 | 50 ~ 70 | **3,0** | **18** | | | | |
| GNDF R/L 2525 M 318-065 | ● | ● | 25 | 25 | 150 | 25 | 25 | 41,6 | 65 ~ 100 | **3,0** | **18** | | | | |
| GNDF R/L 2525 M 318-090 | ● | ● | 25 | 25 | 150 | 25 | 25 | 41,6 | 90 ~ 150 | **3,0** | **18** | | | | |
| GNDF R/L 2525 M 318-140 | ● | ● | 25 | 25 | 150 | 25 | 25 | 41,6 | 140 ~ 200 | **3,0** | **18** | | | | |
| GNDF R/L 2525 M 318-180 | ● | ● | 25 | 25 | 150 | 25 | 25 | 41,6 | 180 ~ 300 | **3,0** | **18** | | | | |
| GNDF R/L 2525 M 418-040 | ● | ● | 25 | 25 | 150 | 25 | 25 | 41,6 | 40 ~ 55 | **4,0** | **18** | GCM N40○○-□□ | BX0520 | 5,0 | LH040 |
| GNDF R/L 2525 M 423-050 | ● | ● | 25 | 25 | 150 | 25 | 25 | 46,6 | 50 ~ 70 | **4,0** | **23** | | | | |
| GNDF R/L 2525 M 423-065 | ● | ● | 25 | 25 | 150 | 25 | 25 | 46,6 | 65 ~ 90 | **4,0** | **23** | | | | |
| GNDF R/L 2525 M 423-085 | ● | ● | 25 | 25 | 150 | 25 | 25 | 46,6 | 85 ~ 130 | **4,0** | **23** | | | | |
| GNDF R/L 2525 M 423-125 | ● | ● | 25 | 25 | 150 | 25 | 25 | 46,6 | 125 ~ 200 | **4,0** | **23** | | | | |
| GNDF R/L 2525 M 423-180 | ● | ● | 25 | 25 | 150 | 25 | 25 | 46,6 | 180 ~ 300 | **4,0** | **23** | | | | |
| GNDF R/L 2525 M 423-280 | ● | ● | 25 | 25 | 150 | 25 | 25 | 46,6 | 280 ~ 1000 | **4,0** | **23** | | | | |
| GNDF R/L 2525 M 523-050 | ● | ● | 25 | 25 | 150 | 25 | 25 | 46,6 | 50 ~ 70 | **5,0** | **23** | GCM N50○○-□□ | BX0520 | 5,0 | LH040 |
| GNDF R/L 2525 M 523-065 | ● | ● | 25 | 25 | 150 | 25 | 25 | 46,6 | 65 ~ 90 | **5,0** | **23** | | | | |
| GNDF R/L 2525 M 523-085 | ● | ● | 25 | 25 | 150 | 25 | 25 | 46,6 | 85 ~ 130 | **5,0** | **23** | | | | |
| GNDF R/L 2525 M 523-125 | ● | ● | 25 | 25 | 150 | 25 | 25 | 46,6 | 125 ~ 200 | **5,0** | **23** | | | | |
| GNDF R/L 2525 M 523-180 | ● | ● | 25 | 25 | 150 | 25 | 25 | 46,6 | 180 ~ 300 | **5,0** | **23** | | | | |
| GNDF R/L 2525 M 523-280 | ● | ● | 25 | 25 | 150 | 25 | 25 | 46,6 | 280 ~ 1000 | **5,0** | **23** | | | | |
| GNDF R/L 2525 M 623-050 | ● | ● | 25 | 25 | 150 | 25 | 25 | 46,6 | 50 ~ 75 | **6,0** | **23** | GCM N60○○-□□ | BX0520 | 5,0 | LH040 |
| GNDF R/L 2525 M 623-070 | ● | ● | 25 | 25 | 150 | 25 | 25 | 46,6 | 70 ~ 110 | **6,0** | **23** | | | | |
| GNDF R/L 2525 M 623-100 | ● | ● | 25 | 25 | 150 | 25 | 25 | 46,6 | 100 ~ 200 | **6,0** | **23** | | | | |
| GNDF R/L 2525 M 623-180 | ● | ● | 25 | 25 | 150 | 25 | 25 | 46,6 | 180 ~ 300 | **6,0** | **23** | | | | |
| GNDF R/L 2525 M 623-280 | ● | ● | 25 | 25 | 150 | 25 | 25 | 46,6 | 280 ~ 1000 | **6,0** | **23** | | | | |

Select holders and inserts with the same grooving width (*w*).



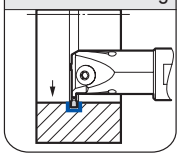


● = Euro stock

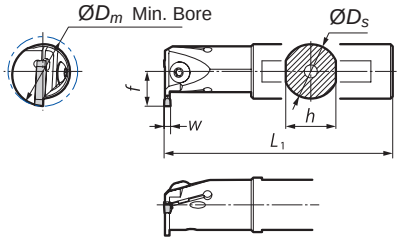
Packing unit and ordering example; 1 pce GNDF-R 2020 K 312-035 ( R: right handed )

## Internal Grooving

**GNDI**
Internal Grooving



New




Above figures show right hand tools.

### ■ Spare Parts




### ■ Holders

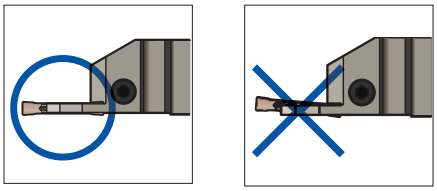
| Cat. No. | Stock | | Dimensions (mm) | | | | Min. Bore (mm) | Groov. Width (mm) | Max. Groov. Depth (mm) | Applicable Insert | Cap Screw | Tor-que (N·m) | Spanner |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | R | L | $ØD_s$ | $h$ | $L_1$ | $f$ | $ØD_m$ | $w$ | $a_r$ | | | | |
| GNDI R/L 2532 T 206 | ● | ● | 25 | 23 | 200 | 16 | 32 | **2,0** | **6** | GCM N20○○-□□ | BH0516 | 5,0 | LH030 |
| GNDI R/L 3240 T 210 | ● | ● | 32 | 30 | 250 | 26 | 40 | **2,0** | **10** | GCM N20○○-□□ | BH0616 | 6,0 | LH040 |
| GNDI R/L 2532 T 306 | ● | ● | 25 | 23 | 200 | 16 | 32 | **3,0** | **6** | GCM N30○○-□□ | BH0516 | 5,0 | LH030 |
| GNDI R/L 3240 T 310 | ● | ● | 32 | 30 | 250 | 26 | 40 | **3,0** | **10** | GCM N30○○-□□ | BH0616 | 6,0 | LH040 |
| GNDI R/L 4050 T 311 | ● | ● | 40 | 38 | 300 | 31 | 50 | **3,0** | **11** | GCM N30○○-□□ | | | |
| GNDI R/L 2532 T 406 | ● | ● | 25 | 23 | 200 | 19 | 32 | **4,0** | **6** | GCM N40○○-□□ | BH0516 | 5,0 | LH030 |
| GNDI R/L 3240 T 410 | ● | ● | 32 | 30 | 250 | 26 | 40 | **4,0** | **10** | GCM N40○○-□□ | BH0616 | 6,0 | LH040 |
| GNDI R/L 4050 T 411 | ● | ● | 40 | 38 | 300 | 31 | 50 | **4,0** | **11** | GCM N40○○-□□ | | | |
| GNDI R/L 2532 T 506 | ● | ● | 25 | 23 | 200 | 19 | 32 | **5,0** | **6** | GCM N50○○-□□ | BH0516 | 5,0 | LH030 |
| GNDI R/L 3240 T 510 | ● | ● | 32 | 30 | 250 | 26 | 40 | **5,0** | **10** | GCM N50○○-□□ | BH0616 | 6,0 | LH040 |
| GNDI R/L 4050 T 511 | ● | ● | 40 | 38 | 300 | 31 | 50 | **5,0** | **11** | GCM N50○○-□□ | | | |
| GNDI R/L 4050 T 611 | ● | ● | 40 | 38 | 300 | 31 | 50 | **6,0** | **11** | GCM N60○○-□□ | BH0616 | 6,0 | LH040 |

Select holders and inserts with the same grooving width (*w*).

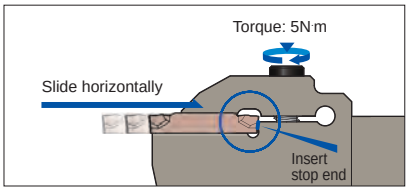
### ■ Notes on how to Attach Inserts

① Remove any foreign particles or oil from the insert seat before attaching the insert.
② Ensure the seat location is clean and free of damage.
③ Slide the insert level over its seat.
④ Push the insert with its opposite end (the holder side) firmly against the insert stop end.
⑤ The recommended tightening torque is 5N·m. Tightening above the recommended torque may damage the insert or the holder which could cause injury and other accidents.

③ Attach insert on the seat flat.



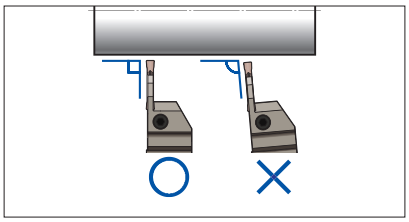
④ Push insert fully into place.



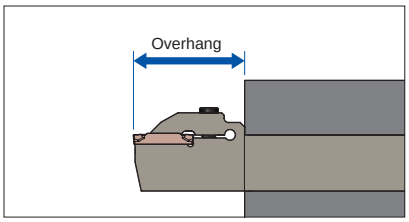

### ■ Notes on how to Apply Holders

① Remove any foreign particles or oil from the tool post before attaching the holder.
② Ensure the seat location is clean and free of damage.
③ Attach the holder so that the insert is perpendicular to the workpiece.
④ Set holder with shortest possible overhang.

③ Attach at right angle to workpiece.



④ Set with short overhang.

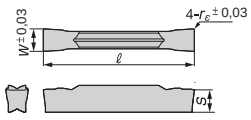


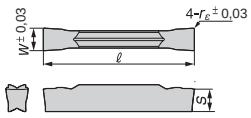

● = Euro stock  Packing unit and ordering example; 1 pce GNDI-R 2532 T 206 ( R: right handed )

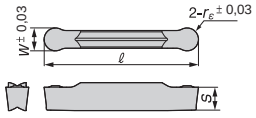
# GND Type

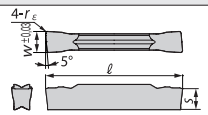
New

## ■ Inserts – GCM Type

| Grooving / Turning | Shape | Cat. No. | Coated Carbide | | Dimensions (mm) | | | | Pcs./ Pack. | Fig. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | AC530U | AC830P | W | $r_\varepsilon$ | ℓ | s | | |
| Fig.1  | **MG** Breaker General Type  | GCM N3004 MG | ● | ● | **3,0** | 0,4 | 21,1 | 3,8 | 5 | 1 |
| | | GCM N4008 MG | ● | ● | **4,0** | 0,8 | 26,4 | 4,0 | | |
| | | GCM N5008 MG | ● | ● | **5,0** | 0,8 | 26,4 | 4,1 | | |
| | | GCM N6008 MG | ● | ● | **6,0** | 0,8 | 26,4 | 4,5 | | |
| | | GCM N7008 MG | ● | ● | **7,0** | 0,8 | 28,75 | 5,5 | | |
| | | GCM N8008 MG | ● | ● | **8,0** | 0,8 | 28,75 | 6,0 | | |
| | **ML** Breaker Low Feed Type  | GCM N3002 ML | ● | ● | **3,0** | 0,2 | 21,1 | 3,8 | 5 | 1 |
| | | GCM N4004 ML | ● | ● | **4,0** | 0,4 | 26,4 | 4,0 | | |
| | | GCM N5004 ML | ● | ● | **5,0** | 0,4 | 26,4 | 4,1 | | |
| | | GCM N6004 ML | ● | ● | **6,0** | 0,4 | 26,4 | 4,5 | | |
| | | GCM N7004 ML | ● | ● | **7,0** | 0,4 | 28,75 | 5,5 | | |
| | | GCM N8004 ML | ● | ● | **8,0** | 0,4 | 28,75 | 6,0 | | |

| Grooving / Cut-Off | Shape | Cat. No. | Coated Carbide | | Dimensions (mm) | | | | Pcs./ Pack. | Fig. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | AC530U | AC830P | W | $r_\varepsilon$ | ℓ | s | | |
| Fig.1  | **GG** Breaker General Type  | GCM N2002 GG | ● | ● | **2,0** | 0,2 | 21,1 | 3,6 | 5 | 1 |
| | | GCM N3002 GG | ● | ● | **3,0** | 0,2 | 21,1 | 3,8 | | |
| | | GCM N4002 GG | ● | ● | **4,0** | 0,2 | 26,4 | 4,0 | | |
| | | GCM N5002 GG | ● | ● | **5,0** | 0,2 | 26,4 | 4,1 | | |
| | | GCM N6002 GG | ● | ● | **6,0** | 0,2 | 26,4 | 4,5 | | |
| | | GCM N3004 GG | ● | ● | **3,0** | 0,4 | 21,1 | 3,8 | 5 | |
| | | GCM N4004 GG | ● | ● | **4,0** | 0,4 | 26,4 | 4,0 | | |
| | | GCM N5004 GG | ● | ● | **5,0** | 0,4 | 26,4 | 4,1 | | |
| | | GCM N6004 GG | ● | ● | **6,0** | 0,4 | 26,4 | 4,5 | | |
| | | GCM N7004 GG | ● | ● | **7,0** | 0,4 | 28,75 | 5,5 | | |
| | | GCM N8004 GG | ● | ● | **8,0** | 0,4 | 28,75 | 6,0 | | |
| | **GL** Breaker Low Feed Type  | GCM N2002 GL | ● | ● | **2,0** | 0,2 | 21,1 | 3,6 | 5 | 1 |
| | | GCM N3002 GL | ● | ● | **3,0** | 0,2 | 21,1 | 3,8 | | |
| | | GCM N4002 GL | ● | ● | **4,0** | 0,2 | 26,4 | 4,0 | | |
| | | GCM N5002 GL | ● | ● | **5,0** | 0,2 | 26,4 | 4,1 | | |
| | | GCM N6002 GL | ● | ● | **6,0** | 0,2 | 26,4 | 4,5 | | |
| | | GCM N7004 GL | ● | ● | **7,0** | 0,4 | 28,75 | 5,5 | | |
| | | GCM N8004 GL | ● | ● | **8,0** | 0,4 | 28,75 | 6,0 | | |

| Copying | Shape | Cat. No. | Coated Carbide | | Dimensions (mm) | | | | Pcs./ Pack. | Fig. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | AC530U | AC830P | W | $r_\varepsilon$ | ℓ | s | | |
| Fig.2  | **RG** Breaker General Type  | GCM N3015 RG | ● | ● | **3,0** | 1,5 | 21,1 | 3,8 | 5 | 2 |
| | | GCM N4020 RG | ● | ● | **4,0** | 2,0 | 26,4 | 4,0 | | |
| | | GCM N5025 RG | ● | ● | **5,0** | 2,5 | 27,2 | 4,1 | | |
| | | GCM N6030 RG | ● | ● | **6,0** | 3,0 | 27,5 | 4,5 | | |
| | | GCM N7035 RG | ● | ● | **7,0** | 3,5 | 29,05 | 5,5 | | |
| | | GCM N8040 RG | ● | ● | **8,0** | 4,0 | 29,05 | 6,0 | | |

| Cut-Off (Handed) | Shape | Cat. No. | Coated Carbide | | Dimensions (mm) | | | | Pcs./ Pack. | Fig. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | AC530U | AC830P | W | $r_\varepsilon$ | ℓ | s | | |
| Fig.3  | **CG** Breaker General Type  | GCM R/L2002 CG05 | ● | ● | **2,0** | 0,2 | 21,1 | 3,6 | 5 | 3 |
| | | GCM R/L3002 CG05 | ● | ● | **3,0** | 0,2 | 21,1 | 3,8 | | |
| | | GCM R/L4002 CG05 | ● | ● | **4,0** | 0,2 | 26,4 | 4,0 | | |

Drawing shows a right hand tool.

## ■ Recommended Cutting Conditions

| Work Material | P Free Cutting Steel | | P Carbon Steel/Alloy Steel | | K Cast Iron | | M Stainless Steel | | N Brass | |
|---|---|---|---|---|---|---|---|---|---|---|
| Coated Carbide | **AC530U** | **AC830P** | **AC530U** | **AC830P** | **AC530U** | **AC830P** | **AC530U** | **AC830P** | **AC530U** | **AC830P** |
| Cutting Speed (m/min) | 50 ~ 200 | 80 ~ 200 | 50 ~ 200 | 80 ~ 200 | 50 ~ 200 | 80 ~ 200 | 50 ~ 150 | 70 ~ 150 | 70 ~ 300 | - |





● = Euro stock

Packing unit and ordering example; 10 pcs GCM N3004 MG, AC530U ( R: right handed )

## ■ Identification Details – Holders

**G N D M R 25 25 M - 3 12 (-035)**

① Series Symbol: GND
② Application: Chart 2
③ Holder Design: Chart 3
④ Shank Height: Chart 4
⑤ Shank Width: Chart 5
⑥ Shank Length: Chart 6
⑦ Insert Width: Chart 7
⑧ Max. Grooving Depth: Chart 8
⑨ Min. Machining Dia.: (mm)

| ② Application | |
|---|---|
| Symbol | Application |
| **M** | External Multi-Purpose (Grooving / Turning / Copying) |
| L | External Deep Grooving / Cut-Off |
| MS | External L-Styled (Side Cut) Multi-Purpose (Grooving / Turning / Copying) |
| LS | External L-Styled (Side Cut) Deep Grooving |
| I | Internal Multi-Purpose (Grooving / Turning / Copying) |
| F | Face Grooving |

| ③ Holder Design | |
|---|---|
| Symbol | Direction |
| **R** | Right |
| L | Left |

| ④ Shank Height | |
|---|---|
| Symbol | Height (mm) |
| 20 | 20 |
| **25** | 25 |
| **32** | 32 |

| ⑤ Shank Width | |
|---|---|
| Symbol | Width (mm) |
| 20 | 20 |
| **25** | 25 |
| **32** | 32 |

| ⑥ Shank Length | |
|---|---|
| Symbol | Length (mm) |
| K | 125 |
| **M** | 150 |
| **P** | 170 |

| ⑦ Insert Width | |
|---|---|
| Symbol | Groov. Width (mm) |
| 2 | 2,0 |
| **3** | 3,0 |
| 4 | 4,0 |
| 5 | 5,0 |
| 6 | 6,0 |
| 7 | 7,0 |
| 8 | 8,0 |

| ⑧ Max. Grooving Depth | |
|---|---|
| Symbol | Groov. Depth (mm) |
| **10** | 10 |
| **12** | 12 |
| 18 | 18 |
| 20 | 20 |
| 23 | 23 |
| 25 | 25 |

To ensure maximum rigidity, use the multi-purpose type holder to machine the maximum grooving depth.

## ■ Identification Details – Inserts

**G C M N 30 02 - G G**

① Series Symbol: **G**rooving
② Front Relief Angle: **C**: 7°
③ Tolerance: **M** Class
④ Insert Design

| Symbol | Direction |
|---|---|
| **N** | Neutral |
| R | Right Hand |
| L | Left Hand |

⑤ Insert Width

| Symbol | Groov. Width (mm) |
|---|---|
| 20 | 2,0 |
| **30** | 3,0 |
| 40 | 4,0 |
| 50 | 5,0 |
| 60 | 6,0 |
| 70 | 7,0 |
| 80 | 8,0 |

⑥ Nose Radius

| Symbol | R (mm) |
|---|---|
| **02** | 0,2 |
| 04 | 0,4 |
| 08 | 0,8 |
| 15 | 1,5 |
| 20 | 2,0 |
| 25 | 2,5 |
| 30 | 3,0 |

⑦ Chipbreaker

| Symbol | Application |
|---|---|
| MG | Multi-Purpose: General Feed |
| ML | Multi-Purpose: Low Feed |
| **GG** | Grooving: General Feed |
| GL | Grooving: Low Feed |
| CG | Cut-Off |
| RG | Copying: General Feed |

# SumiTurn B-Groove Insert
# TGA-BF Type

Indexable insert grooving system with triangular inserts and integral chipbreaker for external and internal grooving



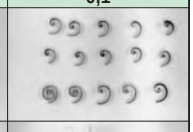
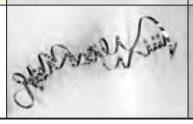
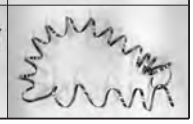
## Characteristics

- Outstanding chip control when grooving
- Excellent chip control when finishing wide grooves using axial feed
- Grooving inserts from 1,5mm - 4,5mm wide
- New grade **AC530U** with Super ZX ultra hard coating for Steels, Stainless Steels, and Non Ferrous metals increases productivity and extends tool life

## Performance

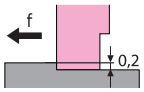
### Comparison of chip control

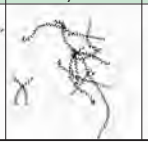
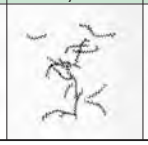
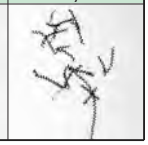
Insert: TGAR4200BF, Work material: 34CrMo4
Cutting data: vc = 120 m/min, Wet

| f (mm/rev) | 0,05 | 0,07 | 0,1 |
|---|---|---|---|
| B-Groove |  |  |  |
| Conventional insert with ground chipbreaker |  |  |  |

### Chip control whilst traversing

Insert: TGAR4200BF, Work material: 34CrMo4
Cutting data: vc = 120 m/min, Wet

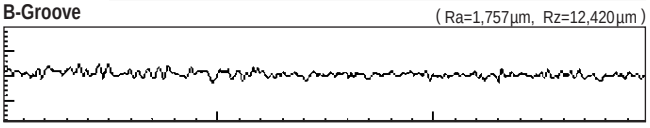



| f (mm/rev) | 0,03 | 0,05 | 0,07 | 0,1 |
|---|---|---|---|---|
| B-Groove |  |  |  |  |

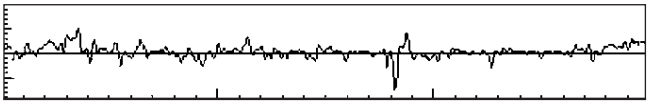
### Comparison of surface roughness along sidewall

Insert: TGAR4200BF, Work material: 34CrMo4
Cutting data: vc = 120 m/min, f = 0,07mm/rev, Wet

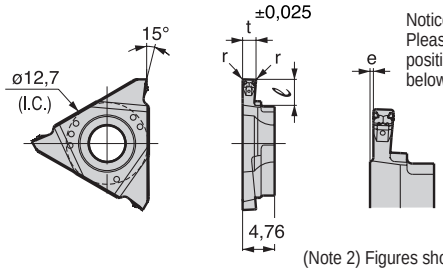
B-Groove ( Ra=1,757µm, Rz=12,420µm )



Conventional carbide insert ( Ra=3,488µm, Rz=20,598µm )



## Inserts



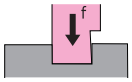

Notice:
Please note the cutting edge position e, for grooving widths below 1,85 mm..

(Note 2) Figures show right hand tools.

| Cat. No. | Coated AC530U R | Coated AC530U L | Dimensions (mm) ( ) in ℓ presents max. depth t | ℓ | r | e | Applicable holder & insert group |
|---|---|---|---|---|---|---|---|
| TGA R/L 4145BF | | | 1,45 | 2,5 (2,0) | 0,2 | 0,275 | ❶ |
| TGA R/L 4150BF | ● | ● | 1,50 | 3,9 External (3,5) Internal (2,5) | 0,2 | 0,250 | ❷ |
| TGA R/L 4165BF | ❍ | ❍ | 1,65 | 3,9 External (3,5) Internal (2,5) | 0,2 | 0,175 | ❷ |
| TGA R/L 4175BF | ❍ | ❍ | 1,75 | 3,9 External (3,5) Internal (2,5) | 0,2 | 0,125 | ❷ |
| TGA R/L 4185BF | ❍ | ❍ | 1,85 | 3,9 External (3,5) Internal (2,5) | 0,2 | 0,075 | ❷ |
| TGA R/L 4200BF | ● | ● | 2,00 | 3,9 External (3,5) Internal (2,5) | 0,2 | 0 | ❷ |
| TGA R/L 4220BF | ❍ | ❍ | 2,20 | 3,9 External (3,5) Internal (2,5) | 0,2 | 0 | ❷ |
| TGA R/L 4230BF | ❍ | ❍ | 2,30 | 3,9 External (3,5) Internal (2,5) | 0,2 | 0 | ❷ |
| TGA R/L 4250BF | ● | ● | 2,50 | 5,4 External (5,0) Internal (2,5) | 0,3 | 0 | ❸ |
| TGA R/L 4265BF | ❍ | ❍ | 2,65 | 5,4 External (5,0) Internal (2,5) | 0,3 | 0 | ❸ |
| TGA R/L 4270BF | ❍ | ❍ | 2,70 | 5,4 External (5,0) Internal (2,5) | 0,3 | 0 | ❸ |
| TGA R/L 4280BF | ❍ | ❍ | 2,80 | 5,4 External (5,0) Internal (2,5) | 0,3 | 0 | ❸ |
| TGA R/L 4300BF | ● | ● | 3,00 | 5,4 External (5,0) Internal (2,5) | 0,3 | 0 | ❸ |
| TGA R/L 4320BF | ❍ | ❍ | 3,20 | 5,4 External (5,0) Internal (2,5) | 0,3 | 0 | ❸ |
| TGA R/L 4330BF | ❍ | ❍ | 3,30 | 5,4 External (5,0) Internal (2,5) | 0,3 | 0 | ❸ |
| TGA R/L 4350BF | ● | ● | 3,50 | 5,4 External (5,0) Internal (2,5) | 0,3 | 0 | ❸ |
| TGA R/L 4370BF | ❍ | ❍ | 3,70 | 5,4 External (5,0) Internal (2,5) | 0,3 | 0 | ❸ |
| TGA R/L 4390BF | ❍ | ❍ | 3,90 | 5,4 External (5,0) Internal (2,5) | 0,3 | 0 | ❸ |
| TGA R/L 4400BF | ● | ● | 4,00 | 5,4 External (5,0) Internal (2,5) | 0,4 | 0 | ❸ |
| TGA R/L 4410BF | ❍ | ❍ | 4,10 | 5,4 External (5,0) Internal (2,5) | 0,4 | 0 | ❸ |
| TGA R/L 4420BF | ❍ | ❍ | 4,20 | 5,4 External (5,0) Internal (2,5) | 0,4 | 0 | ❸ |
| TGA R/L 4430BF | ❍ | ❍ | 4,30 | 5,4 External (5,0) Internal (2,5) | 0,4 | 0 | ❸ |
| TGA R/L 4440BF | ❍ | ❍ | 4,40 | 5,4 External (5,0) Internal (2,5) | 0,4 | 0 | ❸ |
| TGA R/L 4450BF | ● | ● | 4,50 | 5,4 External (5,0) Internal (2,5) | 0,4 | 0 | ❸ |

## Recommended Cutting Conditions

### Grooving

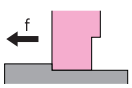



Wet condition is recommended.

| Work material | | General steel | | Stainless steel |
|---|---|---|---|---|
| Cutting speed (m/min) | | 50 ~ 180 | | 50 ~ 160 |
| Groove width (mm) | | 1,5~2,3 | 2,5~3,3 | 3,5~4,5 |
| Feed rate (mm/rev) | | 0,03~0,12 | 0,04~0,12 | 0,05~0,12 |
| Depth of cut (mm) | Ext. | ~3,5 | ~5,0 | ~5,0 |
| | Int. | ~2,5 | | |

### Axial Feed

Feed direction for Axial Feed




Wet condition is recommended.

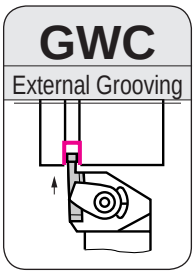
| Work material | General steel | | Stainless steel |
|---|---|---|---|
| Cutting speed (m/min) | 50 ~ 180 | | 50 ~ 160 |
| Feed rate (mm/rev) | 0,03~0,10 | 0,05~0,10 | 0,07~0,12 |
| Depth of cut (mm) | ~0,3 | ~0,5 | ~0,7 |

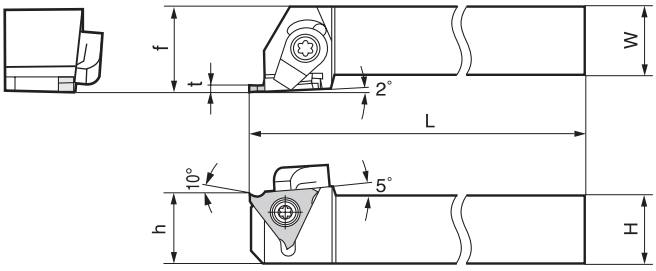
● = Euro stock
❍ = Delivery on request

Packing unit and ordering example; 10 pcs TGAR 2150BF, AC530U ( R: right handed )

## External Grooving

**GWC**
External Grooving






Figures show right hand tools.

### Holders

Right handed tool holders are used with **right** handed inserts (TGA-R), **left** handed clamp (CCM 8U-L) and **right** handed screw (WB8-22-T).

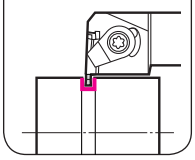
| Cat. No. | Stock R | Stock L | H | W | L | f | h | Grooving width t (mm) | Maximum Grooving Depth (mm) | Applicable Insert Group No. |
|---|---|---|---|---|---|---|---|---|---|---|
| **GWC** R/L **2020-15** | | | 20 | 20 | 125 | 25 | 20 | 1,25~1,45 | 2,0 | ❶ |
| **GWC** R/L **2020-25** | ● | ● | 20 | 20 | 125 | 25 | 20 | 1,50~2,30 | 3,5 | ❷ |
| **GWC** R/L **2020-35** | ● | ● | 20 | 20 | 125 | 25 | 20 | 2,50~4,80 | 5,0 | ❸ |
| **GWC** R/L **2525-15** | | | 25 | 25 | 150 | 30 | 25 | 1,25~1,45 | 2,0 | ❶ |
| **GWC** R/L **2525-25** | ● | ● | 25 | 25 | 150 | 30 | 25 | 1,50~2,30 | 3,5 | ❷ |
| **GWC** R/L **2525-35** | ● | ● | 25 | 25 | 150 | 30 | 25 | 2,50~4,80 | 5,0 | ❸ |

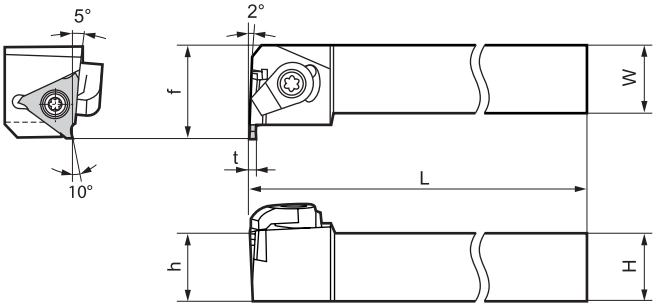
### Spare Parts



| Screw | Wrench | Clamp | Screw | Wrench |
|---|---|---|---|---|
| BFTX 0511N | TRX 20 | CCM 8U -L/R | WB 8-22 -T/TL | LT 27 |

**GWCS**
External Grooving






Figures show right hand tools.

### Holders

Right handed tool holders are used with **left** handed inserts (TGA-L), **right** handed clamp (CCM 8U-R) and **left** handed screw (WB8-22-TL).

| Cat. No. | Stock R | Stock L | H | W | L | f | h | Grooving width t (mm) | Maximum Grooving Depth (mm) | Applicable Insert Group No. |
|---|---|---|---|---|---|---|---|---|---|---|
| **GWCS** R/L **2020-15** | | | 20 | 20 | 125 | 27 | 20 | 1,25~1,45 | 2,0 | ❶ |
| **GWCS** R/L **2020-25** | ❍ | ❍ | 20 | 20 | 125 | 27 | 20 | 1,50~2,30 | 3,5 | ❷ |
| **GWCS** R/L **2020-35** | ❍ | ❍ | 20 | 20 | 125 | 27 | 20 | 2,50~4,80 | 5,0 | ❸ |
| **GWCS** R/L **2525-15** | | | 25 | 25 | 150 | 32 | 25 | 1,25~1,45 | 2,0 | ❶ |
| **GWCS** R/L **2525-25** | ❍ | ❍ | 25 | 25 | 150 | 32 | 25 | 1,50~2,30 | 3,5 | ❷ |
| **GWCS** R/L **2525-35** | ❍ | ❍ | 25 | 25 | 150 | 32 | 25 | 2,50~4,80 | 5,0 | ❸ |

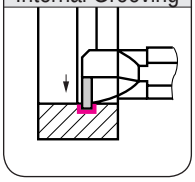
### Spare Parts

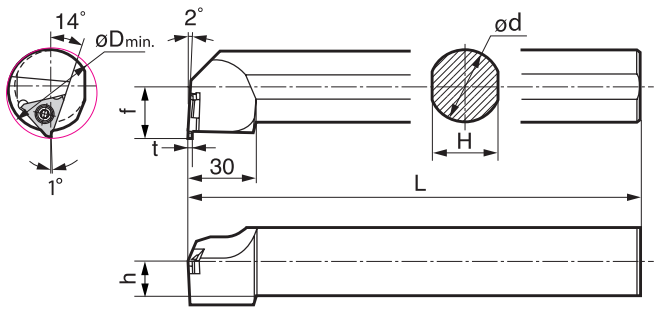


| Screw | Wrench | Clamp | Screw | Wrench |
|---|---|---|---|---|
| BFTX 0511N | TRX 20 | CCM 8U -R/L | WB 8-22 -TL/T | LT 27 |

## Internal Grooving

**GWCI**
Internal Grooving





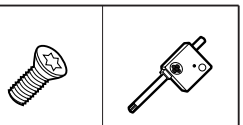

Figures show right hand tools.

### Holders

Right handed tool holders are applicable with **left** handed inserts (TGA-L).

| Cat. No. | Stock R | Stock L | øDmin | ød | L | H | h | f | Grooving width t (mm) | Maximum Grooving Depth (mm) | Applicable Insert Group No. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **GWCI** R/L **325** | | | 35 | 25 | 200 | 23 | 11,5 | 17,5 | 0,33~2,80 | 0,8~2,0 | |
| **GWCI** R/L **432** | ❍ | ❍ | 40 | 32 | 250 | 30 | 15,0 | 17,5 | 1,25~4,80 | 2,0~2,5 | ❶❷❸ |

### Spare Parts



| Screw | Wrench |
|---|---|
| BFTX 0409N | TRX 15 |
| BFTX 0511N | TRX 20 |

*) Please select applicable inserts for the holders by using matching group numbers.

● = Euro stock
❍ = Delivery on request

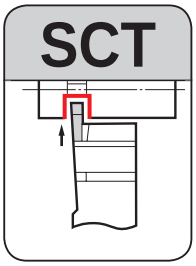
Packing unit and ordering example; 1 pce GWCR 2020-25 ( R: right handed )

# SCT Type

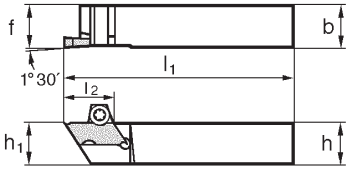







## Holders




## Spare Parts



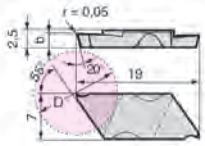
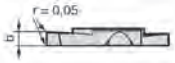
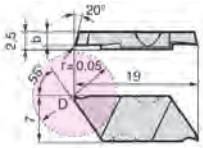


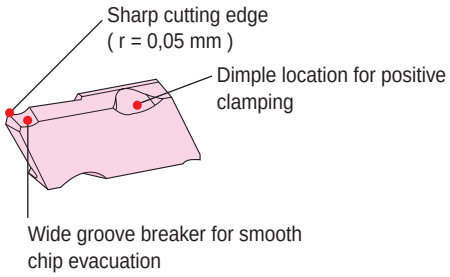
| Ordering No. | Stock | Dimensions (mm) | | | | | Applicable inserts | Screw | Wrench |
|---|---|---|---|---|---|---|---|---|---|
| | | $h=h_1$ | b | $l_1$ | $l_2$ | f | | | |
| **SCT R 1010** | ● | 10 | 10 | 120 | 15 | 10 | CTR ___ | BFTX 0410 T8 **L** | TRX 08 |
| **SCT R 1212** | ● | 12 | 12 | 120 | 15 | 12 | | | |
| **SCT R 1616** | ● | 16 | 16 | 120 | 15 | 16 | | | |
| **SCT L 1010** | ● | 10 | 10 | 120 | 15 | 10 | CTL ___ | BFTX 0410 T8 **R** | |
| **SCT L 1212** | ● | 12 | 12 | 120 | 15 | 12 | | | |
| **SCT L 1616** | ● | 16 | 16 | 120 | 15 | 16 | | | |

Above figures show right hand tools.

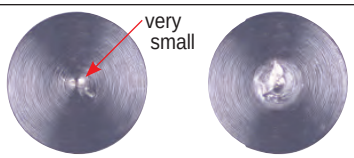
## Inserts

( Coated carbide)

| CTR CTL | Ordering No. | Stock ACZ310 | Dimensions (mm) b | Dimensions (mm) Max. ø D | Insert Type |
|---|---|---|---|---|---|
|  | **CTR 050505 R** | | 0,5 | 5 | (R) right handed type  (N) neutral type  |
| | **CTR 121005 R** | | 1,0 | 12 | |
| | **CTR 121505 R** | ● | 1,5 | | |
| | **CTR 122005 R** | ● | 2,0 | | |
| | **CTR 121005 N** | ● | 1,0 | | |
| | **CTR 121505 N** | | 1,5 | | |
| | **CTR 122005 N** | ● | 2,0 | | |
|  | **CTL 050505 L** | | 0,5 | 5 | (L) left handed type  (N) neutral type  |
| | **CTL 121005 L** | ● | 1,0 | 12 | |
| | **CTL 121505 L** | ● | 1,5 | | |
| | **CTL 122005 L** | ● | 2,0 | | |
| | **CTL 121005 N** | | 1,0 | | |
| | **CTL 121505 N** | | 1,5 | | |
| | **CTL 122005 N** | ● | 2,0 | | |




## ● Surface Finish Comparision




**SCT** Competitor´s tool

| | |
|---|---|
| Work material: | X6Cr17 ( ø8 mm) |
| Insert: | CTR 121005 R, ( b =1,0 mm) |
| Cutting data: | $v_c$ = 45 m/min |
| | f = 0,02 mm/rev, Wet |

## Recommended Cutting Data (SCT Type)

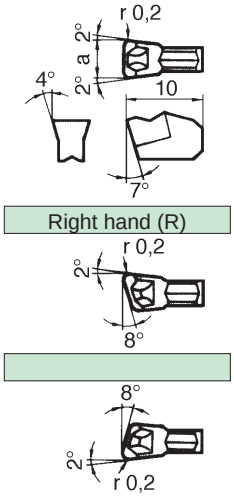
| Work material | Approach angle | $v_c$ (m/min) | f (mm/rev) |
|---|---|---|---|
| General steel | 20° (R/L-Platte) | 50 ~ 150 | 0,02 ~ 0,05 |
| | 0° (N-Platte) | | 0,02 ~ 0,10 |
| Free-cutting steel | 20° (R/L-Platte) | 50 ~ 150 | 0,02 ~ 0,05 |
| | 0° (N-Platte) | | 0,02 ~ 0,10 |
| Stainless steel | 20° (R/L-Platte) | 50 ~ 150 | 0,02 ~ 0,04 |
| | 0° (N-Platte) | | 0,02 ~ 0,05 |

Cutting data for coated grade ACZ310

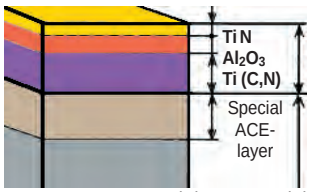


● = Euro stock Packing unit and ordering example; 1 pce SCT R 1010 ( R: right handed )

# Parting-Off Holders
# "Sumi-Grip" Insert



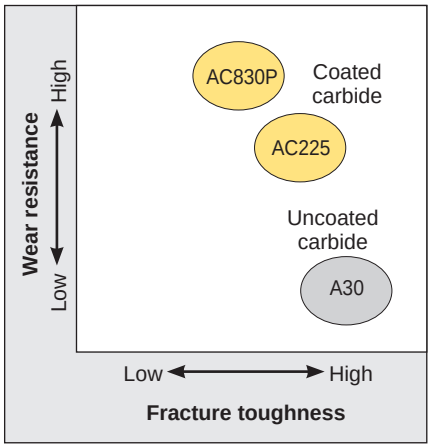

| Ordering No. | Coated carbide AC830P | Coated carbide AC3000 | [a] (mm) | Ordering No. | Coated carbide AC225 | Uncoated carbide A30 | [a] (mm) | Ordering No. | Uncoated carbide G10E | [a] (mm) |
|---|---|---|---|---|---|---|---|---|---|---|
| **WCFN 2 T** | ○ | ▲ | 2 | **WCFN 2 A** | ● | | 2 | | | |
| **WCFN 3** | ○ | ▲ | 3 | **WCFN 3 A** | ● | | 3 | **WCFN 3 B** | ● | 3 |
| **WCFR 3** | ○ | ▲ | | **WCFR 3 A** | ● | | | **WCFR 3 B** | ● | |
| **WCFL 3** | ○ | ▲ | | **WCFL 3 A** | ● | | | **WCFL 3 B** | ● | |
| **WCFN 4** | ○ | ▲ | 4 | **WCFN 4 A** | ● | ● | 4 | **WCFN 4 B** | ● | 4 |
| **WCFR 4** | ○ | ▲ | | **WCFR 4 A** | ● | | | **WCFR 4 B** | | |
| **WCFL 4** | ○ | ▲ | | **WCFL 4 A** | ● | | | **WCFL 4 B** | | |
| **WCFN 5** | ○ | ▲ | 5 | **WCFN 5 A** | ● | | 5 | **WCFN 5 B** | | 5 |
| **WCFR 5** | ○ | ▲ | | **WCFR 5 A** | | | | **WCFR 5 B** | | |
| **WCFL 5** | ○ | ▲ | | **WCFL 5 A** | | | | **WCFL 5 B** | | |




### Structure of AC225 coated layer

There is a multi layer coating which includes a 2 µm thick $Al_2O_3$ layer.
It is very tough and resistant to adhesion wear.

## ■ Insert Grade Map




## ■ Applications and Features of Inserts

| Grade | Ordering No. (Ex. a=3mm) | Applications | Features |
|---|---|---|---|
| AC830P (AC3000) | WCFN 3 | General steel and high feed cutting (0,08~0,3/rev) | Coated insert having excellent wear resistance with low cutting resistance |
| AC225 | WCFN 3A | General steel and slow feed cutting (0,04~0,25/rev) soft steel, stainlessw steel | Coated insert having excellent fracture toughness with good chip removal |
| A30 | WCFN 3A | Hard to cut materials | Equivalent to P30 |
| G10E | WCFN 3B | Cast iron, aluminum alloy | Equivalent to K10 with a small edge treatment |

## ■ Recommended Cutting Conditions

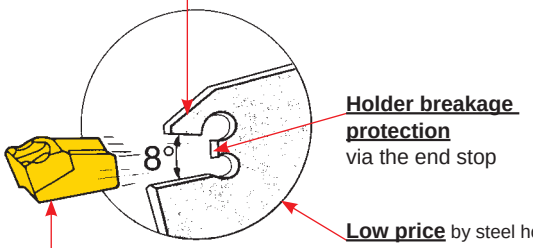
| Grade | $v_c$ (m/min) f (mm/rev) | General steel | Soft steel | Stainless steel | Die steel | Gray cast iron |
|---|---|---|---|---|---|---|
| AC830P (AC3000) | $v_c$ | 100 - 220 | 120 - 250 | 80 - 200 | 60 - 150 | - |
| | f | 0,08 - 0,3 | 0,08 - 0,15 | 0,08 - 0,15 | 0,08 - 0,15 | - |
| AC225 | $v_c$ | 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 | - |
| 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.

● = Euro stock
○ = Delivery on request
▲ = To be replaced by new item

Packing unit and ordering example; 1 pce WCFN 2A, AC225 ( R: right handed )

## Features of Design



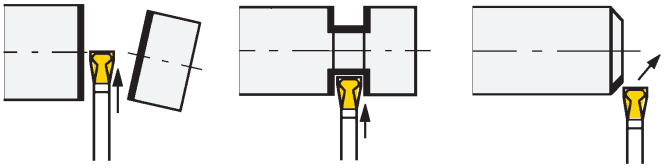

**Twice the holding force**
of conventional SUMI-GRIP

**Holder breakage protection**
via the end stop

**Low price** by steel holders

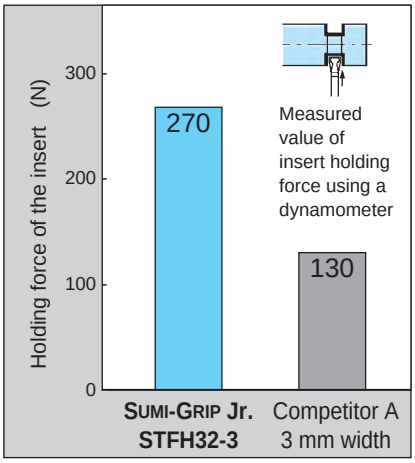
**Long tool life** from high performance inserts (interchangeable with SUMI-GRIP).

Effective Tooling with **Sumi-Grip Jr.**



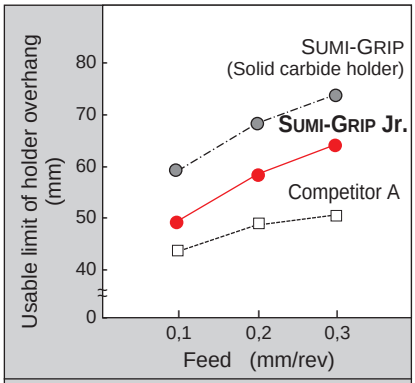
**Parting-Off** **Grooving** **Chamfering**

## Twice the Insert Holding Force




## Low Vibration

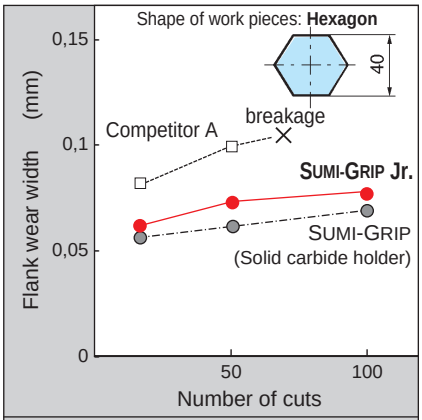
● Comparison of usable limit vibration




| | |
|---|---|
| Work material: | C45 (ø 50 mm, HB 250) |
| Insert : | 3 mm width, coated (P25) |
| Cutting data: | $v_c$ = 80 m/min, Dry |

## WEAR RESISTANCE

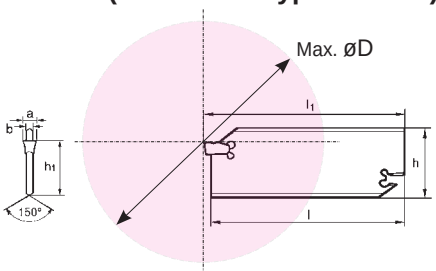
● (Interrupted cut part off)




| | |
|---|---|
| Work material: | C45 |
| Insert : | 3 mm width, coated (P25) |
| Cutting data: | $v_c$ = 150 m/min |
| f = 0,15 mm/rev. | Water soluble coolant |

## Part-Off Holders

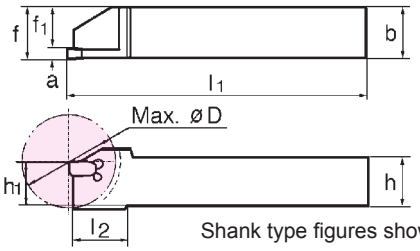
### ● Steel Blades (Tool Block Type Holders)




| Ordering No. | Stock | Dimensions (mm) | | | | | | | Applicable inserts |
|---|---|---|---|---|---|---|---|---|---|
| | | a | $øD_{Max}$ | h | $h_1$ | b | l | $l_1$ | |
| **STFH 26-2** | ● | 2 | 40 | 26 | 21,4 | 1,7 | 108 | 109 | WCF_ 2 _ |
| **STFH 26-3** | ● | 3 | 70 | 26 | 21,4 | 2,4 | 108 | 109 | WCF_ 3 _ |
| **STFH 26-4** | ● | 4 | 70 | 26 | 21,4 | 3,4 | 108 | 109 | WCF_ 4 _ |
| **STFH 26-5** | ● | 5 | 70 | 26 | 21,4 | 4,3 | 108 | 109 | WCF_ 5 _ |
| | | | | | | | | | |
| **STFH 32-2** | ● | 2 | 40 | 32 | 25 | 1,7 | 148 | 149 | WCF_ 2 _ |
| **STFH 32-3** | ● | 3 | 100 | 32 | 25 | 2,4 | 148 | 149 | WCF_ 3 _ |
| **STFH 32-4** | ● | 4 | 100 | 32 | 25 | 3,4 | 148 | 149 | WCF_ 4 _ |
| **STFH 32-5** | ● | 5 | 100 | 32 | 25 | 4,3 | 148 | 149 | WCF_ 5 _ |

Remarks: All tool holders include a wrench type **SL-4** .
Tool blocks for steel blades are ordered separately.

### ● Shank Type Holders



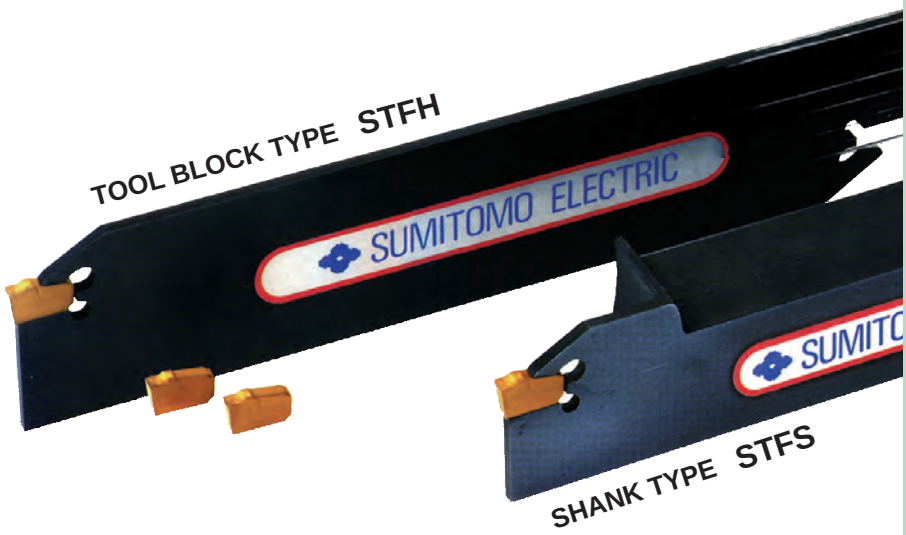

Shank type figures show right hand tools.

| Ordering No. | Stock | | Dimensions (mm) | | | | | | | | | Applicable inserts |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | R | L | a | $øD_{Max}$ | h | $h_1$ | b | $l_1$ | $l_2$ | f | $f_1$ | |
| **STFS R/L 1010-2** | ● | ○ | 2 | 28 | 10 | 10 | 10 | 86 | 18 | 10 | 8 | WCF_ 2 _ |
| **STFS R/L 1212-2** | ● | ● | | 30 | 12 | 12 | 12 | 110 | 20 | 12 | 10 | |
| **STFS R/L 1616-2** | ● | ● | | 35 | 16 | 16 | 16 | 110 | 20 | 16 | 14 | |
| **STFS R/L 2020-2** | ● | ● | | 50 | 20 | 20 | 20 | 125 | - | 20 | 18 | |
| **STFS R/L 1616-3** | ● | ● | 3 | 35 | 16 | 16 | 16 | 110 | 20 | 16 | 13 | WCF_ 3 _ |
| **STFS R/L 2012-3** | ● | ○ | | 40 | 20 | 20 | 12 | 110 | - | 12 | 9 | |
| **STFS R/L 2020-3** | ● | ● | | 50 | 20 | 20 | 20 | 125 | - | 20 | 17 | |
| **STFS R/L 2525-3** | ● | ● | | 50 | 25 | 25 | 25 | 150 | - | 25 | 22 | |
| **STFS R/L 2020-4** | ● | ● | 4 | 50 | 20 | 20 | 20 | 125 | - | 20 | 16 | WCF_ 4 _ |
| **STFS R/L 2525-4** | ● | ● | | 50 | 25 | 25 | 25 | 150 | - | 25 | 21 | |
| **STFS R/L 2020-5** | ● | ○ | 5 | 50 | 20 | 20 | 20 | 125 | - | 20 | 15 | WCF_ 5 _ |
| **STFS R/L 2525-5** | ● | ○ | | 50 | 25 | 25 | 25 | 150 | - | 25 | 20 | |

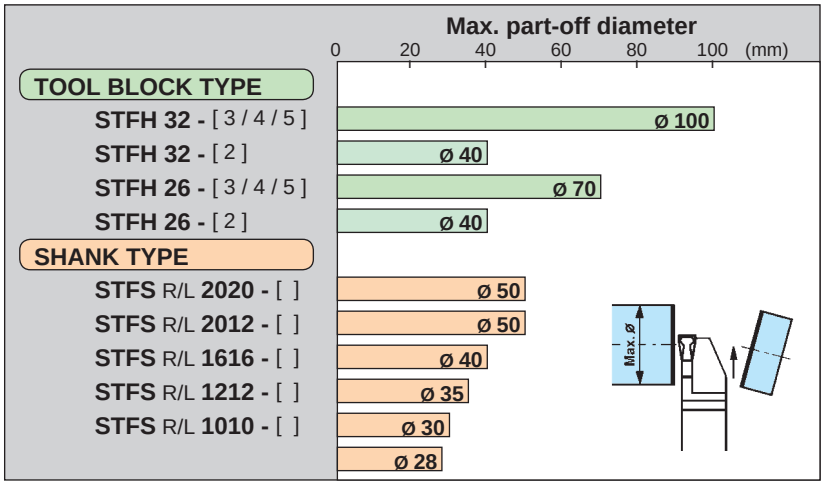


● = Euro stock  Packing unit and ordering example; 1 pce  STFH 26-2, 1 pce SBN 20-26

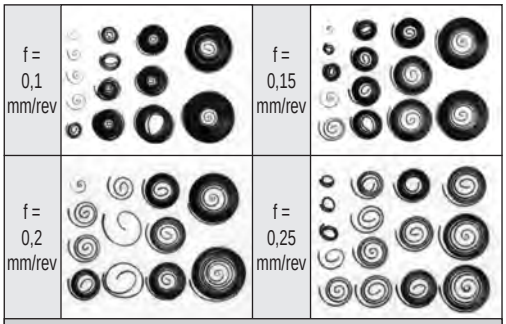
# Sumi-Grip "Jr."




## Recommended Application Range



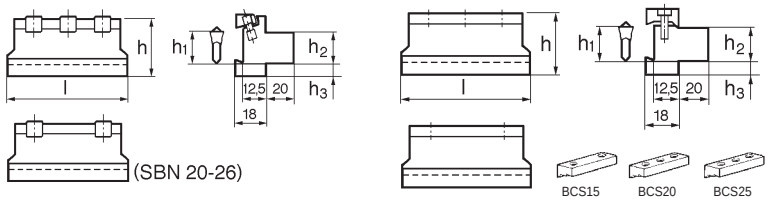

## Good Chip Removal




Work material: C45 ( ø 60 mm, HB 250)
Insert : **WCFN 3A** (AC225)
Cutting data: $v_c$ = 150 m/min
Water soluble coolant

## Tool Blocks

**< Type SBN > Clamp System** **< Type SBU > Wedge System**




| Ordering No. | Stock | Dimensions (mm) h | h1 | h2 | h3 | l | Applicable steel blades | SPARE PARTS Clamp | Screw | Wrench |
|---|---|---|---|---|---|---|---|---|---|---|
| SBN 20-26 | ● | 45 | 20 | 20 | 10 | 80 | STFH 26 _ | BWS30 | WB8-20 | LH040 |
| SBN 20-32 | ● | 50 | 20 | 20 | 13,5 | 100 | STFH 32 _ | | | |
| SBN 25-32 | ● | 50 | 25 | 25 | 8,5 | 110 | STFH 32 _ | | | |

| Ordering No. | Stock | Dimensions (mm) h | h1 | h2 | h3 | l | Applicable steel blades | SPARE PARTS Wedge | Screw | Wrench |
|---|---|---|---|---|---|---|---|---|---|---|
| SBU 20-26 | ● | 45 | 20 | 20 | 10 | 80 | STFH 26 _ | BCS15 | BX0622 | LH050 |
| SBU 20-32 | ● | 50 | 20 | 20 | 13,5 | 100 | STFH 32 _ | BCS20 | | |
| SBU 25-32 | ● | 50 | 25 | 25 | 8,5 | 110 | STFH 32 _ | BCS25 | | |

## Recommended Grades and Cutting Conditions

| Work material | Grade | Cutting speed (m/min) / Feed (mm/rev) |
|---|---|---|
| General steel | AC225 | 80 – 200 / 0,05 – 0,2 |
| Mild steel | | |
| Stainless steel | AC225 | 60 – 180 / 0,05 – 0,2 |
| Cast iron | G10E | 50 – 120 / 0,06 – 0,2 |

● = Euro stock

Packing unit and ordering example; 1 pce STFH 26-2, 1 pce SBN 20-26

## Sumi-Grip- Series



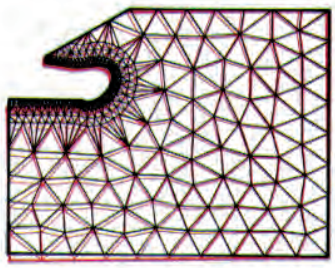

## Features of Sumi-Grip

### ●High Rigidity

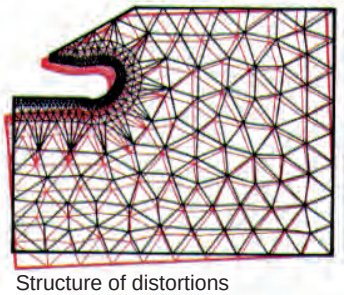
This figure shows a computer generated comparison of the distortion of steel and carbide holders caused by cutting forces.

The reduced distortion of the carbide holder makes cutting under harsher conditions and higher feeds possible.

Destortion of **Sumi-Grip** (Carbide holder)



Destortion of steel holder

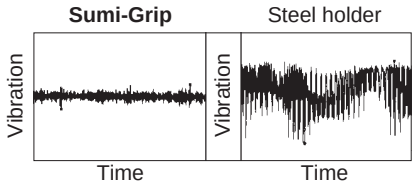


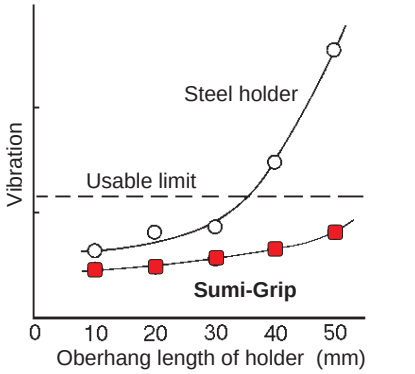
Structure of distortions
Changed sharp
Unchanged sharp

### ●Low Vibration

The figure shows the measurement of cutting vibration.
At high speeds the carbide holder experiences for less vibrations than does the steel holder. Thus, the overhang length can be extended and cutting speed can be increased with the **Sumi Grip**´s carbide holder.

Measurement of vibrations
(Overhang of holder: 50 mm)

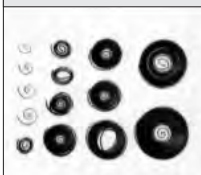
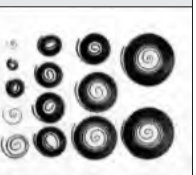
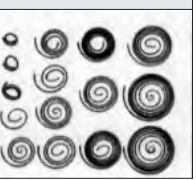


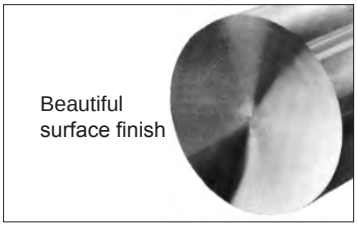

Work; Carbon steel (ø 60mm, HB250)
Width of insert: 3 mm
Cutting data: $v_c$ = 150 m/min, f = 0,1 mm/rev

### ●Good Chip Removal

This picture show the shape of chips according to feed rate.
**SUMI GRIP** produces rolled chip which are easily removed.

| f = 0,05 mm/rev | f = 0,08 mm/rev |
|---|---|
|  |  |
| f = 0,1 mm/rev | f = 0,15 mm/rev |
|  |  |
| f = 0,2 mm/rev | f = 0,25 mm/rev |
|  |  |

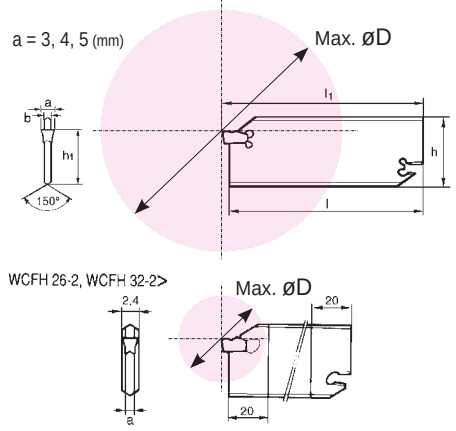
Work material: Ck 45 (ø 60mm, HB250)
Insert width and type : 3 mm,
WCFN 3A (AC225)
Cutting conditions: $v_c$ = 150 m/min, Wet





- Width of cut off: 2 ~ 5 mm
- Max. cut-off diameter is 140 mm (In case of 2,0 mm width insert up to ø 40 mm).
- double sided carbide blade
- Tool block and carbide holder are interchangable between right and left hand use.

## Carbide blades




| Ordering No. | Stock | Dimensions (mm) | | | | | | | Applicable inserts |
|---|---|---|---|---|---|---|---|---|---|
| | | a | $øD_{Max}$ | h | $h_1$ | b | l | $l_1$ | |
| WCFH 26-2 | ● | 2 | 40 | 26 | 21,4 | 1,7 | 109 | 110 | WCF_ 2 _ |
| WCFH 26-3 | ● | 3 | 80 | 26 | 21,4 | 2,4 | 108,5 | 110 | WCF_ 3 _ |
| WCFH 26-4 | ● | 4 | 80 | 26 | 21,4 | 3,4 | 108,5 | 110 | WCF_ 4 _ |
| WCFH 26-5 | ● | 5 | 80 | 26 | 21,4 | 4,3 | 108,5 | 110 | WCF_ 5 _ |
| WCFH 32-2 | ● | 2 | 40 | 32 | 25 | 1,7 | 149 | 150 | WCF_ 2 _ |
| WCFH 32-3 | ● | 3 | 140 | 32 | 25 | 2,4 | 148,5 | 150 | WCF_ 3 _ |
| WCFH 32-4 | ● | 4 | 140 | 32 | 25 | 3,4 | 148,5 | 150 | WCF_ 4 _ |
| WCFH 32-5 | ● | 5 | 140 | 32 | 25 | 4,3 | 148,5 | 150 | WCF_ 5 _ |

## Wrench

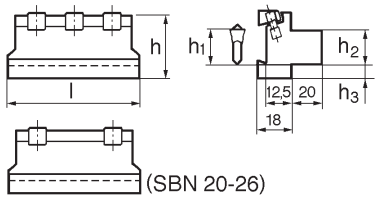


| |
|---|
| SL - 2 |
| SL - 1 |
| SL - 1 |
| SL - 1 |
| |
| SL - 2 |
| SL - 1 |
| SL - 1 |
| SL - 1 |

Remark: A carbide blade includes a wrench. Applicable Tool block and insert are ordered separately.

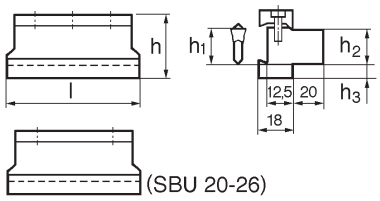
## Tool blocks

<Type SBN> One piece type




| Ordering No. | Stock | Dimensions (mm) | | | | | Applicable carbide blades |
|---|---|---|---|---|---|---|---|
| | | h | $h_1$ | $h_2$ | $h_3$ | l | |
| SBN 20-26 | ● | 45 | 20 | 20 | 10 | 80 | WCFH 26 _ |
| SBN 20-32 | ● | 50 | 20 | 20 | 13,5 | 100 | WCFH 32 _ |
| SBN 25-26 | ○ | 48 | 25 | 25 | 10 | 80 | WCFH 26 _ |
| SBN 25-32 | ● | 50 | 25 | 25 | 8,5 | 110 | WCFH 32 _ |

<Type SBU> Separete type




| Ordering No. | Stock | Dimensions (mm) | | | | | Applicable carbide blades |
|---|---|---|---|---|---|---|---|
| | | h | $h_1$ | $h_2$ | $h_3$ | l | |
| SBU 20-26 | ● | 45 | 20 | 20 | 10 | 80 | WCFH 26 _ |
| SBU 20-32 | ● | 50 | 20 | 20 | 13,5 | 100 | WCFH 32 _ |
| SBU 25-26 | ○ | 48 | 25 | 25 | 10 | 80 | WCFH 26 _ |
| SBU 25-32 | ● | 50 | 25 | 25 | 8,5 | 110 | WCFH 32 _ |

## Spare Parts

| Clamp | Screw | Wrench |
|---|---|---|
|  |  |  |
| BWS 30 | WB 8-20 | LH 040 |

| Wedge | | |
|---|---|---|
|  20-26 SBU 25-26 |  SBU20-32 |  SBU25-32 |
| BCS 15 | BCS 20 | BCS 25 |
| Screw | Wrench | |
|  |  | |
| BX 0622 | LH 050 | |

## Nomenclature

**Holder**

WCF H 26-3
- WCF: Sumi-Grip
- H: Holder type
- 26: Holder height — h = 26, 32 mm (Type H); h = 20, 25 mm (Type S)
- 3: Insert width — a = 2, 3, 4, 5 mm

**Insert**

WCF N 3 A
- WCF: Sumi-Grip
- N: Feed direction — Neutral (N), Right hand (R), Left hand (L)
- 3: Insert width — a = 2, 3, 4, 5 mm
- A: Breaker type — Standard (Nil), Type A, Type B

● = Euro stock  Packing unit and ordering example; 1 pce  WCFH 26-2, 1 pce SBN 20-26

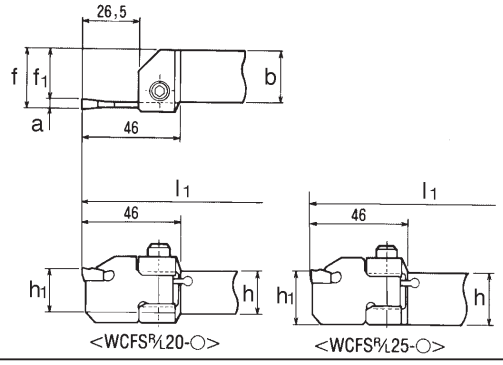


- Carbide blade on shank fixed type
- Width of cut off: 3,0 ~ 5,0 mm
- Max. cut off diameter is 50 mm
- Suitable for machining with small N/C machines and automated lathe machines



- 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)

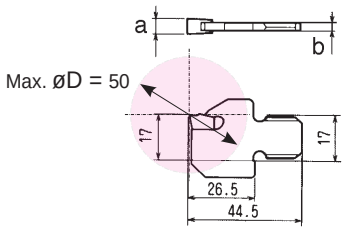



| Ordering No. | Stock R | Stock L | a | b | h | $h_1$ | $l_1$ | f | $f_1$ | Included carbide blade | Applicable inserts |
|---|---|---|---|---|---|---|---|---|---|---|---|
| WCFS R/L 20-3 | ● | ● | 3 | 20 | 20 | 20 | 125 | 23 | 20 | WCFH 17-3 | WCF_ 3 _ |
| WCFS R/L 20-4 | ● | ● | 4 | 20 | 20 | 20 | 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

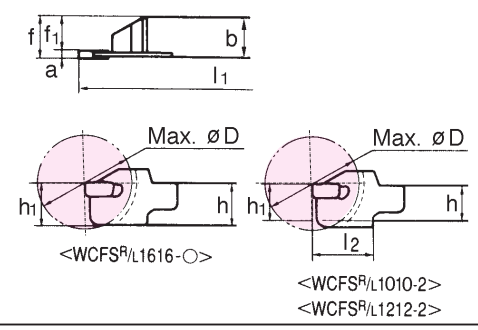





| Carbide blade | Stock | Dimensions (mm) a | Dimensions (mm) b | Applicable inserts | Ordering No. |
|---|---|---|---|---|---|
| WCFH 17-3 | ● | 3 | 2,4 | WCF_ 3 _ | SL - 1 |
| WCFH 17-4 | ● | 4 | 3,4 | WCF_ 4 _ | SL - 1 |
| WCFH 17-5 | ● | 5 | 4,3 | WCF_ 5 _ | SL - 1 |

## ■ Holders (Brazed Type)

## Wrench



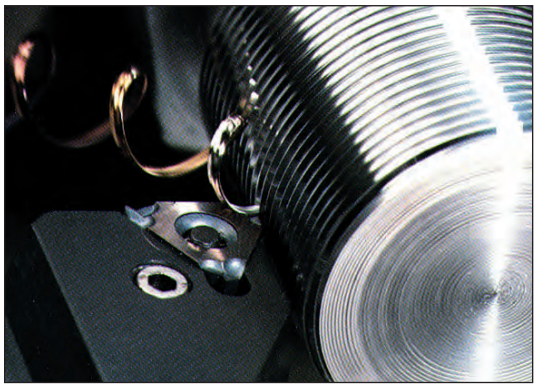

| Ordering No. | Stock R | Stock L | a | $øD_{Max}$ | h | $h_1$ | b | $l_1$ | $l_2$ | f | $f_1$ | Applicable inserts | Wrench |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| WCFS R/L 1010-2 | ● | ❍ | 2 | 28 | 10 | 10 | 10 | 86 | 18 | 10 | 8 | WCFN 2A | SL - 2 |
| WCFS R/L 1212-2 | ● | ● | 2 | 30 | 12 | 12 | 12 | 110 | 20 | 12 | 10 | WCFN 2A | SL - 2 |
| WCFS R/L 1616-2 | ● | ● | 2 | 35 | 16 | 16 | 16 | 100 | – | 16 | 14 | WCFN 2A | SL - 2 |

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





● = Euro stock  Packing unit and ordering example; 1 pce  WCFSR 20-3  ( R: right handed )



## 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 external thread

- ISO-Metric 60°
  - **TME** — with flat wiper edge — Pitch (mm): 1,0 1,25 1,5 1,75 2,0 2,5 3,0
  - **TME** — without flat wiper edge — Pitch (mm): 1,0 ~ 2,0 , 1,5 ~ 3,0
- Whitworth 55°
  - **TWE** — without flat wiper edge — Number of threads / inch: 14 ~ 10 , 24 ~ 16

→ **LTER** (□20, □25 mm) — (Lever lock system)

→ **STER** (□12, □16 mm) — (Screw on system)

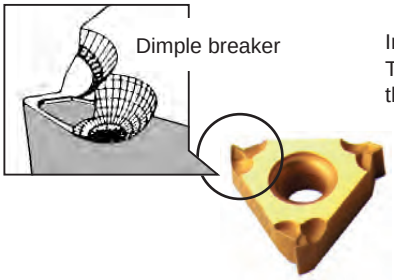
### For Internal Threading

For internal thread — ISO-Metric 60°

- **TMI** — with flat wiper edge — Pitch (mm): 1,0 1,25 1,5 1,75 2,0 2,5 3,0
- **TMI** — without flat wiper edge — Pitch (mm): 1,0 ~ 2,0 , 1,5 ~ 3,0

→ **STIR** (Ø 16, Ø 20 mm) — (Screw on system)

# Threading Insert



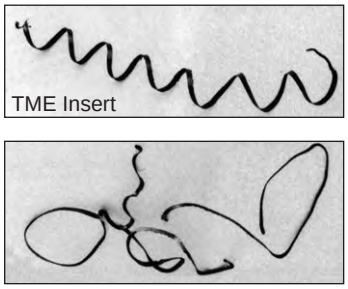

New sintered threading insert
with special dimple shaped chip breaker

## General Features

- **A positive rake angle encourages good chip control and reduces cutting resistance.**
- **Two tier dimple-style chip breakers evacuate chip smoothly and easily.**
- **M-class tolerance reduces insert cost.**
- **Four available grades cover a wider range of applications.**
- **The LTER type holder is designed for easy clamping and replacement.**

## Comparison of Chip Control

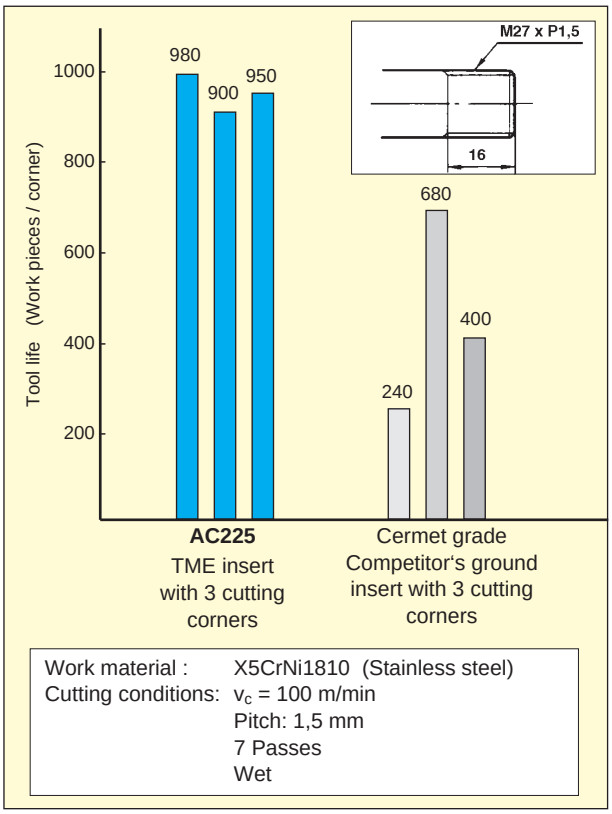





Competitor's ground insert

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

## Comparison of Tool Life

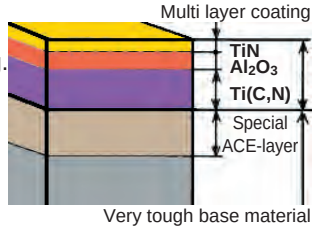


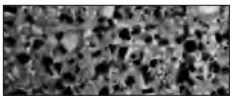

Work material : X5CrNi1810 (Stainless steel)
Cutting conditions: $v_c$ = 100 m/min
Pitch: 1,5 mm
7 Passes
Wet

## Cutting Grades for Threading

**AC225**

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



Neue
Cermet-Grade
T130A

**T130A**

The T130A is a cermet grade containing high TiN with a uniform fine-grain microstructure which results in improved wear resistance and toughness.
Thus, the T130A **produces a goods surface finish**.

## Recommended cutting conditions

● **Cutting Speed (m/min.)**

| Work material \ Grade | AC225 | T130A |
|---|---|---|
| Soft steel | 150 ~170 | 100 ~150 |
| Carbon steel | 100 ~170 | 80 ~130 |
| Alloy steel | 90 ~150 | 80 ~120 |
| Stainless steel | 70 ~140 | - |

● **Depth of Cut (Wiper Insert)**

| | | Cat. No. | Pitch | Depth of cut | Pass | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ISO-Metric 60° | External | TME 100 R | 1,00 | 0,68 | 5 | 0,20 | 0,16 | 0,14 | 0,11 | 0,07 | | | | | | | |
| | | TME 125 R | 1,25 | 0,82 | 6 | 0,20 | 0,18 | 0,15 | 0,12 | 0,10 | 0,07 | | | | | | |
| | | TME 150 R | 1,50 | 0,96 | 7 | 0,22 | 0,18 | 0,14 | 0,13 | 0,12 | 0,10 | 0,07 | | | | | |
| | | TME 175 R | 1,75 | 1,12 | 8 | 0,22 | 0,19 | 0,16 | 0,14 | 0,13 | 0,12 | 0,09 | 0,07 | | | | |
| | | TME 200 R | 2,00 | 1,25 | 8 | 0,25 | 0,21 | 0,18 | 0,16 | 0,15 | 0,13 | 0,10 | 0,07 | | | | |
| | | TME 250 R | 2,50 | 1,55 | 10 | 0,27 | 0,24 | 0,20 | 0,18 | 0,16 | 0,13 | 0,11 | 0,10 | 0,09 | 0,07 | | |
| | | TME 300 R | 3,00 | 1,86 | 12 | 0,28 | 0,25 | 0,20 | 0,19 | 0,17 | 0,15 | 0,13 | 0,12 | 0,10 | 0,10 | 0,09 | 0,07 |
| | Internal | TMI 100 R | 1,00 | 0,63 | 5 | 0,18 | 0,16 | 0,12 | 0,10 | 0,07 | | | | | | | |
| | | TMI 125 R | 1,25 | 0,77 | 6 | 1,08 | 0,16 | 0,14 | 0,12 | 0,10 | 0,07 | | | | | | |
| | | TMI 150 R | 1,50 | 0,90 | 7 | 0,20 | 0,16 | 0,14 | 0,13 | 0,11 | 0,09 | 0,07 | | | | | |
| | | TMI 175 R | 1,75 | 1,03 | 8 | 0,20 | 0,18 | 0,15 | 0,14 | 0,11 | 0,10 | 0,08 | 0,07 | | | | |
| | | TMI 200 R | 2,00 | 1,18 | 8 | 0,22 | 0,19 | 0,17 | 0,15 | 0,14 | 0,13 | 0,11 | 0,07 | | | | |
| | | TMI 250 R | 2,50 | 1,44 | 10 | 0,25 | 0,22 | 0,19 | 0,16 | 0,14 | 0,12 | 0,10 | 0,10 | 0,09 | 0,07 | | |
| | | TMI 300 R | 3,00 | 1,7 | 12 | 0,27 | 0,24 | 0,20 | 0,17 | 0,14 | 0,12 | 0,10 | 0,10 | 0,10 | 0,09 | 0,06 | 0,07 |

● **Depth of Cut (Non wiper insert)**

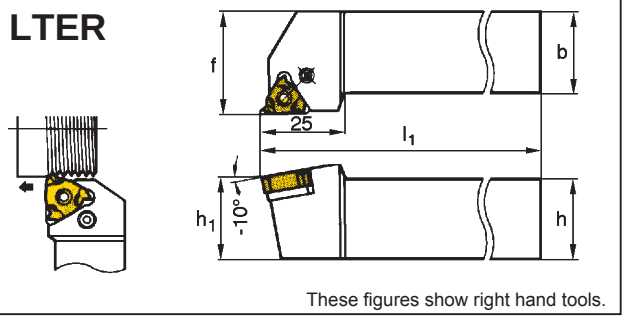
| | | Cat. No. | Radius | Pitch | Depth of cut | Pass | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ISO-Metric 60° | External | TME 1020 R | 0,13 | 1,00 | 0,68 | 5 | 0,20 | 0,16 | 0,12 | 0,10 | 0,07 | | | | | | | | | |
| | | | | 1,25 | 0,84 | 6 | 0,20 | 0,18 | 0,16 | 0,13 | 0,10 | 0,07 | | | | | | | | |
| | | | | 1,50 | 1,03 | 7 | 0,22 | 0,20 | 0,17 | 0,15 | 0,12 | 0,10 | 0,07 | | | | | | | |
| | | | | 1,75 | 1,22 | 8 | 0,22 | 0,21 | 0,18 | 0,16 | 0,15 | 0,13 | 0,10 | 0,07 | | | | | | |
| | | | | 2,00 | 1,41 | 10 | 0,22 | 0,20 | 0,18 | 0,16 | 0,14 | 0,13 | 0,12 | 0,10 | 0,09 | 0,07 | | | | |
| | | TME 1530 R | 0,20 | 1,50 | 0,95 | 7 | 0,22 | 0,17 | 0,14 | 0,13 | 0,12 | 0,10 | 0,07 | | | | | | | |
| | | | | 1,75 | 1,14 | 8 | 0,22 | 0,18 | 0,15 | 0,14 | 0,13 | 0,12 | 0,09 | 0,07 | | | | | | |
| | | | | 2,00 | 1,33 | 9 | 0,25 | 0,20 | 0,18 | 0,16 | 0,15 | 0,13 | 0,10 | 0,09 | 0,07 | | | | | |
| | | | | 2,50 | 1,71 | 12 | 0,25 | 0,22 | 0,19 | 0,17 | 0,15 | 0,14 | 0,13 | 0,12 | 0,10 | 0,09 | 0,08 | 0,07 | | |
| | | | | 3,00 | 2,09 | 14 | 0,25 | 0,22 | 0,20 | 0,20 | 0,18 | 0,17 | 0,15 | 0,14 | 0,14 | 0,10 | 0,10 | 0,09 | 0,08 | 0,07 |
| | Internal | TMI 1020 R | 0,06 | 1,00 | 0,59 | 6 | 0,16 | 0,12 | 0,10 | 0,08 | 0,08 | 0,05 | | | | | | | | |
| | | | | 1,25 | 0,75 | 7 | 0,16 | 0,14 | 0,12 | 0,10 | 0,10 | 0,08 | 0,05 | | | | | | | |
| | | | | 1,50 | 0,92 | 8 | 0,18 | 0,15 | 0,14 | 0,12 | 0,10 | 0,10 | 0,08 | 0,05 | | | | | | |
| | | | | 1,75 | 1,08 | 9 | 0,18 | 0,16 | 0,14 | 0,13 | 0,12 | 0,12 | 0,10 | 0,08 | 0,05 | | | | | |
| | | | | 2,00 | 1,24 | 10 | 0,20 | 0,18 | 0,15 | 0,14 | 0,12 | 0,12 | 0,10 | 0,10 | 0,08 | 0,05 | | | | |
| | | 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.

# LTER / STER Type

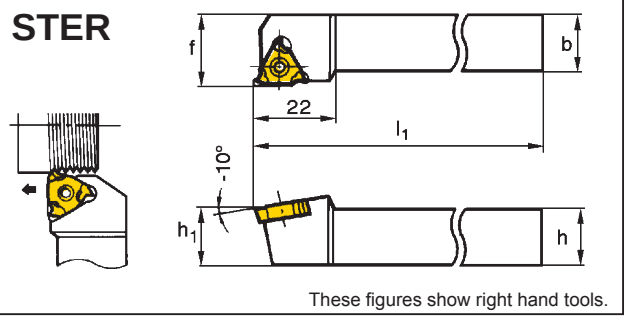


## LTER




These figures show right hand tools.

## STER




These figures show right hand tools.

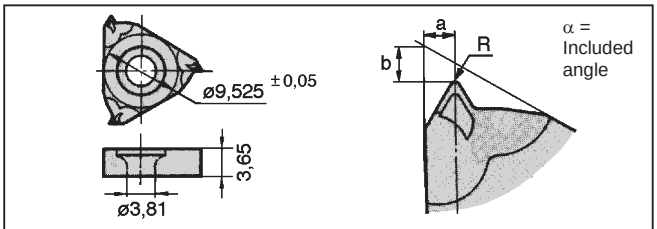
## Holders with Lever Lock System

| 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

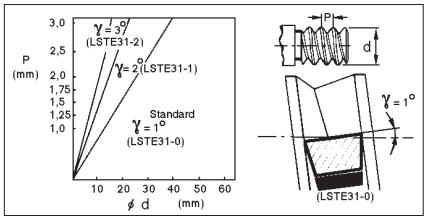
| Ordering No. | Stock | Dimensions (mm) | | | | | |
|---|---|---|---|---|---|---|---|
| | | h | $h_1$ | b | $l_1$ | f | |
| STER 1212 | ● | 12 | 12 | 12 | 100 | 16 | |
| STER 1616 | ● | 16 | 16 | 16 | 100 | 20 | |

## Inserts

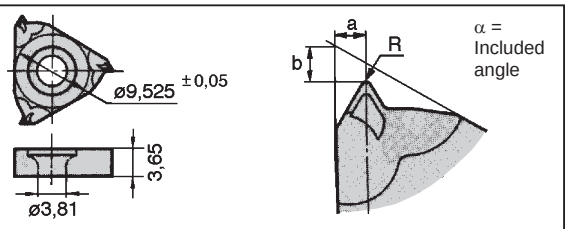



| Ordering No. | Pitch (mm) | Pitch Threads No./inch | Coated carbide AC225 | Cermet T130A | Dimensions (mm) R | α | a | b | |
|---|---|---|---|---|---|---|---|---|---|
| TME 100 R | 1,00 | - | ● | ● | 0,13 | 60 | 0,8 | 1,2 | |
| TME 125 R | 1,25 | - | ● | | 0,17 | 60 | 0,8 | 1,2 | |
| TME 150 R | 1,50 | - | ● | | 0,20 | 60 | 1,0 | 1,2 | |
| TME 175 R | 1,75 | - | ● | | 0,24 | 60 | 1,2 | 1,2 | (1) |
| 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 | (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 | (3) |
| 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 (mm) | Pitch Threads No./inch | Coated carbide AC225 | Cermet T130A | Dimensions (mm) 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 | (1) |
| 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 | (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 | (3) |
| 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 | Rohstift | Wrench |
|---|---|---|---|---|---|
| |  |  |  |  |  |
| LTER | LCL3SD | LCS3TE | LSTE31-0 *) | LSP3SD | LH025 |

*) Remarks: LTER type has supplement of γ =1° shim LSTE 31-0.
Shims LSTE 31-1 for γ = 2° and LSTE 31-2 for γ = 3° are option.

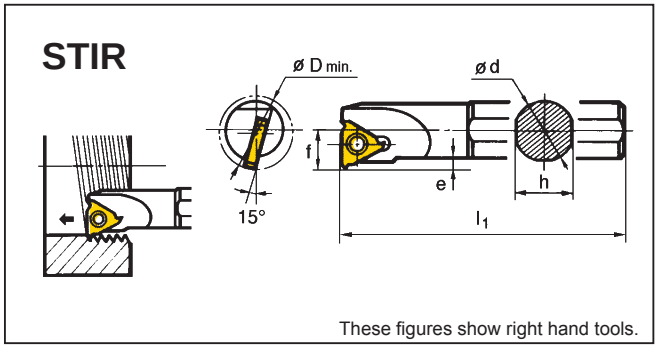
## Spare Parts

| Holder | Screw | Wrench |
|---|---|---|
| |  |  |
| STER | BFTX03508 | TRX 10 |



● = Euro stock

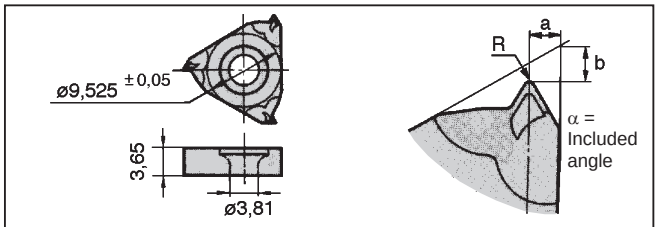
LTER 2020, 10 pcs TME100 R, AC225




## Holders with Screw on System

| Ordering No. | Stock | Dimensions (mm) | | | | | |
|---|---|---|---|---|---|---|---|
| | | ød | h | $l_1$ | e | f | ø$D_{min.}$ |
| 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 | AC225 | T130A | R | α | a | b | |
| TMI 100 R | 1,00 | - | ● | | 0,06 | 60 | 0,8 | 1,2 | |
| TMI 125 R | 1,25 | - | | | 0,07 | 60 | 0,8 | 1,2 | |
| TMI 150 R | 1,50 | - | ● | | 0,09 | 60 | 1,0 | 1,2 | |
| TMI 175 R | 1,75 | - | | | 0,11 | 60 | 1,2 | 1,2 | (1) |
| TMI 200 R | 2,00 | - | ● | | 0,12 | 60 | 1,4 | 1,2 | |
| TMI 250 R | 2,50 | - | ● | | 0,16 | 60 | 1,4 | 1,2 | |
| TMI 300 R | 3,00 | - | ● | | 0,20 | 60 | 1,8 | 1,2 | |
| TMI 1020 R | 1,00 ~ 2,00 | 24 ~12 | | | 0,06 | 60 | 1,0 | 1,2 | (2) |
| TMI 1530 R | 1,50 ~ 3,00 | 16 ~ 8 | ● | | 0,09 | 60 | 1,5 | 1,2 | |

Remarks: (1) TME100R- 300R (ISO Thread)
(2) TME1020R,1530R (ISO Thread) without chamfer

## Spare Parts

| Holder | Screw | Wrench |
|---|---|---|
| |  | |
| STIR | BFTX03508 | TRX 10 |

● = Euro stock

Packing unit and ordering example; 1 pce STIR 316, 10 pcs. TMI 100 R, AC225

# Milling Cutters

G

G1 ~ G34






Selection Guide — **Face Mill Series** ..... G 2 - 3
ISO — **Milling Insert Identification Table** ..... G 4 - 5

**Face Mills**

General Purpose Face Mills
- **DGC** (M/F) **13000** New ..... G 6 - 9
- **WGX** (M/F) **13000** New ..... G10-11
- **WGC** (M/F) **3000/4000** ..... G12-13
- **UFO** (F) **4000/5000** ..... G14-15
- **DNX** (F) **12000** ..... G16-17

Multi Purpose "Wave Radius Mills" with Polygon Inserts
- **WRCX** (F) **1200/1600/2000** ..... G18-19

**Shoulder Mills**

"Wave Mills" for Shoulder Milling
- **WFX** (F) **12000** New ..... G20-23

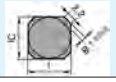
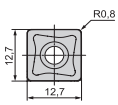
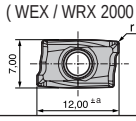
Tangential Milling System
- **PWS** (F) **4000** New ..... G24-25
- **PWC** (F) **4000** ..... G27
- **CNP** (F) **13000** ..... G28

**Others**

High Feed Milling
- **"Metal Slash Mill" MSX** ..... G29

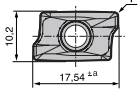
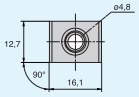
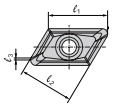
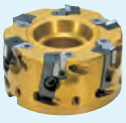
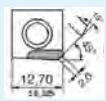
Aluminium Milling
- SUMIDIA **"RF"** ..... G30
- SUMIDIA **"SRF"** ..... G31

Grey Cast Iron Milling
- SUMIBORON **"BN Finish Mill" FMU** ..... G32-33

| Application | Endmill Type | Series | Insert Type | Approach Angle / Max. Depth of Cut (mm) | External Diameter (mm) | Application: Face Milling – General Purpose | Face Milling – Finishing | Face Milling – High Feed | Shoulder Milling | Slot Milling | Ramping | Copying | Chamfering | Boring | Finishing | Work Material: P – Carbon Steel / Alloy Steel | P – Tempered Steel / Die Steel | M – Stainless Steel | K – Cast Iron / Ductile Cast Iron | N – Non-Ferrous Metal | N – Aluminium Alloy | S – Ti Alloy / Heat Resistant Alloy | H – Hardened Steel HRC 45 ~ 55 | Ref. Page |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Face Milling | DGC New  | DGC (-M/F) 13000RS | SNMU 13T6ANER-L/G/H  ONMU 13T6ANER-L/G  | SNMU 6 mm 45° / ONMU 3 mm 45° | ø40 ~ ø250 / ø42,9 ~ ø252,9 | ◎ | | | | ○ | | | ○ | | | ◎ | ◎ | ○ | ○ | | | | | G8 |
| | WGX New  | WGX (-M/F) 13000RS | SEMT 13T3 AGSR - L / G / H / FG  | 6 mm 45° | ø40 ~ ø250 | ◎ | | | | ○ | | | ○ | | | ◎ | ◎ | ○ | ○ | | | | | G10 |
| | WGC  | WGC 3000 RS 4000 RS | SEE(M)T 0903 (IC/ l = 9,525) SEE(M)T 13T3 (IC/ l = 13,4)  | 4 mm 45° / 6 mm 45° | ø32 ~ ø100 / ø40 ~ ø200 | ◎ | | | | ○ | | | ○ | | | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | | G12 |
| | | WGC (-M/F) 4000 RS | | | | | | | | | | | | | | | | | | | | | | |
| | UFO  | UFO (-F) 4000 RS | SFK-N/R 12T3 (IC/ l = 12,7) SFK-N 1504 (IC/ l = 15,875)  | 5 mm 45° / 7 mm 45° | ø50 ~ ø315 / ø80 ~ ø315 | ○ | | | | ○ | | | ○ | | | ○ | ○ | ○ | ○ | ○ | ○ | ○ | | G14 G15 |
| | | UFO 5000 RS | | | | | | | | | | | | | | | | | | | | | | |
| | DNX  | DNX(-F) 12000RS | SNMT1205 ZNEN  | 8 mm 65° | ø80 ~ ø250 | ○ | | | | | | | | | | ○ | | | ◎ | | | | | G16 |
| Multi-Purpose | WRCX  | WRCX (-F/X) 12000RS 16000RS 20000RS | QPMT 120440PPEN/-H 160660PPEN/-H 200670PPEN/-H QPET 120460PPFR-S 160680PPFR-S | 6 ~ 10 mm | ø40 ~ ø160 | ◎ | | | | ○ | ◎ | ◎ | | | | ◎ | ◎ | ◎ | ◎ | | ○ | ○ | ○ | G19 |
| Shoulder Milling | WFX New  | WFX (-F) 12000 RS | SOMT 120408 PDER-L/G/H  | 10 mm 88° | ø50 ~ ø160 | ○ | | | ◎ | ○ | | | | | | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | | | G22 |
| | PWS New  | PWS (-F) 4000 RS | LNMX 170808 PNSR-L/G/R  | 16 mm 90° | ø80 ~ ø250 | ○ | | ◎ | ◎ | ○ | | | | | | ◎ | ○ | ○ | ○ | | | | | G25 |
| | WEX...F  | WEX 2000F | AXMT123504PEER-G ( WEX / WRX 2000 F)  | 10 mm 90° / 14 mm 90° | ø40 ~ ø100 / ø40 ~ ø100 | ○ | | | ◎ | ◎ | ◎ | | | | | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | | H16 H17 |
| | | WEX 3000F | | | | | | | | | | | | | | | | | | | | | | |

◎ : Best
○ : Good
□ : Not recommended

# Selection Guide

| Application | Endmill Type | Series | Insert Type | Approach Angle / Max. Depth of Cut (mm) | External Diameter (mm) | Application: Face Milling: General Purpose | Face Milling: Finishing | Face Milling: High Feed | Shoulder Milling | Slot Milling | Ramping | Copying | Chamfering | Boring | Finishing | Work Material: P: Carbon Steel / Alloy Steel | P: Tempered Steel / Die Steel | M: Stainless Steel | K: Cast Iron / Ductile Cast Iron | N: Non-Ferrous Metal | N: Aluminium Alloy | S: Ti Alloy / Heat Resistant Alloy | H: Hardened Steel HRC 45 ~ 55 | Ref. Page |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Shoulder Milling | WRX...F  | WRX 2000F | AXMT170508PEER-G ( WEX / WRX 3000 F)  | 18 ~ 36 mm 90° | ø40 ~ ø50 | ○ | | | ◎ | ◎ | ◎ | | | | | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | | H25 H26 |
| | | WRX 3000F | | 27 ~ 53 mm 90° | ø50 ~ ø100 | | | | | | | | | | | | | | | | | | | |
| | PWC  | PWC (-F) 4000 RS | LNMX 160608 PNS-N/H  | 12 mm 88° | ø80 ~ ø200 | ○ | | ◎ | ○ | ○ | | | ◎ | | | | | | ◎ | | | | | G27 |
| | CNP  | CNP (-F) 13000 RS | CNMU 130608 N-G/H CNMQ 130608 N  | 12 mm 90° | ø40 ~ ø200 | | | | ◎ | | | | | | | ◎ | ◎ | ◎ | ◎ | | | | | G28 |
| High Feed Milling | MSX-RS  | MSX 08000 RS 12000 RS 14000 RS | WDMT0603ZDTR (d=6,35) WDMT0804ZDTR (d=8,5) WDMT1205ZDTR (d=12) WDMT1406ZDTR (d=14) | 1,5 ~ 2,5 mm 20° | ø40 ~ ø100 | | | ◎ | | ○ | ○ | | | | | ◎ | ◎ | ◎ | ◎ | | | | ○ | G29 H10 |
| Alumimium Alloy and Non-Ferrous Metals | WAX-RS  | WAX 3000 RS | AECT 160404 PEFRA  | 16 ~ 18 mm 90° | ø50 ~ ø125 | ○ | | | ◎ | ◎ | ◎ | ◎ | | | | | | | | ○ | ◎ | | | H20 |
| | RF  | RF 4000 RS | SNEW 1204 ADFR-NF SDET 1204 ZDFR  | 3 mm 90° | ø80 ~ ø315 | ◎ | ◎ | | | | | | | | | | | | | ○ | ◎ | | | G30 |
| | SRF  | SRF 50/63 RS | SNEW 09T3 ADTR-NF  | 5 mm 90° | ø30 ~ ø63 | ◎ | ◎ | | | | | | | | | | | | | ○ | ◎ | | | G31 |
| High Speed Finishing of Cast Iron | FMU  | FMU 4000 RS | SNEW 1204 ADT-R/L  | 0,5 mm 45° | ø80 ~ ø315 | | ◎ | | | | | | | | | | | | ◎ | | | | | G33 |

◎ : Best
○ : Good
□ : Not recommended

# ISO Identification Table

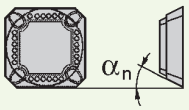


## Insert shape

| | | | |
|---|---|---|---|
| C | 80° | A | 85° |
| D | 55° | B | 82° |
| E | 75° | K | 55° |
| F | 50° | H | 120° |
| V | 35° | O | 135° |
| R | - | P | 108° |
| S | 90° | L | 90° |
| T | 60° | M | 86° |
| W | 80° | | |

## Clearance angle

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



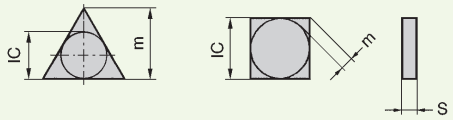

O Other clearance angle with specific description

## Insert type

| | | | |
|---|---|---|---|
| A | | W | |
| G | | T | |
| M | | | |
| N | | | |
| R | | X | Non standard |

**S F K R**

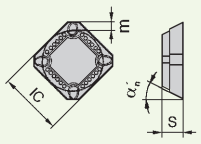
## Tolerances




IC: theoretical diameter of inscribed circle
m: nose height
s: thickness

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

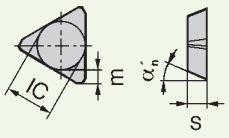
| Class | Tolerances (mm) | | |
|---|---|---|---|
| | m | IC | s |
| J | ±0,005 | ±0,05~ ±0,13*) | ±0,025 |
| K | ±0,013 | ±0,05~ ±0,13*) | ±0,025 |
| L | ±0,025 | ±0,05~ ±0,13*) | ±0,025 |
| M | ±0,08~ ±0,18*) | ±0,05~ ±0,13*) | ±0,13 |
| N | ±0,08~ ±0,18*) | ±0,05~ ±0,13*) | ±0,025 |
| U | ±0,13~ ±0,38*) | ±0,08~ ±0,25*) | ±0,13 |




*) The tolerance is dependent upon the insert size of IC. See tables below.

### Tolerance class for dimension m

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



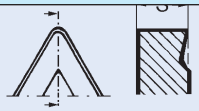

### Tolerance class for dimension IC

| IC | S | T | C | D | V | W | R |
|---|---|---|---|---|---|---|---|
| 6,35 | ±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 |

# ISO Identification Table



## Thickness

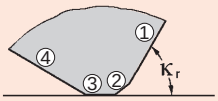


| | |
|---|---|
| **02** | s = 2,38 mm |
| **03** | s = 3,18 |
| **T3** | **s = 3,97** |
| **04** | s = 4,76 |
| **05** | s = 5,56 |
| **06** | s = 6,35 |
| **07** | s = 7,94 |
| **09** | s = 9,52 |

## Corner geometry with wiper flat

### Entering angle

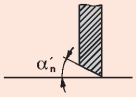
Feed direction




| | |
|---|---|
| **A** | **45°** |
| **D** | 60° |
| **E** | 75° |
| **F** | 85° |
| **P** | 90° |
| **Z** | - Others |

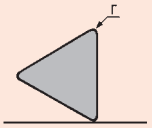
1. Major cutting edge
2. Chamfered corner
3. Wiper flat
4. Side cutting edge

### Clearance angle on wiper flat




| | |
|---|---|
| **A** | 3° |
| **B** | 5° |
| **C** | 7° |
| **D** | 15° |
| **E** | 20° |
| **F** | **25°** |
| **G** | 30° |
| **N** | 0° |
| **P** | 11° |
| **Z** | - **Others** |

## Radius




| | |
|---|---|
| **02** | r = 0,2 mm |
| **04** | r = 0,4 |
| **08** | r = 0,8 |
| **12** | r = 1,2 |
| **16** | r = 1,6 |
| **20** | r = 2,0 |
| **24** | r = 2,4 |

**M0** - Round insert (metric)
**00** - Round insert (inch)

| 1 | 2 | T | 3 | A | Z | T | N |
|---|---|---|---|---|---|---|---|

## Insert size

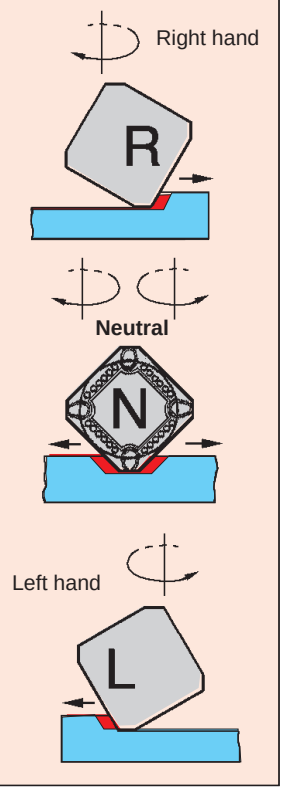
Symbol and cutting edge length (mm)

| IC d (mm) \ Insert type | C | D | R | S | T | V | W |
|---|---|---|---|---|---|---|---|
| 3,97 | | | | | **06** (6,9) | | |
| 4,76 | | | | | **08** (8,2) | | |
| 5,0 | | | **05** (5,0) | | | | |
| 5,56 | | | | | **09** (9,6) | **09** (9,7) | **03** (3,8) |
| 6,0 | | | **06** (6,0) | | | | |
| 6,35 | **06** (6,4) | **07** (7,7) | | **06** (6,35) | **11** (11,0) | **11** (11,1) | **04** (4,3) |
| 7,94 | **08** (8,0) | | | **07** (7,94) | | | **05** (5,4) |
| 8,0 | | | **08** (8,0) | | | | |
| 9,525 | **09** (9,7) | **11** (11,6) | **09** (9,525) | **09** (9,525) | **16** (16,5) | **16** (16,6) | **06** (6,5) |
| 10 | | | **10** (10,0) | | | | |
| 12 | | | **12** (12,0) | | | | |
| **12,7** | **12** (12,9) | **15** (15,5) | **12** (12,7) | **12** (12,7) | **22** (22,0) | | **08** (8,7) |
| 15,875 | **16** (16,1) | **19** (19,4) | **15** (15,875) | **15** (15,875) | **27** (27,5) | | **10** (10,9) |
| 16 | | | **16** (16,0) | | | | |
| 19,05 | **19** (19,3) | | **19** (19,05) | **19** (19,05) | **33** (33,0) | | |
| 20 | | | **20** (20,0) | | | | |
| 25 | | | **25** (25,0) | | | | |
| 25,4 | | | **25** (25,4) | **25** (25,4) | | | |
| 31,75 | | | **31** (31,75) | **31** (31,75) | | | |
| 32 | | | **32** (32,0) | | | | |

## Cutting edge condition

| | |
|---|---|
| **F** | Sharp |
| **E** | Rounded |
| **T** | Chamfered |
| **S** | Rounded and chamfered |

## Feed direction



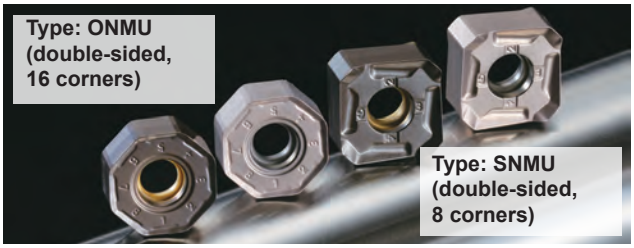
# DGC(M/F) Type




## General Features

Sumi Dual Mill DGC type utilizes double-sided inserts for excellent economy. This is a general-purpose cutter featuring high cutting edge strength for high efficiency milling and low-burr chipbreaker design that provides high qualitiy machined surface.

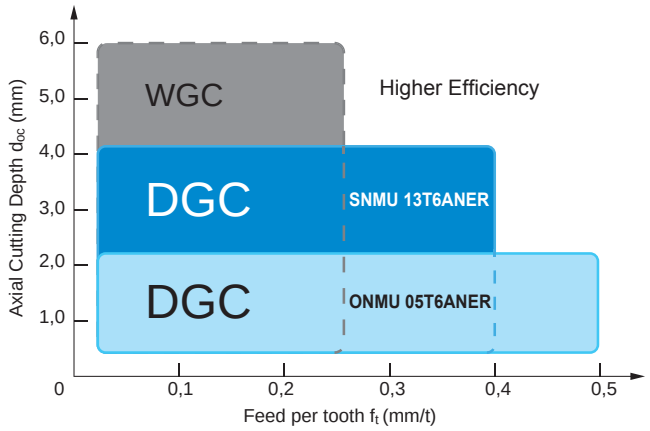
The DGC type insert lineup includes double-sided SNMU and ONMU types.
Up to 16 corners can be used for improved economy.



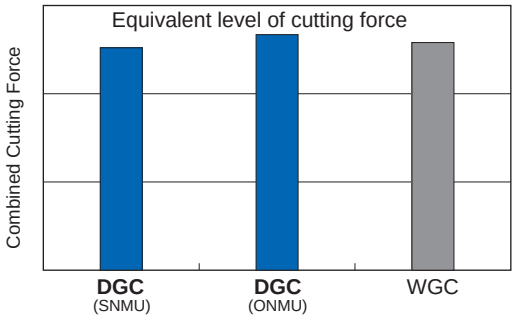

## Characteristics

- Same cutting performance as single-sided inserts plus superior economy.
- Achieves level of cutting edge sharpness and machined surface quality equivalent to single-sided cutter at a maximum cutting depth of $d_{oc} \leq 3$mm.

## Recommended Cutting Conditions for General Steel Milling




## Cutting Force Comparison




| | |
|---|---|
| Work Material: | 34CrMo4 |
| Tool: | Ø100 |
| Cutting Data: | $v_c$=200m/min, $f_t$=0,3mm/t, $d_{oc}$=3mm, $w_{oc}$=85mm |

## Dual-Purpose Body

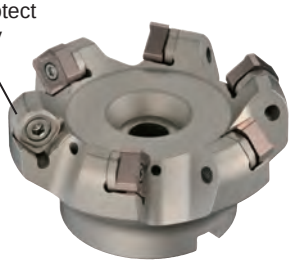
Two types of inserts can be used with a single body depending on milling application to help reduce costs.
Stronger than single-sided cutters.

**SNMU**



– first recommendation
– economical double-sided design offers 8 cutting edges with SNMU inserts
– maximum depth of cut: $d_{oc}$ = 6mm

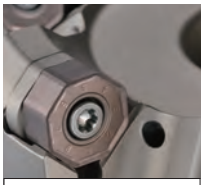
shim to protect cutter body





max. $d_{oc}$ = 6mm
8 corners use

Use two types of inserts for different applications.



max. $d_{oc}$ = 3mm
16 corners use

**ONMU**



– double-sided design with 16 corners for improved economy
– maximum depth of cut: $d_{oc}$ = 3mm

## Line-up

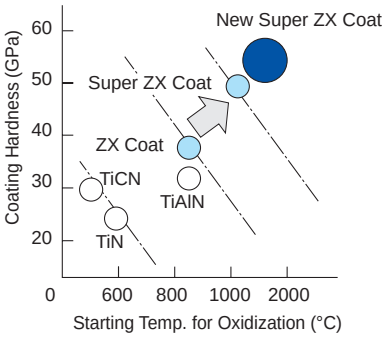
Choose a tool that fits your application from a comprehensive line-up

| Cat. No | DGC 13000 RS | DGCM 13000 RS | DGCF 13000 RS | DGC 13000 EW |
|---|---|---|---|---|
| Type | Standard pitch | Medium pitch | Fine pitch | Endmill type |
| Cutter Diameter | Ø40mm ~ Ø250mm | Ø50mm ~ Ø250mm | Ø50mm ~ Ø250mm | Ø40mm ~ Ø63mm |
| Cutting Edges | 3 ~ 10 | 4 ~ 14 | 5 ~ 18 | 3 ~ 4 |
| Shape |  |  |  |  |

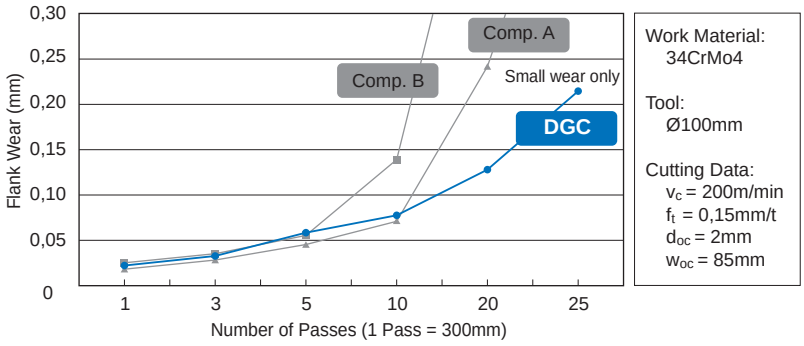
## High Reliability

Employs New Super ZX Coating, a multi-layer PVD coating grade and CVD coating grade with enhanced coating strength provided by newly developed stress control technology.
Improved run-out precision reduces tool life deviation to achieve highly reliable tool life.

## Multi-layer PVD Coating

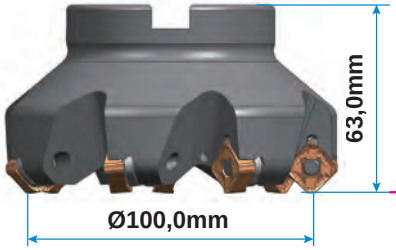



## Wear Resistance

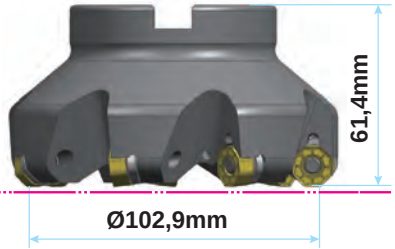



## Cutter Diameter and Cutter Body Height

Insert: SNMU 13T6ANER (square)




Insert: ONMU 05T6ANER (octagonal)



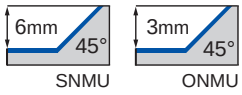

| Example: $D_c$ = 100mm | Number of Cutting Edges | Tool Diameter (mm) | Cutter Height (mm) | Max. Depth of Cut (mm) |
|---|---|---|---|---|
| SNMU  | 8 | 100,0 | 63,0 | 6,0 |
| ONMU  | 16 | 102,9 | 61,4 | 3,0 |

Square inserts (SNMU) and octagonal inserts (ONMU) can be used interchangeably on the same body.
Using these inserts the cutter will have different cutter diameter and cutter body height.

# DGC(M/F) Type

## General Milling of Steel and Cast Iron

| Rake Angle | Radial | -10° |
|---|---|---|
| | Axial | -5° |




SNMU ONMU

### ■ Body – Shell type




Fig. 1

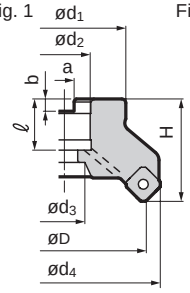



Fig. 2

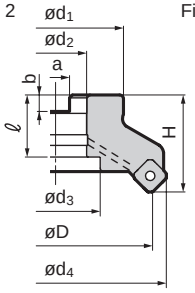



Fig. 3

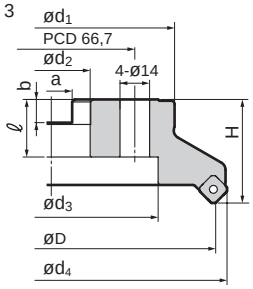
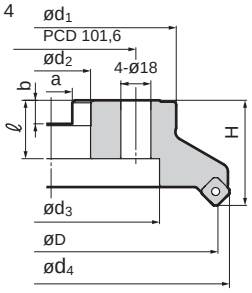



Fig. 4




Cutter body ØD ≥ 160mm: no inner coolant

### ■ Body

#### ● Type: DGC, Standard Pitch

| Cat. No. | Stock | Dimension (mm) | | | | Mounting | | | | | No. of Teeth | Weight (kg) | Fig. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | øD | ød4 | ød1 | H | ød2 | ød3 | a | b | ℓ | | | |
| DGC 13040 RS | ● | 40 (42,90) | 54 | 36 | 40 (38,44) | 16 | 13,5 | 8,4 | 5,6 | 18 | 3 | 0,3 | 1 |
| DGC 13050 RS | ● | 50 (52,90) | 64 | 40 | 40 (38,44) | 22 | 18,0 | 10,4 | 6,3 | 20 | 3 | 0,4 | 1 |
| DGC 13063 RS | ● | 63 (65,90) | 77 | 50 | 40 (38,44) | 22 | 18,0 | 10,4 | 6,3 | 20 | 4 | 0,5 | 1 |
| DGC 13080 RS | ● | 80 (82,90) | 94 | 60 | 50 (48,44) | 27 | 20,0 | 12,4 | 7,0 | 25 | 4 | 1,2 | 1 |
| DGC 13100 RS | ● | 100 (102,90) | 114 | 70 | 50 (48,44) | 32 | 46,0 | 14,4 | 8,5 | 32 | 5 | 1,6 | 2 |
| DGC 13125 RS | ● | 125 (127,90) | 139 | 80 | 63 (61,44) | 40 | 52,0 | 16,4 | 9,5 | 29 | 6 | 2,8 | 1 |
| DGC 13160 RS | ● | 160 (162,90) | 174 | 130 | 63 (61,44) | 40 | 88,0 | 16,4 | 9,5 | 29 | 7 | 4,5 | 3 |
| DGC 13200 RS | ❍ | 200 (202,90) | 214 | 150 | 63 (61,44) | 60 | 130,0 | 25,7 | 14,0 | 35 | 8 | 7,1 | 4 |
| DGC 13250 RS | ❍ | 250 (252,90) | 264 | 190 | 63 (61,44) | 60 | 160,0 | 25,7 | 14,0 | 35 | 10 | 11,2 | 4 |

#### ● Type: DGCM, Medium Pitch

| Cat. No. | Stock | Dimension (mm) | | | | Mounting | | | | | No. of Teeth | Weight (kg) | Fig. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | øD | ød4 | ød1 | H | ød2 | ød3 | a | b | ℓ | | | |
| DGCM 13050 RS | ● | 50 (52,90) | 64 | 40 | 40 (38,44) | 22 | 18 | 10,4 | 6,3 | 20 | 4 | 0,3 | 1 |
| DGCM 13063 RS | ● | 63 (65,90) | 77 | 50 | 40 (38,44) | 22 | 18 | 10,4 | 6,3 | 20 | 5 | 0,5 | 1 |
| DGCM 13080 RS | ● | 80 (82,90) | 94 | 60 | 50 (48,44) | 27 | 20 | 12,4 | 7,0 | 25 | 6 | 1,1 | 1 |
| DGCM 13100 RS | ● | 100 (102,90) | 114 | 70 | 50 (48,44) | 32 | 46 | 14,4 | 8,5 | 32 | 7 | 1,5 | 2 |
| DGCM 13125 RS | ● | 125 (127,90) | 139 | 80 | 63 (61,44) | 40 | 52 | 16,4 | 9,5 | 29 | 8 | 2,8 | 1 |
| DGCM 13160 RS | ● | 160 (162,90) | 174 | 130 | 63 (61,44) | 40 | 88 | 16,4 | 9,5 | 29 | 10 | 4,6 | 3 |
| DGCM 13200 RS | ❍ | 200 (202,90) | 214 | 150 | 63 (61,44) | 60 | 130 | 25,7 | 14,0 | 35 | 12 | 7,0 | 4 |
| DGCM 13250 RS | ❍ | 250 (252,90) | 264 | 190 | 63 (61,44) | 60 | 160 | 25,7 | 14,0 | 35 | 14 | 11,1 | 4 |

#### ● Type: DGCF, Fine Pitch

| Cat. No. | Stock | Dimension (mm) | | | | Mounting | | | | | No. of Teeth | Weight (kg) | Fig. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | øD | ød4 | ød1 | H | ød2 | ød3 | a | b | ℓ | | | |
| DGCF 13050 RS | ● | 50 (52,90) | 64 | 40 | 40 (38,44) | 22 | 18 | 10,4 | 6,3 | 20 | 5 | 0,3 | 1 |
| DGCF 13063 RS | ● | 63 (65,90) | 77 | 50 | 40 (38,44) | 22 | 18 | 10,4 | 6,3 | 20 | 6 | 0,5 | 1 |
| DGCF 13080 RS | ● | 80 (82,90) | 94 | 60 | 50 (48,44) | 27 | 20 | 12,4 | 7,0 | 25 | 8 | 1,1 | 1 |
| DGCF 13100 RS | ● | 100 (102,90) | 114 | 70 | 50 (48,44) | 32 | 46 | 14,4 | 8,5 | 32 | 10 | 1,4 | 2 |
| DGCF 13125 RS | ● | 125 (127,90) | 139 | 80 | 63 (61,44) | 40 | 52 | 16,4 | 9,5 | 29 | 12 | 2,7 | 1 |
| DGCF 13160 RS | ● | 160 (162,90) | 174 | 130 | 63 (61,44) | 40 | 88 | 16,4 | 9,5 | 29 | 14 | 4,4 | 3 |
| DGCF 13200 RS | ❍ | 200 (202,90) | 214 | 150 | 63 (61,44) | 60 | 130 | 25,7 | 14,0 | 35 | 16 | 6,9 | 4 |
| DGCF 13250 RS | ❍ | 250 (252,90) | 264 | 190 | 63 (61,44) | 60 | 160 | 25,7 | 14,0 | 35 | 18 | 11,0 | 4 |

( ) Figures in brackets indicate values for ONMU inserts.
Inserts are not included.

● = Euro stock
❍ = Delivery on request

### ■ Identification Details

| DGC | M | 13 | 050 | R | S |
|---|---|---|---|---|---|
| Cutter Series | M: Medium F: Fine | Insert Size | Cutter Diameter | Direction | Metric |




## Inserts

| Application | Coated Carbide | | | | | |
|---|---|---|---|---|---|---|
| High Speed/Light cut | P | | | K | | |
| General Purpose | | P/M | M | K | | |
| Roughing | | P/M | P/M | | K | |
| Cat. No. | ACP100 | ACP200 | ACP300 | ACK200 | ACK300 | Fig. |
| SNMU 13T6ANER L | | ● | ● | ● | | 1 |
| SNMU 13T6ANER G | ● | ● | ● | ● | ● | 1 |
| SNMU 13T6ANER H | | ● | ● | | ● | 1 |
| ONMU 05T6ANER L | | ● | ● | ● | | 2 |
| ONMU 05T6ANER G | ● | ● | ● | ● | ● | 2 |

● = Euro stock

Fig. 1

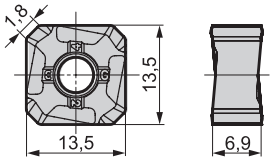
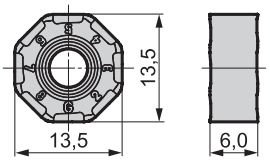
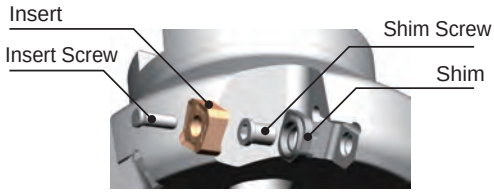


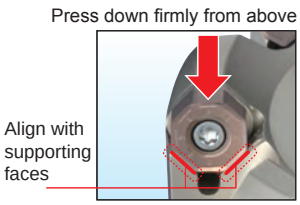

Fig. 2




**Attaching Octagonal Inserts**

Firmly align insert with supporting face, press down in the direction of the arrow and tighten the screw to fix the insert.




## Spare Parts

| Shim | Shim Screw | L Type Wrench | Insert Srew | Spanner |
|---|---|---|---|---|
|  |  |  |  |  |
| DGCS13R | BW0609F | LH040 | BFTX0412IP | TRDR15IP |

Optional

| Insert Srew (*) |
|---|
|  |
| BFTX0418IP |

*Corners can be changed simply by loosening the screw. (Only suitable for DGC / DGCM types with body size ≥ Ø80).

## SNMU – Recommended Cutting Conditions

| ISO | Work Material | Fit-ness | Cutting Speed $v_c$ (m/min) | Feed Rate $f_t$ (min/t) | Depth of Cut (mm) | Grade |
|---|---|---|---|---|---|---|
| P | General Steel | ◉ | 150-**200**-250 | 0,10-**0,25**-0,40 | <4 | ACP200 ACP300 |
| P | Alloyed Steel | ◉ | 180-**250**-350 | 0,10-**0,30**-0,45 | <4 | ACP200 ACP300 |
| P | Die Steel | ◉ | 100-**150**-200 | 0,15-**0,25**-0,35 | <4 | ACP200 ACP300 |
| M | Stainless Steel | ⊙ | 160-**200**-250 | 0,15-**0,23**-0,30 | <3 | ACP300 |
| K | GG+GGG | ◉ | 100-**200**-250 | 0,10-**0,25**-0,40 | <5 | ACK200 ACK300 |

Min. – **Optimum** – Max.

## ONMU – Recommended Cutting Conditions

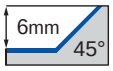
| ISO | Work Material | Fit-ness | Cutting Speed $v_c$ (m/min) | Feed Rate $f_t$ (min/t) | Depth of Cut (mm) | Grade |
|---|---|---|---|---|---|---|
| P | General Steel | ◉ | 150-**200**-250 | 0,10-**0,30**-0,50 | <2 | ACP200 ACP300 |
| P | Alloyed Steel | ◉ | 180-**250**-350 | 0,10-**0,50**-0,50 | <2 | ACP200 ACP300 |
| P | Die Steel | ◉ | 100-**150**-200 | 0,15-**0,25**-0,30 | <2 | ACP200 ACP300 |
| M | Stainless Steel | ⊙ | 160-**200**-250 | 0,15-**0,23**-0,30 | <2 | ACP300 |
| K | GG+GGG | ◉ | 100-**200**-250 | 0,10-**0,30**-0,50 | <2 | ACK200 ACK300 |

◉ Preferred choice ⊙ Suitable

# WGX (M/F) Type

## General Milling of Steel and Cast Iron

| Rake Angle | | |
|---|---|---|
| | Radial | -20° ~ -24° |
| | Axial | 20° ~ 22° |




### ■ Body – Shell type




Fig. 1

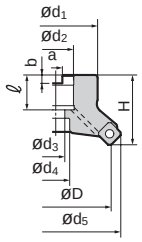



Fig. 2

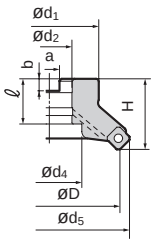



Fig. 3

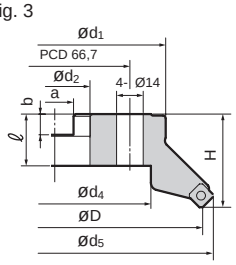
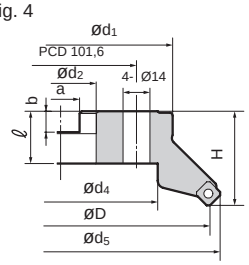



Fig. 4




Cutter body ØD ≥ 160mm: no inner coolant

### ■ Body

Inner coolant available for $D_c$ ≤ Ø125mm

#### ● Type: WGX, Standard Pitch

| Cat. No. | Stock | Dimension (mm) | | | | Mounting | | | | | | No. of Teeth | Weight (kg) | Fig. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | øD | ød5 | ød1 | H | ød2 | ød4 | ød3 | a | b | ℓ | | | |
| WGX 13040 RS | ● | 40 | 52 | 32 | 40 | 16 | 14,0 | 9,0 | 8,4 | 5,6 | 18 | 3 | 0,3 | 1 |
| WGX 13050 RS | ● | 50 | 62 | 40 | 40 | 22 | 18,0 | 11,0 | 10,4 | 6,3 | 20 | 3 | 0,4 | 1 |
| WGX 13063 RS | ● | 63 | 76 | 50 | 40 | 22 | 18,0 | 11,0 | 10,4 | 6,3 | 20 | 4 | 0,6 | 1 |
| WGX 13080 RS | ● | 80 | 93 | 55 | 50 | 27 | 20,0 | 13,5 | 12,4 | 7,0 | 25 | 4 | 1,2 | 1 |
| WGX 13100 RS | ● | 100 | 113 | 70 | 50 | 32 | 46,0 | - | 14,4 | 8,5 | 32 | 5 | 1,6 | 2 |
| WGX 13125 RS | ● | 125 | 138 | 80 | 63 | 40 | 52,0 | 29,0 | 16,4 | 9,5 | 29 | 6 | 2,8 | 1 |
| WGX 13160 RS | ● | 160 | 173 | 130 | 63 | 40 | 88,0 | - | 16,4 | 9,5 | 29 | 7 | 4,5 | 3 |
| WGX 13200 RS | ● | 200 | 213 | 150 | 63 | 60 | 130,0 | - | 25,7 | 14,0 | 35 | 8 | 7,1 | 4 |
| WGX 13250 RS | ❍ | 250 | 263 | 190 | 63 | 60 | 160,0 | - | 25,7 | 14,0 | 35 | 10 | 11,2 | 4 |

#### ● Type: WGXM, Medium Pitch

| Cat. No. | Stock | Dimension (mm) | | | | Mounting | | | | | | No. of Teeth | Weight (kg) | Fig. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | øD | ød5 | ød1 | H | ød2 | ød4 | ød3 | a | b | ℓ | | | |
| WGXM 13050 RS | ● | 50 | 62 | 40 | 40 | 22 | 18,0 | 11,0 | 10,4 | 6,3 | 20 | 4 | 0,4 | 1 |
| WGXM 13063 RS | ● | 63 | 77 | 50 | 40 | 22 | 18,0 | 11,0 | 10,4 | 6,3 | 20 | 5 | 0,6 | 1 |
| WGXM 13080 RS | ● | 80 | 94 | 55 | 50 | 27 | 20,0 | 13,5 | 12,4 | 7,0 | 25 | 6 | 1,1 | 1 |
| WGXM 13100 RS | ● | 100 | 114 | 70 | 50 | 32 | 46,0 | - | 14,4 | 8,5 | 32 | 7 | 1,6 | 2 |
| WGXM 13125 RS | ● | 125 | 139 | 80 | 63 | 40 | 52,0 | 29,0 | 16,4 | 9,5 | 29 | 8 | 2,8 | 1 |
| WGXM 13160 RS | ● | 160 | 174 | 130 | 63 | 40 | 88,0 | - | 16,4 | 9,5 | 29 | 10 | 4,5 | 3 |
| WGXM 13200 RS | ● | 200 | 214 | 150 | 63 | 60 | 130,0 | - | 25,7 | 14,0 | 35 | 12 | 7,0 | 4 |
| WGXM 13250 RS | ❍ | 250 | 264 | 190 | 63 | 60 | 160,0 | - | 25,7 | 14,0 | 35 | 14 | 11,1 | 4 |

#### ● Type: WGXF, Fine Pitch

| Cat. No. | Stock | Dimension (mm) | | | | Mounting | | | | | | No. of Teeth | Weight (kg) | Fig. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | øD | ød5 | ød1 | H | ød2 | ød4 | ød3 | a | b | ℓ | | | |
| WGXF 13050 RS | ● | 50 | 62 | 40 | 40 | 22 | 18,0 | 11,0 | 10,4 | 6,3 | 20 | 5 | 0,4 | 1 |
| WGXF 13063 RS | ● | 63 | 77 | 50 | 40 | 22 | 18,0 | 11,0 | 10,4 | 6,3 | 20 | 6 | 0,6 | 1 |
| WGXF 13080 RS | ● | 80 | 94 | 55 | 50 | 27 | 20,0 | 13,5 | 12,4 | 7,0 | 25 | 8 | 1,1 | 1 |
| WGXF 13100 RS | ● | 100 | 114 | 70 | 50 | 32 | 46,0 | - | 14,4 | 8,5 | 32 | 10 | 1,5 | 2 |
| WGXF 13125 RS | ● | 125 | 139 | 80 | 63 | 40 | 52,0 | 29,0 | 16,4 | 9,5 | 29 | 12 | 2,7 | 1 |
| WGXF 13160 RS | ● | 160 | 174 | 130 | 63 | 40 | 88,0 | - | 16,4 | 9,5 | 29 | 16 | 4,5 | 3 |
| WGXF 13200 RS | ● | 200 | 214 | 150 | 63 | 60 | 130,0 | - | 25,7 | 14,0 | 35 | 20 | 6,9 | 4 |
| WGXF 13250 RS | ❍ | 250 | 264 | 190 | 63 | 60 | 160,0 | - | 25,7 | 14,0 | 35 | 24 | 11,0 | 4 |

( ) Figures in brackets indicate values for ONMU inserts.
Inserts are not included.

● = Euro stock
❍ = Delivery on request

### ■ Identification Details

| WGX | M | 13 | 050 | R | S |
|---|---|---|---|---|---|
| Cutter Series | M: Medium F: Fine | Insert Size | Cutter Diameter | Direction | Metric |

# WGX (M/F) Type




## General Features

The Wavemill WGX Type employs unique chipbreaker design to provide lower cutting resistance and higher quality surface finishes than conventional tools.

## Series

| Type | Cat. No. | Cutter | No. of Teeth |
|---|---|---|---|
| Standard Pitch | WGX 13000RS | Ø40 ~ Ø250 | 3 ~ 10 |
| Medium Pitch | WGXM 13000RS | Ø50 ~ Ø250 | 4 ~ 14 |
| Fine Pitch | WGXF 13000RS | Ø50 ~ Ø250 | 5 ~ 24 |
| Endmill Type | WGX 13000EW | Ø32 ~ Ø63 | 3 ~ 5 |

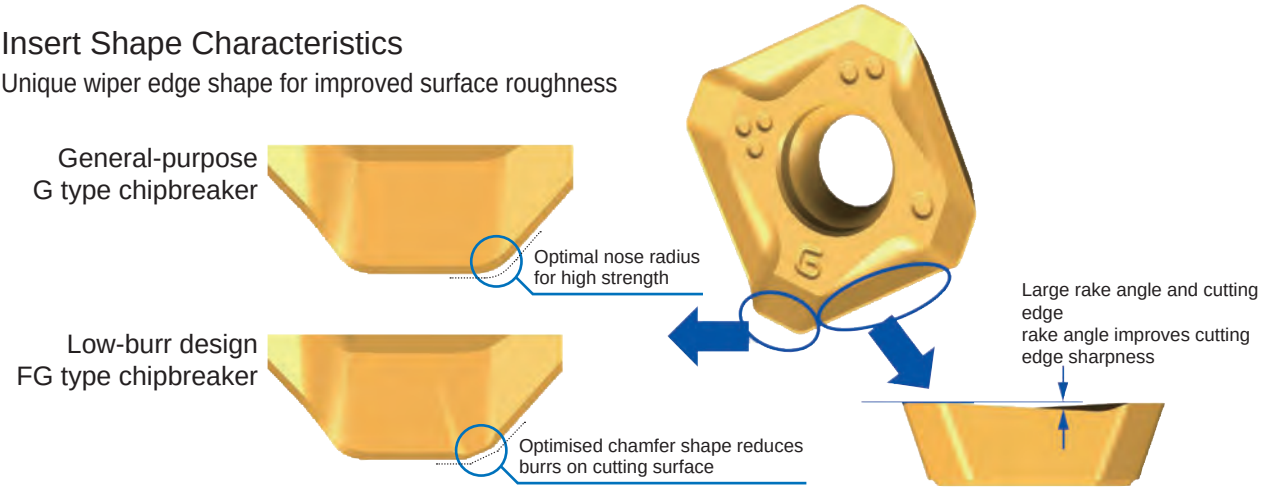
Inner coolant available for $D_c \leq$ Ø125mm

## Characteristics

- Stable Cutting
  Special chipbreaker designed for WGX enables lower cutting forces.
- High Quality
  Improved run-out precision and unique wiper edge shape ensure excellent surface finish quality.
  Optimised chamfer edge reduces burr and edge chipping.
- Long Tool Life
  Features high precision technology that reduces insert run-out variation and a new coating to provide stable and long tool life.

## Insert Shape Characteristics

Unique wiper edge shape for improved surface roughness




## Inserts

| Application | Coated Carbide | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| High Speed/Light cut | P | | | K | | MS | | |
| General Purpose | | PM | M | K | | MS | MS | |
| Roughing | | PM | PM | | K | | MS | |
| Cat. No. | ACP100 | ACP200 | ACP300 | ACK200 | ACK300 | ACM200 | ACM300 | Fig. |
| SEMT 13T3AGSR-L | ● | ● | ● | ● | ● | ● | ● | |
| SEMT 13T3AGSR-G | ● | ● | ● | ● | ● | ● | ● | 1 |
| SEMT 13T3AGSR-H | ● | ● | ● | ● | ● | ● | ● | |
| SEMT 13T3AGSR-FG | ● | ● | ● | ● | ● | ● | ● | 2 |

● Euro stock

Fig. 1

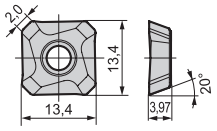
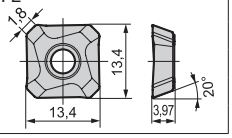
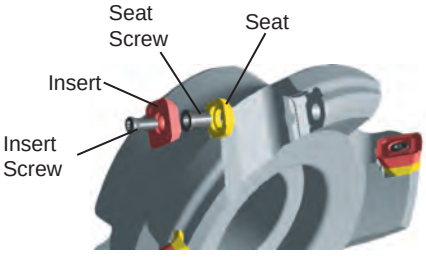



Fig. 2




## Spare Parts

| Applicable Cutters | Seat | Seat Screw | Insert Screw | Insert Wrench | Torque (N·m) | Seat Wrench |
|---|---|---|---|---|---|---|
| |  |  |  |  | |  |
| WGX (-M/F) | WGCS 13 R | BW 0507 F | BFTX 03512 IP | TRDR 15 IP | 3,0 | LH 035 |

## Recommended Cutting Conditions

| ISO | Work Material | Hardness | Cutting Speed $v_c$ (m/min) | Feed Rate $f_t$ (mm/tooth) | Grade |
|---|---|---|---|---|---|
| P | General Steel | 180~280HB | 150-**200**-250 | 0,15-**0,20**-0,25 | ACP200 |
| P | Soft Steel | ≤180HB | 180-**265**-350 | 0,10-**0,25**-0,40 | ACP200 |
| P | Die Steel | 200~220HB | 100-**150**-200 | 0,15-**0,20**-0,25 | ACP200 |
| M | Stainless Steel | - | 160-**205**-250 | 0,15-**0,23**-0,30 | ACM300 |
| K | Cast Iron | 250HB | 100-**175** -250 | 0,15-**0,23**-0,30 | ACK200 |
| S | Exotic Alloy | - | 30 - **50**- 80 | 0,10-**0,20**-0,30 | ACM300 |

Minimum-**Optimum**-Maximum

## General Milling for Steel, Cast Iron & Exotic Material

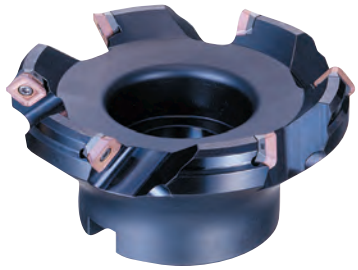


Fig. 1

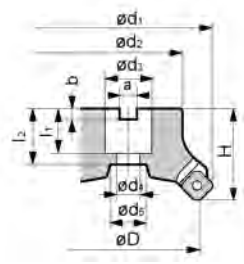



Fig. 2

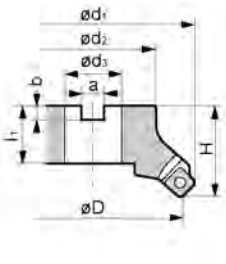
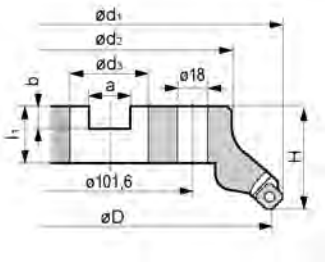



Fig. 3




### ■ Body

#### ● Standard WGC - Type

| Type | Cat. No. | Stock | Dimensions (mm) | | | | Mounting | | | | | | | No. of teeth | Weight (Kg) | Fig. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | ø D | ød1 | ød2 | H | a | b | ød3 | ød4 | ød5 | l1 | l2 | | | |
| WGC 3000 | WGC 3032 RS | ❍ | 32 | 41 | 32 | 40 | 8,4 | 5,6 | 16 | 9 | 14 | 18 | 28 | 4 | 0,2 | 1. |
| | WGC 3040 RS | ● | 40 | 49 | 32 | 40 | 8,4 | 5,6 | 16 | 9 | 14 | 18 | 28 | 4 | 0,3 | |
| | WGC 3050 RS | ● | 50 | 59 | 40 | 40 | 10,4 | 6,3 | 22 | 11 | 18 | 20 | 26 | 5 | 0,4 | |
| | WGC 3063 RS | ● | 63 | 72 | 50 | 40 | 10,4 | 6,3 | 22 | 11 | 18 | 20 | 26 | 6 | 0,6 | |
| | WGC 3080 RS | | 80 | 89 | 60 | 50 | 12,4 | 7,0 | 27 | 13,5 | 20 | 25 | 31 | 6 | 1,1 | |
| | WGC 3100 RS | | 100 | 109 | 70 | 50 | 14,4 | 8,5 | 32 | - | - | 32 | - | 7 | 1,5 | 2. |
| WGC 4000 | WGC 4040 RS | ❍ | 40 | 52 | 32 | 40 | 8,4 | 5,6 | 16 | 9 | 14 | 18 | 28 | 3 | 0,4 | 1. |
| | WGC 4050 RS | ● | 50 | 63 | 40 | 40 | 10,4 | 6,3 | 22 | 11 | 18 | 20 | 26 | 3 | 0,5 | |
| | WGC 4063 RS | ● | 63 | 76 | 50 | 40 | 10,4 | 6,3 | 22 | 11 | 18 | 20 | 26 | 4 | 0,6 | |
| | WGC 4080 RS | ● | 80 | 93 | 60 | 50 | 12,4 | 7,0 | 27 | 13,5 | 20 | 25 | 31 | 4 | 1,0 | |
| | WGC 4100 RS | ● | 100 | 113 | 70 | 50 | 14,4 | 8,5 | 32 | - | - | 32 | - | 5 | 1,5 | 2. |
| | WGC 4125 RS | ● | 125 | 138 | 80 | 63 | 16,4 | 9,5 | 40 | - | - | 38 | - | 6 | 2,6 | |
| | WGC 4160 RS | ● | 160 | 173 | 100 | 63 | 16,4 | 9,5 | 40 | - | - | 38 | - | 7 | 4,0 | |
| | WGC 4200 RS | ❍ | 200 | 213 | 130 | 63 | 25,7 | 14,0 | 60 | - | - | 35 | - | 8 | 6,6 | 3. |

#### ● Medium Pitch WGCM - Type

| Type | Cat. No. | Stock | Dimensions (mm) | | | | Mounting | | | | | | | No. of teeth | Weight (Kg) | Fig. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | ø D | ød1 | ød2 | H | a | b | ød3 | ød4 | ød5 | l1 | l2 | | | |
| WGCM 4000 | WGCM 4050 RS | ● | 50 | 63 | 40 | 40 | 10,4 | 6,3 | 22 | 11 | 18 | 20 | 26 | 4 | 0,5 | 1. |
| | WGCM 4063 RS | ● | 63 | 76 | 50 | 40 | 10,4 | 6,3 | 22 | 11 | 18 | 20 | 26 | 5 | 0,6 | |
| | WGCM 4080 RS | ● | 80 | 93 | 60 | 50 | 12,4 | 7,0 | 27 | 13,5 | 20 | 25 | 31 | 6 | 1,0 | |
| | WGCM 4100 RS | ● | 100 | 113 | 70 | 50 | 14,4 | 8,5 | 32 | - | - | 32 | - | 7 | 1,5 | 2. |
| | WGCM 4125 RS | ● | 125 | 138 | 80 | 63 | 16,4 | 9,5 | 40 | - | - | 38 | - | 8 | 2,6 | |
| | WGCM 4160 RS | ● | 160 | 173 | 100 | 63 | 16,4 | 9,5 | 40 | - | - | 38 | - | 10 | 4,0 | |
| | WGCM 4200 RS | ❍ | 200 | 213 | 130 | 63 | 25,7 | 14,0 | 60 | - | - | 35 | - | 12 | 6,6 | 3. |

#### ● Close Pitch WGCF - Type

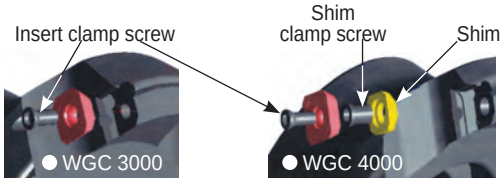
| Type | Cat. No. | Stock | Dimensions (mm) | | | | Mounting | | | | | | | No. of teeth | Weight (Kg) | Fig. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | ø D | ød1 | ød2 | H | a | b | ød3 | ød4 | ød5 | l1 | l2 | | | |
| WGCF 4000 | WGCF 4050 RS | ● | 50 | 63 | 40 | 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 |

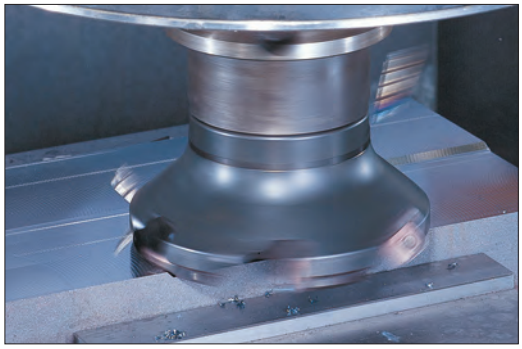
### ■ Structure



# Face Mill
# WGC (M/F) Type

## Features

- Suitable for high speed machining $v_c$ < 400m/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

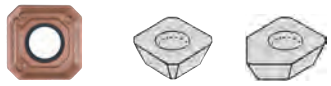



Fig. 1

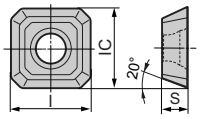



Fig. 2

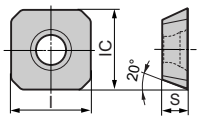
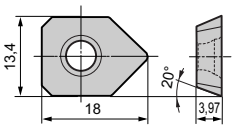


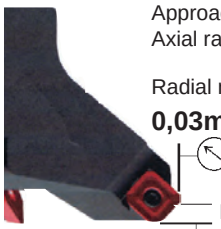

Fig. 3




| For WGC 3000 series | Cat. No. | Coated carbide | | | | | DLC | Cermet | Uncoated carbide | | PCD | Dimensions (mm) | | | Fig. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ACP100 | ACP200 | ACP300 | ACK200 | ACK300 | DL1000 | T250A | EH520 | H1 | DA2200 | l | IC | $s^{\pm t}$ | |
|  | 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 | |
| | SEMT 0903 AGSN-G | ● | ● | ● | ● | ● | | | | | | | | | |
| For WGC, WGC M/-F 4000 series | SEET 13T3 AGFN-L | ● | ● | ● | ● | ● | ● | | ● | ● | | 13,4 ±0,025 | | 3,97 ±0,025 | 1. |
|  | SEET 13T3 AGSN-G | ● | ● | ● | ● | ● | | ● | | | | | | | |
| | SEET 13T3 AGSN-N | ● | ● | ● | ● | ● | | ● | | | | | | | |
| | SEMT 13T3 AGSN-L | ● | ● | ● | ● | ● | | | | | | 13,4 ±0,08 | | 3,97 ±0,13 | |
| | 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 | | | | | | | | | | | 18 | 13,4 | 3,97 ±0,025 | 3. |
| | XEEW 13T3 AGER-W | | | | | ❍ | | | | | | | | | |

● = Euro stock
❍ = Delivery on request

## Specifications



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

**0,03mm**

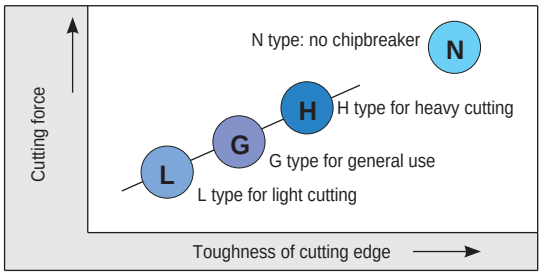
Max. depth of cut: 6 mm
( 4 mm)

**0,02mm**

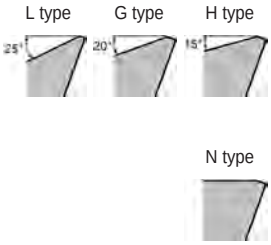
Run-out with M class insert SEMT13T3

( ) shows WGC 3000 type

## Chip Breaker System




● Cutting edge geometry




## Recommended Cutting Conditions

[$v_c$ =m/min, $f_t$ =mm/tooth] [min.– **optimum** – max.]

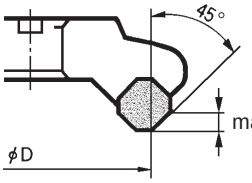
| Insert type | | SEMT 13T3 AGSN-G | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Grade | | ACP100 | | | ACP200 | | | ACP300 | | ACK200 | | ACK300 | | |
| Work material / Type | | Low carbon steel | Alloy steel | Die steel | Low carbon steel | Alloy steel | Die steel | Stainless steel austenitic | Stainless steel martensitic | Cast iron | Ductile cast iron | Cast iron | Ductile cast iron |
| WGC (-M/-F) 4040 ~ 4200 | $v_c$ | 100 - **250** - 400 | 80 - **220** - 280 | 80 - **150** - 250 | 80 - **200** - 370 | 70 - **150** - 250 | 60 - **130** - 220 | 120 - **180** - 240 | 100 - **140** - 200 | 220 - **270** - 450 | 150 - **180** - 250 | 180 - **220** - 270 | 130 - **160** - 220 |
| | $f_t$ | 0,1 - **0,25** - 0,4 | 0,1 - **0,25** - 0,4 | 0,1 - **0,2** - 0,3 | 0,1 - **0,25** - 0,4 | 0,1 - **0,25** - 0,4 | 0,1 - **0,2** - 0,3 | 0,1 - **0,2** - 0,3 | 0,1 - **0,2** - 0,3 | 0,1 - **0,25** - 0,4 | 0,1 - **0,25** - 0,4 | 0,1 - **0,25** - 0,4 | 0,1 - **0,25** - 0,4 |
| | $d_{oc}$ | 1,0 - **3,0** - 5,0 | | | 1,0 - **3,0** - 5,0 | | | 1,0 - **2,0** - 3,0 | | 1,0 - **3,0** - 5,0 | | 1,0 - **3,0** - 5,0 | |

# 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 R | Stock L | Dimensions (mm) ø D | ø $d_1$ | ø $d_2$ | H | Mounting ø $d_3$ | a | b | $l_1$ | No. of teeth | max. depth of cut | Weight (Kg) | Fig. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 | 2. |
| | 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 | 3. |
| | UFO 4160 R/L-S | ● | | 160 | 180 | 100 | 63 | 40 | 16,4 | 9,5 | 29 | 9 | | 6,6 | |
| | 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 | |
| | UFO 4315 R/L-S | ❍ | | 315 | 335 | 240 | 80 | 60 | 25,7 | 14,0 | 40 | 15 | | 26,6 | 5. |
| UFO 5000 | UFO 5080 R/L-S | ● | | 80 | 102 | 60 | 50 | 27 | 12,4 | 7,0 | 25 | 5 | 7,0 | 2,1 | 1. |
| | UFO 5100 R/L-S | ● | | 100 | 119 | 75 | 50 | 32 | 14,4 | 8,5 | 29 | 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

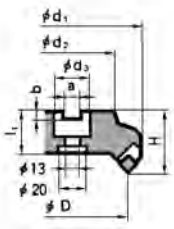



Fig. 2

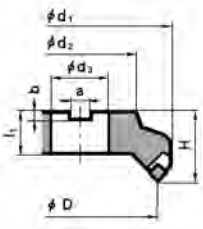



Fig. 3

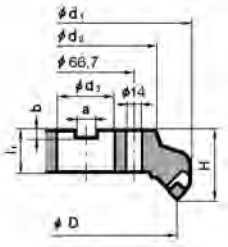



Fig. 4

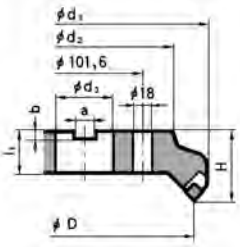
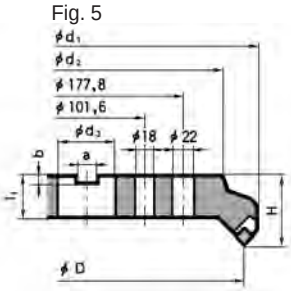
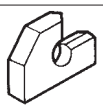
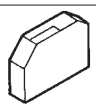



Fig. 5

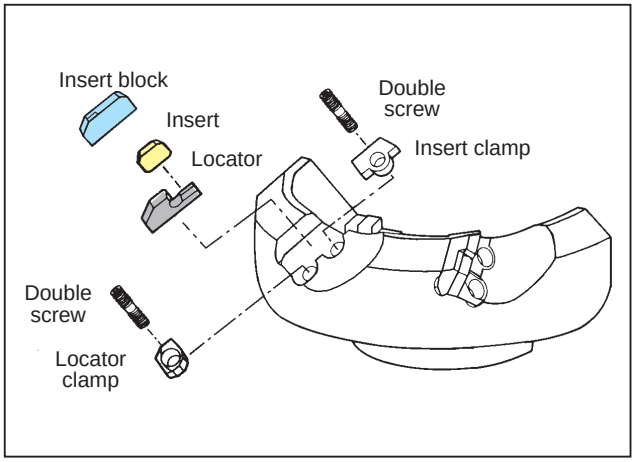



### Spare Parts

| 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 | UFKW R/L | WB 7-15 T | TT 25 |
| 4080 - 4315 | | | |
| 5080 - 5315 | | | |

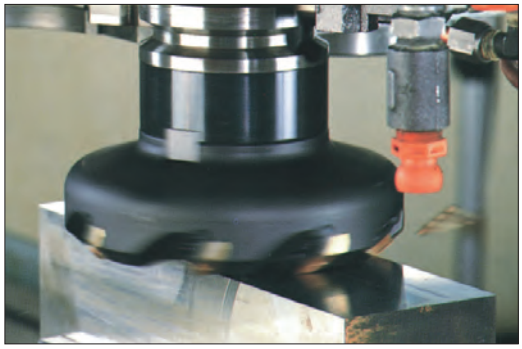
### Structure



# Face Mill
# UFO / UFOF Type

## Features

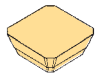
- 45° approach face mills
- 27° super high rake multi purpose cutter for outstanding productivity milling steels, irons and alloys
- Substantially improves metal removal rates on low powered machines
- Differential pitched inserts guarantee smooth cutting action
- Rigid body incorporates carbide locators and HSS shims resulting in extremely low run out



## Body (Close Pitch Type)

| Type | Cat. No. | Stock R | Stock L | Dimensions (mm) ø D | ø $d_1$ | ø $d_2$ | H | Mounting ø $d_3$ | a | b | $l_1$ | No. of teeth | max. depth of cut | Weight (Kg) | Fig. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| UFOF 4000 | **UFOF 4080 R/L-S** | ● | | 80 | 103 | 60 | 50 | 27 | 12,4 | 7,0 | 25 | 6 | 5,0 | 2,1 | 1. |
| | **UFOF 4100 R/L-S** | ● | | 100 | 122 | 75 | 50 | 32 | 14,4 | 8,5 | 29 | 8 | | 2,9 | 2. |
| | **UFOF 4125 R/L-S** | ● | | 125 | 146 | 75 | 63 | 40 | 16,4 | 9,5 | 29 | 10 | | 4,2 | |
| | **UFOF 4160 R/L-S** | ● | | 160 | 180 | 100 | 63 | 40 | 16,4 | 9,5 | 29 | 12 | | 6,6 | 3. |
| | **UFOF 4200 R/L-S** | ❍ | | 200 | 220 | 130 | 63 | 60 | 25,7 | 14,0 | 32 | 16 | | 9,5 | 4. |
| | **UFOF 4250 R/L-S** | ❍ | | 250 | 270 | 300 | 63 | 60 | 25,7 | 14,0 | 40 | 20 | | 14,8 | |
| | **UFOF 4315 R/L-S** | ❍ | | 315 | 335 | 240 | 80 | 60 | 25,7 | 14,0 | 40 | 24 | | 26,6 | 5. |

## Insert


SFKN


SFKR


UW

Fig. 1

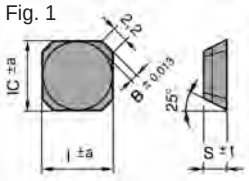



Fig. 2

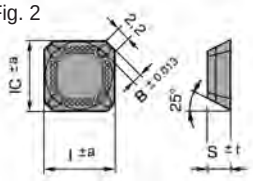
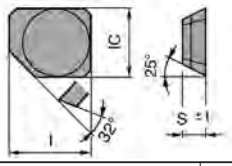



Fig. 3




| UFO 4000 / UFOF 4000 | | | Cat. No. | Coated carbide ACP100 | ACP200 | ACP300 | ACK200 | ACK300 | Cermet T250A | Uncoated carbide A30N | G10E | H1 | H10E | Dimensions (mm) l | IC | s ±t | Fig. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  | 12 | T3 | **SFKN 12T3 AZFN** | | | | ● | ● | | | ❍ | ❍ | | 12,7 ±0,075 | | 3,97 ±0,025 | 1. |
| | | | **SFKN 12T3 AZTN** | ● | ● | ● | | | ❍ | ❍ | | | | | | | |
| | | | **SFKR 12T3 AZTN** | ❍ | ❍ | | | | | | | | | 12,7 ±0,05 | | | 2. |
| | | | **UW 12500 R** | | | | | | | | | | ❍ | 16 | 12,2 | | 3. |
| UFO 5000 | 15 | 04 | **SFKN 1504 AZFN** | | | | ● | ❍ | | | ❍ | | | 15,875 ±0,075 | | 4,76 ±0,025 | 1. |
| | | | **SFKN 1504 AZTN** | ● | ● | ● | | | | | | | | | | | |
| | | | **UW 15500 R** | | | | | | | | | | ❍ | 16 | 12,2 | | 3. |

● = Euro stock
❍ = Delivery on request

## Recommended Cutting Conditions

[$v_c$ =m/min, $f_t$ =mm/tooth] [min.– **optimum** – max.]

| Grade / Work material / Insert type | | ACP100 Low carbon steel | ACP100 Alloy steel | ACP100 Die steel | ACP200 Low carbon steel | ACP200 Alloy steel | ACP200 Die steel | ACP300 Stainless steel austenitic | ACP300 Stainless steel martensitic | ACK200 Cast iron | ACK200 Ductile cast iron | ACK300 Cast iron | ACK300 Ductile cast iron |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| UFO (-F) 4000 | $v_c$ | 100-**250**-400 | 80-**220**-280 | 80-**150**-250 | 80-**200**-370 | 70-**150**-250 | 60-**130**-220 | 120-**180**-240 | 100-**140**-200 | 220-**270**-450 | 150-**180**-250 | 180-**220**-270 | 130-**160**-220 |
| | $f_t$ | 0,1-**0,25**-0,4 | 0,1-**0,25**-0,4 | 0,1-**0,2**-0,3 | 0,1-**0,25**-0,4 | 0,1-**0,25**-0,4 | 0,1-**0,2**-0,3 | 0,1-**0,2**-0,3 | 0,1-**0,2**-0,3 | 0,1-**0,25**-0,4 | 0,1-**0,25**-0,4 | 0,1-**0,25**-0,4 | 0,1-**0,25**-0,4 |
| | $d_{oc}$ | 1,0-**3,0**-5,0 | | | 1,0-**3,0**-5,0 | | | 1,0-**2,0**-3,0 | | 1,0-**3,0**-5,0 | | 1,0-**3,0**-5,0 | |
| UFO (-F) 5000 | $v_c$ | 100-**250**-400 | 80-**220**-280 | 80-**150**-250 | 80-**200**-370 | 70-**150**-250 | 60-**130**-220 | 120-**180**-240 | 100-**140**-200 | 220-**270**-450 | 150-**180**-250 | 180-**220**-270 | 130-**160**-220 |
| | $f_t$ | 0,1-**0,25**-0,4 | 0,1-**0,25**-0,4 | 0,1-**0,2**-0,3 | 0,1-**0,25**-0,4 | 0,1-**0,25**-0,4 | 0,1-**0,2**-0,3 | 0,1-**0,2**-0,3 | 0,1-**0,2**-0,3 | 0,1-**0,25**-0,4 | 0,1-**0,25**-0,4 | 0,1-**0,25**-0,4 | 0,1-**0,25**-0,4 |
| | $d_{oc}$ | 1,0-**4,0**-7,0 | | | 1,0-**4,0**-7,0 | | | 1,0-**3,0**-5,0 | | 1,0-**4,0**-7,0 | | 1,0-**4,0**-7,0 | |

# DNX / DNXF Type

## General Milling for Cast Iron and Steel

| | | |
|---|---|---|
| Approach angle | : | 65° |
| Axial rake angle | : | + 5° |
| Radial rake angle | : | - 6° |

8 mm / 65°



Fig. 1

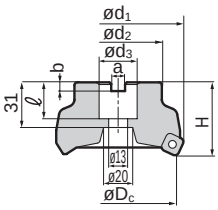



Fig. 2

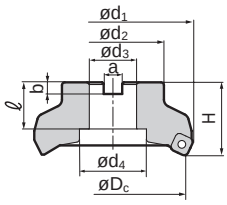



Fig. 3

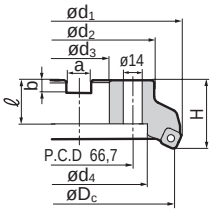
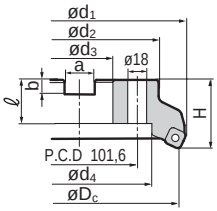



Fig. 4




### ■ Body

### ● Standard DNX - Type

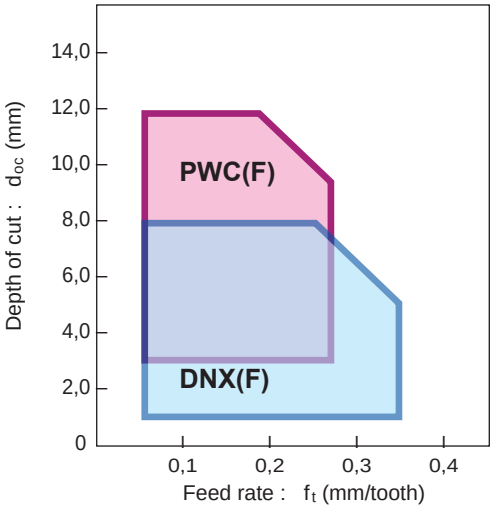
| Type | Cat. No. | Stock | Dimensions (mm) | | | | Mounting | | | | | Number of teeth | Max. depth of cut | Weight (Kg) | Fig. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | ø D | ød1 | H | ød2 | ød3 | ød4 | a | b | ℓ | | | | |
| DNX 12000 | DNX 12080 RS | ● | 80 | 88 | 50 | 60 | 27 | – | 12,4 | 7,0 | 25 | 6 | 8,0 | 1,2 | 1. |
| | DNX 12100 RS | ● | 100 | 108 | 50 | 80 | 32 | 46 | 14,4 | 8,5 | 29 | 7 | | 1,6 | 2. |
| | DNX 12125 RS | ● | 125 | 133 | 63 | 80 | 40 | 56 | 16,4 | 9,5 | 29 | 8 | | 2,8 | |
| | DNX 12160 RS | ● | 160 | 168 | 63 | 100 | 40 | 88 | 16,4 | 9,5 | 29 | 10 | | 4,4 | 3. |
| | DNX 12200 RS | ❍ | 200 | 210 | 63 | 150 | 60 | 130 | 25,7 | 14,0 | 35 | 16 | | 8,0 | 4. |
| | DNX 12250 RS | ❍ | 250 | 260 | 63 | 180 | 60 | 160 | 25,7 | 14,0 | 35 | 20 | | 12,2 | |

### ● Close Pitch DNXF - Type

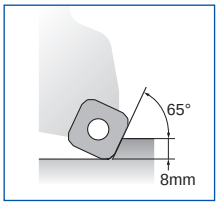
| Type | Cat. No. | Stock | Dimensions (mm) | | | | Mounting | | | | | Number of teeth | Max. depth of cut | Weight (Kg) | Fig. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | ø D | ød1 | H | ød2 | ød3 | ød4 | a | b | ℓ | | | | |
| DNXF 12000 | DNXF 12080 RS | ● | 80 | 88 | 50 | 60 | 27 | – | 12,4 | 7,0 | 25 | 8 | 8,0 | 1,2 | 1. |
| | DNXF 12100 RS | ● | 100 | 108 | 50 | 80 | 32 | 46 | 14,4 | 8,5 | 29 | 10 | | 1,6 | 2. |
| | DNXF 12125 RS | ● | 125 | 133 | 63 | 80 | 40 | 56 | 16,4 | 9,5 | 29 | 11 | | 2,7 | |
| | DNXF 12160 RS | ● | 160 | 168 | 63 | 100 | 40 | 88 | 16,4 | 9,5 | 29 | 12 | | 4,4 | 3. |

● = Euro stock
❍ = Delivery on request

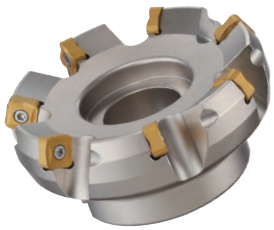
### ■ First Recommendation: DNX




### DNX / DNXF




Wiper width = 1,2mm



| Max. depth of cut : 8mm, Approach angle : 65° | | |
|---|---|---|
| Cutter type | Diameter range | Characteristics |
| DNX 12000 RS | Ø80~Ø250mm | - General purpose<br>- Medium pitch type |
| DNXF 12000 RS | Ø80~Ø160mm | - General purpose<br>- Fine pitch type |

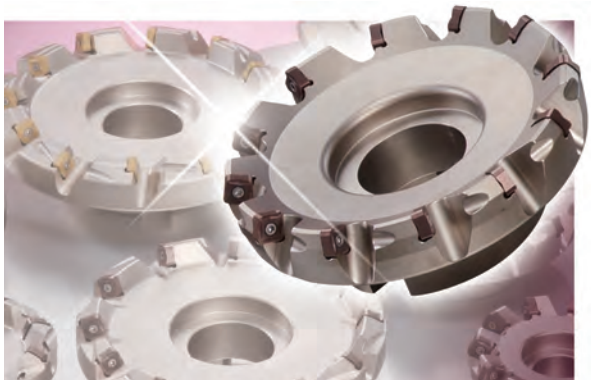
### ■ Spare Parts

| Cutter | Insert screw | Wrench | Locator | Clamp screw | Wrench |
|---|---|---|---|---|---|
| |  |  |  |  |  |
| Ø 80 ~ Ø160 | BFTX0412 IP | TRDR15 IP | – | – | – |
| Ø200 , Ø250 | | | DNXK 12 R | BX 0515 | LH 040 |

### ■ Identification of Cutter Body

**DNX F 12 080 R S**

| DNX | F | 12 | 080 | R | S |
|---|---|---|---|---|---|
| Cutter type | Fine pitch | Insert size | Diam. | Cutting direction | Shell type |



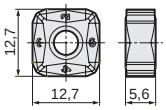
## Features

- Small inserts with 8 cutting edges
- Economic by double-side usage
- Excellent grade for cast iron machining
- Optimised geometry for best results in cast iron
- Special inserts for steel machining

## Insert

| Cat. No. | Coated carbide | | | | | Fig. |
|---|---|---|---|---|---|---|
| | ACP200 | ACP300 | ACK100 | ACK200 | ACK300 | |
| SNMT 1205 ZNEN-G | ● | | ● | ● | ● | 1 |
| SNMT 1205 ZNEN-H | ● | | ● | ● | ● | 2 |
| SNMT 1205 ZNEN-SH | ● | ❍ | ● | ● | ● | 3 |

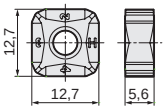
Fig. 1 **G** Type




Cutting edge



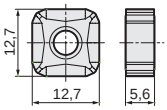
Fig. 2 **H** Type




Flat land



Fig. 3 **SH** Type



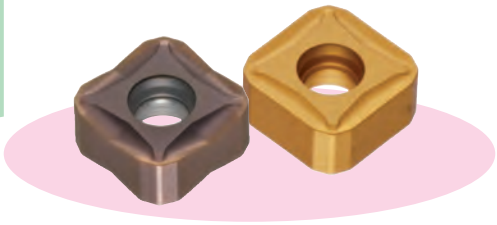

Flat land



**G** Type : For general purpose
**H** Type : For heavy machining
**SH** Type : For steel machining

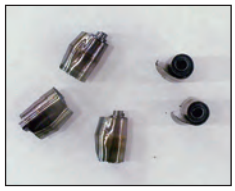
● = Euro stock
❍ = Delivery on request

●Negative inserts
●Inserts with 8 cutting edges
●Applicable for steel machining



## Advantage of SH-Type when Steel machining

G Type



Chip packing causes higher cutting forces !

**SH** Type



Smooth chip evacuation reduces cutting forces !

## Recommended Cutting Conditions

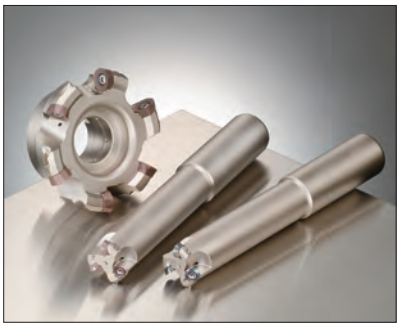
[$v_c$ = m/min, $f_t$ = mm/tooth] [min.– **optimum** – max.]

| ISO | Work material | Hardness (HB) | Cutting speed $v_c$ (m/min) | Feed rate $f_t$ (mm/tooth) | Insert grade |
|---|---|---|---|---|---|
| P | Carbon steel | 180 - 280 | 150 - **175** - 200 | 0,10 - **0,15** - 0,20 | ACP200 |
| | Alloy steel | 180 - 280 | 150 - **175** - 200 | 0,10 - **0,15** - 0,20 | ACP200 |
| K | Grey cast iron (GG) | 250 | 150 - **225** - 300 | 0,10 - **0,20** - 0,30 | ACK200 / ACK300 |
| | Ductile cast iron (GGG) | 250 | 150 - **225** - 250 | 0,10 - **0,18** - 0,25 | ACK200 / ACK300 |

# Wave Radius Mill
# WRCX Type

## High Durable Mill with Polygon Inserts

## Grades for Steels, Cast Iron and Aluminium



## Features

The "Wave Mill" WRCX type is a new multi purpose milling cutter for face milling, slotting, helical boring, plunging and profiling. Its unique design features 16 corner polygon inserts and a durable cutter body manufactured from high tensile alloyed steel protected by a hard surface treatment. Insert rigidity is maximised via close tolerance seat pockets and centre clamped using a torxscrew . Choose from a variety of insert grades such as our award winning Diamond like Carbon DL 1000 capable of high feed machining aluminium, our uncoated H1 grade suitable for non-ferrous metals or our new ACP/ACK grades for steels and irons.

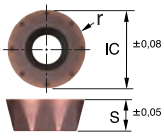
## Advantages

- Durable cutter body – Special alloyed steel with hard surface.
- High feed cutting – Optimised pitch and high number of cutting edges
- Excellent chip removal – Wide pocket and integral coolant hole
- Maximum rigidity – Rigid clamping of inserts with TORXPLUS screw
- Wide application range – Carbon steels, alloy steels, stainless steels, high temperature alloys, diemould steels, aluminiums, non-ferrous metals etc

## Insert

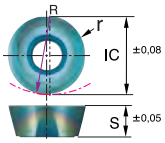
● QPMT... : Standard 16 cornered polygon type
QPMT...-H : Stronger cutting edge type

Fig. 1




● QPET...-S : Polished round insert for non-ferrous material

Fig. 2




Rake angle: 25°

4 corners use

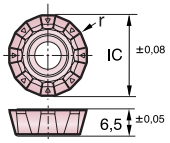
R : wiper radius

| Cat. No. | Coated carbide | | | | | Diamond coated | Uncoated carbide | IC (mm) | r (mm) | s (mm) | Max. $d_{oc}$ 4 corners application | Max. $d_{oc}$ 8 corners application | Fig. | Applicable cutter |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ACP100 | ACP200 | ACP300 | ACK200 | ACK300 | DL1000 | H1 | | | | | | | |
| **QPMT 120440 PPEN** | ● | ● | ● | ● | ● | | | 12 | 4,0 | 4,76 | 5,6 | 1,5 | ❶ | WRCX/-F 12000 RS |
| **QPMT 120440 PPEN-H** | ● | ● | ● | ● | ● | | | | | | | | | |
| **QPET 120460 PPFR-S** | | | | | | ● | ● | | 6,0 | | | – | ❷ | |
| **QPMT 160660 PPEN** | ● | ● | ● | ● | ● | | | 16 | 6,0 | 6,5 | 7,6 | 2,1 | ❶ | WRCX/-F/-X 16000 RS |
| **QPMT 160660 PPEN-H** | ● | ● | ● | ● | ● | | | | | | | | | |
| **QPET 160680 PPFR-S** | | | | | | ● | ● | | 8,0 | | | – | ❷ | |
| **QPMT 200670 PPEN** | ● | ● | ● | ● | ● | | | 20 | 7,0 | 6,5 | 9,4 | 2,5 | ❶ | WRCXF 20000 RS |
| **QPMT 200670 PPEN-H** | ● | ● | ● | ● | ● | | | | | | | | | |

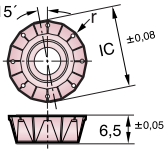
● = Euro stock
❍ = Delivery on request

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

Type 08



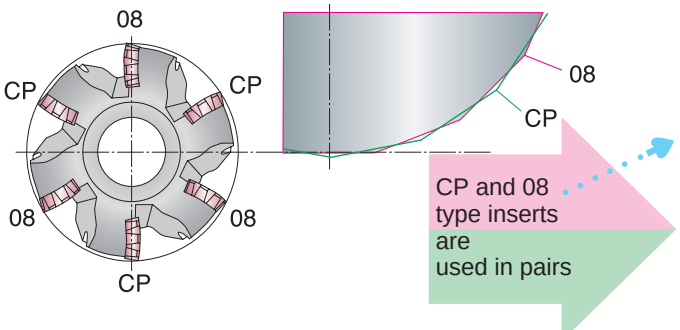

Type CP




| Cat. No. | Coated carbide | | | | | Diamond coated | Uncoated carbide | IC (mm) | r (mm) | s (mm) | Max. $d_{oc}$ 4 corners application | Max. $d_{oc}$ 8 corners application | Insert type | Applicable cutter |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ACP100 | ACP200 | ACP300 | ACK200 | ACK300 | DL1000 | H1 | | | | | | | |
| **QPMT 160608 PPEN** | ● | ● | ● | ● | ● | | | 16 | 0,8 | 6,5 | 7,6 | 1,2 | 08 | WRCX/-F/-X 16000 RS |
| **QPMT 160608 PPEN-CP** | ● | ● | ● | ● | ● | | | | | | | 2,3 | CP | |
| **QPMT 200608 PPEN** | ● | ● | ● | ● | ● | | | 20 | 0,8 | 6,5 | 9,4 | 1,6 | 08 | WRCXF 20000 RS |
| **QPMT 200608 PPEN-CP** | ● | ● | ● | ● | ● | | | | | | | 2,9 | CP | |

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

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




### ● Chip Formation

| Anti-vibration Type | Standard Type |
|---|---|
|  |  |

Work material: 50C
Cutting data: $f_t$ = 0,1mm/tooth, $d_{oc}$ = 7 mm
Insert size: IC = 20 mm

Axial rake angle: - 3°
Radial rake angle: 0°

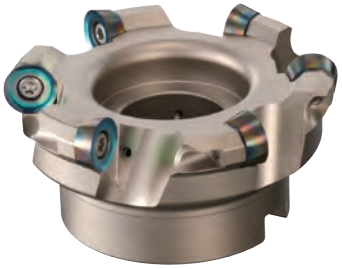


Fig. 1

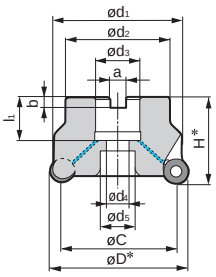



Fig. 2

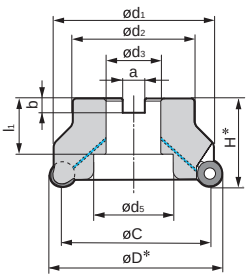
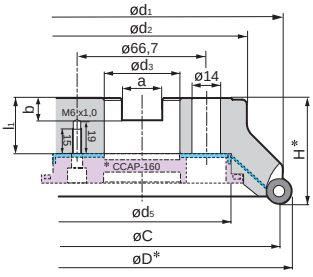



Fig. 3




## ■ Body

### ● Standard WRCX Type

| Insert IC (mm) | Cat. No. | Stock | Dimensions (mm) | | | | | Mounting | | | | | | No. of teeth | Helical boring øB Standard | Ramping αmax. | Weight (Kg) | Fig. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | ø D* | ø C | ød1 | ød2 | H* | a | b | ød3 | ød4 | ød5 | l1 | | | | | |
| 12 | WRCX 12040 RS | ● | 40 | 28 | 36 | 36 | 40 | 8,4 | 5,6 | 16 | 9 | 14 | 18 | 4 | 68 ± 11 | 10° | 0,2 | 1 |
| | WRCX 12050 RS | ● | 50 | 38 | 46 | 40 | 40 | 10,4 | 6,3 | 22 | 11 | 18 | 20 | 4 | 88 ± 11 | 7° | 0,3 | |
| | WRCX 12052 RS | ● | 52 | 40 | 48 | 40 | 40 | 10,4 | 6,3 | 22 | 11 | 18 | 20 | 5 | 92 ± 11 | 6°30´ | 0,3 | |
| | WRCX 12063 RS | ● | 63 | 51 | 59 | 40 | 40 | 10,4 | 6,3 | 22 | 11 | 18 | 20 | 5 | 114 ± 11 | 5° | 0,4 | |
| | WRCX 12080 RS | ● | 80 | 68 | 76 | 55 | 50 | 12,4 | 7,0 | 27 | 13,5 | 20 | 25 | 6 | 148 ± 11 | 3°30´ | 0,9 | |
| 16 | WRCX 16063 RS | ● | 63 | 47 | 50 | 50 | 40 | 10,4 | 6,3 | 22 | 11 | 18 | 20 | 3 | 110 ± 15 | 8° | 0,4 | 1 |
| | WRCX 16080 RS | ● | 80 | 64 | 70 | 55 | 50 | 12,4 | 7,0 | 27 | 13,5 | 20 | 25 | 4 | 144 ± 15 | 5°30´ | 0,8 | |
| | WRCX 16100 RS | ● | 100 | 84 | 90 | 70 | 50 | 14,4 | 8,5 | 32 | - | 46 | 32 | 5 | 184 ± 15 | 4° | 1,3 | 2 |
| | WRCX 16125 RS | ❍ | 125 | 109 | 115 | 80 | 63 | 16,4 | 9,5 | 40 | - | 52 | 38 | 5 | 234 ± 15 | 3° | 2,4 | |

### ● Close Pitch WRCXF Type

| Insert IC (mm) | Cat. No. | Stock | Dimensions (mm) | | | | | Mounting | | | | | | No. of teeth | Helical boring øB Standard | Ramping αmax. | Weight (Kg) | Fig. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | ø D* | ø C | ød1 | ød2 | H* | a | b | ød3 | ød4 | ød5 | l1 | | | | | |
| 12 | WRCXF 12050 RS | ❍ | 50 | 38 | 46 | 40 | 40 | 10,4 | 6,3 | 22 | 11 | 18 | 20 | 5 | 88 ± 11 | 7° | 0,3 | 1 |
| | WRCXF 12063 RS | ❍ | 63 | 51 | 59 | 40 | 40 | 10,4 | 6,3 | 22 | 11 | 18 | 20 | 6 | 114 ± 11 | 5° | 0,4 | |
| 16 | WRCXF 16052 RS | ● | 52 | 36 | 45 | 45 | 40 | 10,4 | 6,3 | 22 | 11 | 17,7 | 20 | 4 | 88 ± 15 | 10° | 0,3 | |
| | WRCXF 16063 RS | ● | 63 | 47 | 50 | 50 | 40 | 10,4 | 6,3 | 22 | 11 | 18 | 20 | 4 | 110 ± 15 | 8° | 0,4 | |
| | WRCXF 16080 RS | ● | 80 | 64 | 70 | 55 | 50 | 12,4 | 7,0 | 27 | 13,5 | 20 | 25 | 5 | 144 ± 15 | 5°30´ | 0,8 | |
| | WRCXF 16100 RS | ● | 100 | 84 | 90 | 70 | 50 | 14,4 | 8,5 | 32 | - | 46 | 32 | 6 | 184 ± 15 | 4° | 1,3 | 2 |
| | WRCXF 16125 RS | ● | 125 | 109 | 115 | 80 | 63 | 16,4 | 9,5 | 40 | 29 | 52 | 29 | 6 | 234 ± 15 | 3° | 2,4 | 1 |
| | WRCXF 16160 RS | ● | 160 | 144 | 150 | 100 | 63 | 16,4 | 9,5 | 40 | - | 93 | 29 | 8 | 304 ± 18 | 2° | 4,0 | 3* |
| 20 | WRCXF 20080 RS | ● | 80 | 60 | 68 | 55 | 50 | 12,4 | 7,0 | 27 | 13,5 | 20 | 25 | 5 | 140 ± 18 | 7° | 0,7 | 1 |
| | WRCXF 20100 RS | ● | 100 | 80 | 88 | 70 | 50 | 14,4 | 8,5 | 32 | - | 46 | 32 | 6 | 180 ± 18 | 5° | 1,1 | 2 |
| | WRCXF 20125 RS | ● | 125 | 105 | 113 | 80 | 63 | 16,4 | 9,5 | 40 | 29 | 52 | 29 | 6 | 230 ± 18 | 3°30´ | 2,3 | 1 |
| | WRCXF 20160 RS | ● | 160 | 140 | 148 | 100 | 63 | 16,4 | 9,5 | 40 | - | 93 | 29 | 8 | 300 ± 18 | 2°30´ | 3,9 | 3* |

### ● Extra Close Pitch WRCXX Type

| Insert IC (mm) | Cat. No. | Stock | Dimensions (mm) | | | | | Mounting | | | | | | No. of teeth | Helical boring øB Standard | Ramping αmax. | Weight (Kg) | Fig. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | ø D* | ø C | ød1 | ød2 | H* | a | b | ød3 | ød4 | ød5 | l1 | | | | | |
| 16 | WRCXX 16080 RS | ● | 80 | 64 | 70 | 55 | 50 | 12,4 | 7,0 | 27 | 13,5 | 20 | 25 | 6 | 144 ± 15 | 5°30´ | 0,8 | 1 |
| | WRCXX 16100 RS | ● | 100 | 84 | 90 | 70 | 50 | 14,4 | 8,5 | 32 | - | 46 | 32 | 7 | 184 ± 15 | 4° | 1,3 | 2 |

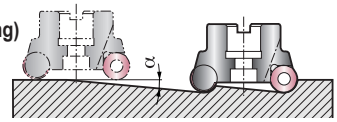
* Note : When using CP type anti-vibration inserts / IC = 16, please change above dimensions: øD* +0,3 & H* +0,15 mm
In case of anti-vibration inserts / IC = 20, please change above dimensions: øD* +0,4 & H* +0,2 mm

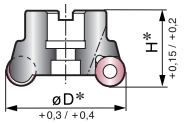
* Note Fig.3 for øD=160 : Coolant cap (CCAP-160) with 4 screws (BX0620) and wrench (TH050) is available seperately.

## ■ Maximum Rotation (min-1) for Non-ferrous cutting when using QPET Insert

| Cutter ø D \ n | 10 | 12 | 16 |
|---|---|---|---|
| 25 | 28.000 | | |
| 32 | 25.000 | | |
| 40 | | 22.000 | |
| 50 | | 20.000 | 14.000 |
| 63 | | 18.000 | 13.000 |
| 80 | | 16.000 | 12.000 |
| 100 | | | 10.000 |
| 125 | | | 9.000 |
| 160 | | | 8.000 |

**Ramping (Slant Milling)**

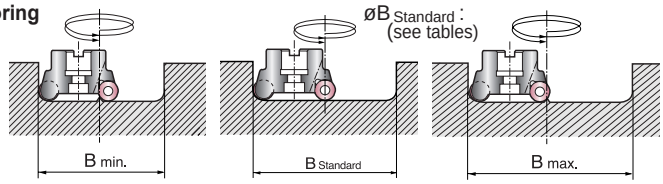



α max : (see tables)

**Helical Boring**

øB Standard : (see tables)




## ■ Spare Parts

| Cutter | | Screw | Screw |
|---|---|---|---|
| | |  |  |
| WRCX | 12○○○ | BFTX 0409 IP | TRDR 15 IP |
| WRCX/-F/-X | 16052 ~ 16100 | BFTX 0511 IP | TRDR 20 IP |
| | 16125 ~ 16160 | BFTX 0513 IP | |
| WRCX/-F | 20○○○ | BFTX 0615 IP | TRDR 25 IP |

## ■ Recommended Cutting Conditions

| øD (mm) \ Material / Grade | | Carbon steel (ex. C40 ~ C50) | Alloy steel (Below HRC40) | Stainless steel (ex. X10CrNiS18-9) | Cast iron (ex. GG20) | Non-ferrous material |
|---|---|---|---|---|---|---|
| | | ACP100, ACP200 | ACP100, ACP200 | ACP200, ACP300 | ACK200, ACK300 | DL1000, H1 |
| 40 ~ 80 | $v_c$ | 100-**160**-200 | 100-**140**-180 | 80-**120**-160 | 80-**120**-160 | 200-**500**-1000 |
| | $f_t$ | 0,2-**0,4**-0,6 | 0,2-**0,3**-0,4 | 0,1-**0,2**-0,3 | 0,1-**0,2**-0,4 | 0,1-**0,3**-0,4 |
| 100 ~ 160 | $v_c$ | 150-**200**-250 | 100-**160**-200 | 160-**180**-200 | 100-**150**-200 | 200-**500**-1000 |
| | $f_t$ | 0,3-**0,4**-0,6 | 0,1-**0,3**-0,5 | 0,15-**0,2**-0,3 | 0,1-**0,15**-0,2 | 0,2-**0,3**-0,6 |

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

# WFX (F) Type




## General Features

Wavemill Shoulder Milling Cutter WFX is a screw locking type cutter capable of using 4-cornered inserts. Ideal cutting edge design delivers superior squareness.

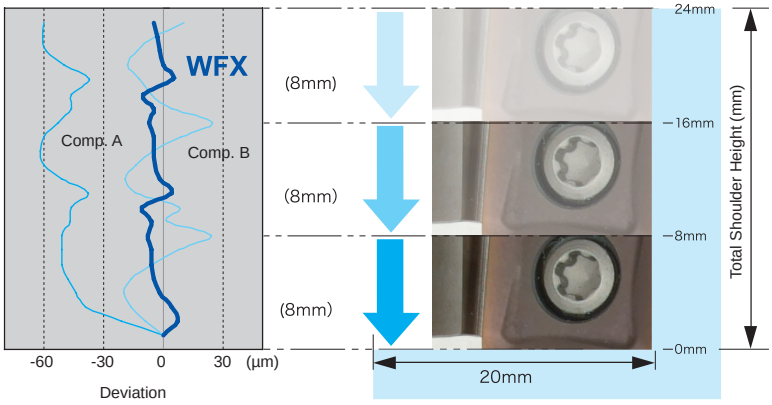
## Characteristics

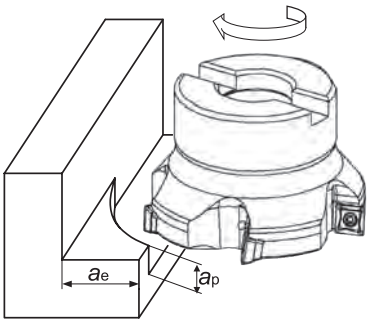
The insert shape optimized for shoulder milling combined with a high-precision body leaves a superior machined surface finish.

- Maximum depth of cut 10 mm
- With oil hole (ø125 mm or less)
- 3 chip breaker types (L-type / G-type / H-type)

## Performance

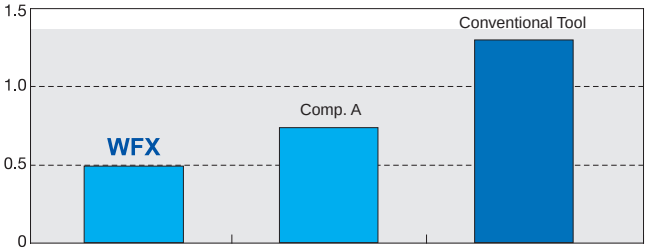
### 1 • Squareness



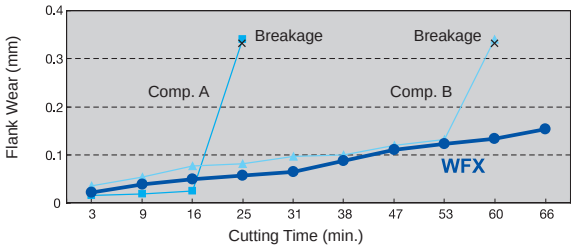

Work Material: C50
Tool: WFX 1 21 00 RS (ø100 mm x 5 Teeth)
Cutting Conditions: $v_c$: 200 m / min $a_e$: 20 mm
$f_t$: 0,15 mm / t $a_p$: 8 mm x 3 times

### 2 • Surface Finish




Work Material: 42CrMo4
Tool: WFX 12 100 RS (5 Teeth)
Cutting Conditions: $v_c$: 200 m / min $f_t$: 0,1 mm / t $a_e$: 90 mm $a_p$: 3 mm

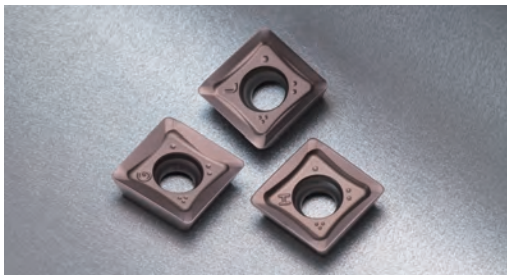
### 3 • Wear Resistance




Work Material: 42CrMo4 Tool: WFX 12 100 RS (1 flute test)
Cutting Conditions: $v_c$: 200 m / min $f_t$: 0,15 mm / t
$a_e$: 30 mm $a_p$: 5 mm

## Product Range

| Series | | Type | Diameter | No. of Teeth | Image |
|---|---|---|---|---|---|
| Shell Type | Standard | WFX 12000 RS | ø40 ø50 ø63 ø80 ø100 ø125 ø160 | 3～8 |  |
| | Fine-Pitch | WFXF 12000 RS | | 4～12 | |
| Shank Type | Standard | WFX 12000 E | | 3～4 |  |
| | Fine-Pitch | WFXF 12000 E | | 4～6 | |

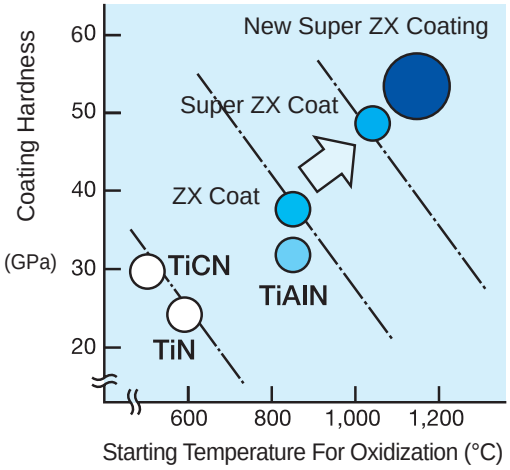


## Grade

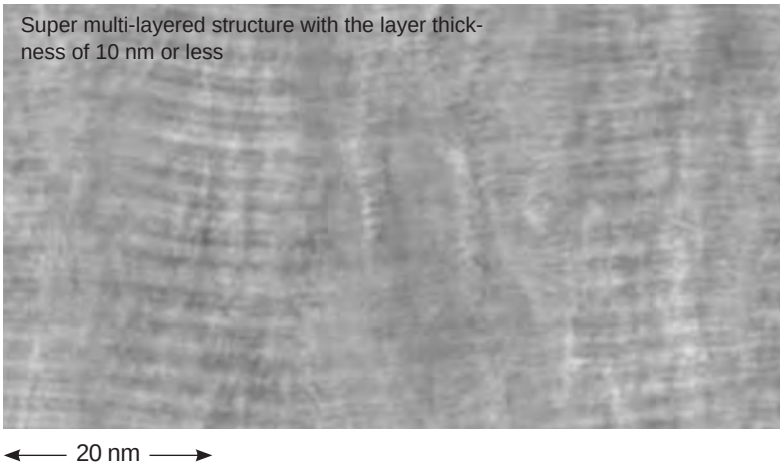
The WFX type is the first series to offer the newly developed multi-layer PVD coating structure on these grades: ACP200, ACP300 and ACK300.

With excellent resistance against wear, fracture and adhesion, the grades achieve 1,5 times longer tool life than conventional coating.

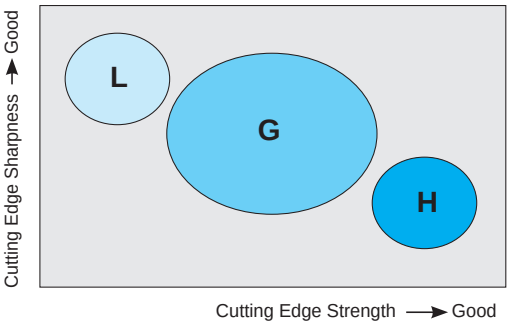
## Characteristics of Coatings




## Cross Sectional TEM Photo of Coating

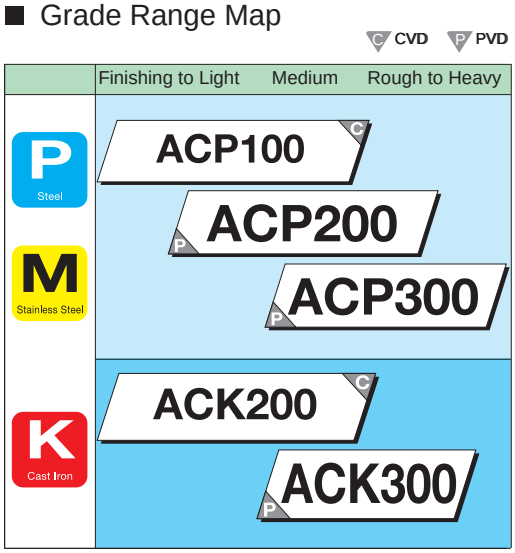


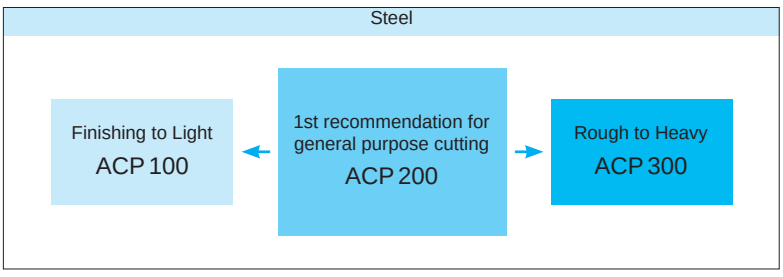

## Chipbreaker Selection

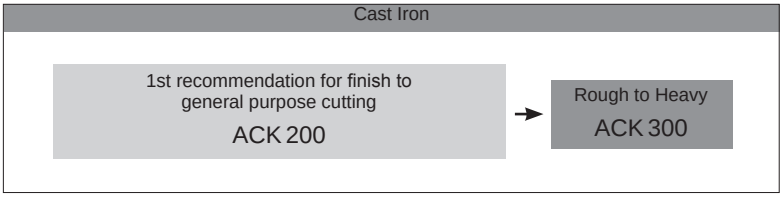



| Work Material | Steel, Cast Iron | | |
|---|---|---|---|
| | L | G | H |
| Chipbreaker |  |  |  |
| Feature | Low Cutting Force | General Purpose | Strong Edge |
| Insert Figure |   |   |   |
| Application | Light cut, low rigidity milling and reduced burrs | Main chipbreaker, general purpose to interrupted milling | Roughing, heavy interrupted and hardened steel milling |

## Grade Range Map



# WFX (F) Type

## Shoulder Milling for Steel, Stainless Steel, Die Steel, Cast Iron, Non-Ferrous Alloys

10 mm 90°

New



Fig. 1

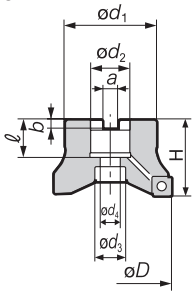



Fig. 2

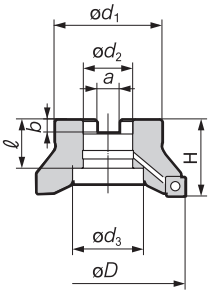
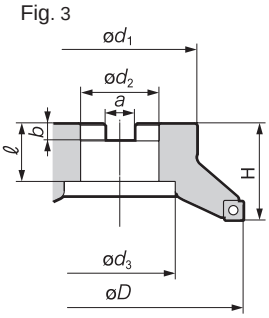



Fig. 3




Cutter body ØD ≥ 160mm: no inner coolant

Fig. 4

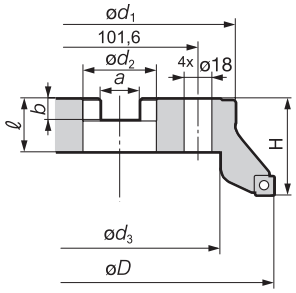



Fig. 4
(ø 200 / 250 on request)

## ■ Body

### ● Standard WFX - Type

| Cat. No. | Stock | Dimension (mm) | | | Mounting | | | | | | No. of Teeth | Weight (kg) | Fig. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | øD | ød1 | H | a | b | ød2 | ød3 | ød4 | ℓ | | | |
| WFX 12050 RS | ● | 50 | 40 | 40 | 10,4 | 6,3 | 22 | 18 | 11 | 20 | 3 | 0,2 | 1 |
| WFX 12063 RS | ● | 63 | 50 | 40 | 10,4 | 6,3 | 22 | 18 | 11 | 20 | 4 | 0,4 | 1 |
| WFX 12080 RS | ● | 80 | 60 | 50 | 12,4 | 7 | 27 | 20 | 13,5 | 25 | 4 | 0,9 | 1 |
| WFX 12100 RS | ● | 100 | 70 | 50 | 14,4 | 8,5 | 32 | 46 | – | 32 | 5 | 1,3 | 2 |
| WFX 12125 RS | ● | 125 | 90 | 63 | 16,4 | 9,5 | 40 | 52 | – | 29 | 6 | 2,7 | 2 |
| WFX 12160 RS | ● | 160 | 130 | 63 | 16,4 | 9,5 | 40 | 88 | – | 29 | 8 | 4,8 | 3 |

### ● Close Pitch WFXF - Type

| Cat. No. | Stock | Dimension (mm) | | | Mounting | | | | | | No. of Teeth | Weight (kg) | Fig. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | øD | ød1 | H | a | b | ød2 | ød3 | ød4 | ℓ | | | |
| WFXF 12050 RS | ● | 50 | 40 | 40 | 10,4 | 6,3 | 22 | 18 | 11 | 20 | 4 | 0,2 | 1 |
| WFXF 12063 RS | ● | 63 | 50 | 40 | 10,4 | 6,3 | 22 | 18 | 11 | 20 | 5 | 0,4 | 1 |
| WFXF 12080 RS | ● | 80 | 60 | 50 | 12,4 | 7 | 27 | 20 | 13,5 | 25 | 6 | 0,9 | 1 |
| WFXF 12100 RS | ● | 100 | 70 | 50 | 14,4 | 8,5 | 32 | 46 | – | 32 | 7 | 1,2 | 2 |
| WFXF 12125 RS | ● | 125 | 90 | 63 | 16,4 | 9,5 | 40 | 52 | – | 29 | 8 | 2,6 | 2 |
| WFXF 12160 RS | ● | 160 | 130 | 63 | 16,4 | 9,5 | 40 | 88 | – | 29 | 12 | 4,7 | 3 |

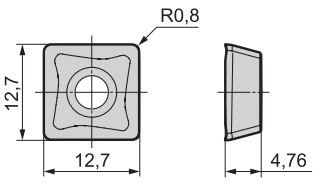
Inserts are not included. Cutters ø 160 mm do not have coolant holes.

● = Euro stock

## ■ Inserts

P Steel M Stainless Steel K Cast Iron

| Grade | | Coated Carbide | | | | |
|---|---|---|---|---|---|---|
| Application | High Speed / Light | P | | | K | |
| | General Purpose | | P M | M | K | |
| | Roughing | | P M | P M | | K |
| Cat. No. | | ACP 100 | ACP 200 | ACP 300 | ACK 200 | ACK 300 |
| SOMT 120408 PDER-L | | ● | ● | ● | ❍ | ● |
| SOMT 120408 PDER-G | | ● | ● | ● | ● | ● |
| SOMT 120408 PDER-H | | ❍ | ● | ● | ❍ | ● |



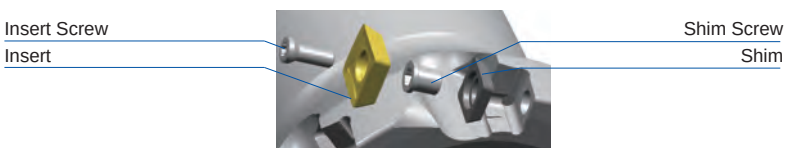

## ■ Identification of Cutter Body

**WFX F 12 050 R S**

| WFX | F | 12 | 050 | R | S |
|---|---|---|---|---|---|
| Cutter type | Fine pitch | Insert size | Diam. | Cutting Direction | Shell type |

## ■ Spare Parts

| Applicable Cutters | Shim | Shim Screw | Insert Screw | Torque (Nm) | Wrench (insert) | Wrench (shim) |
|---|---|---|---|---|---|---|
| WFX (F) 12000 E | WFXS4R | BW0507F | BFTX03512IP | 3,0 N · m | TRDR15IP | LH035 |



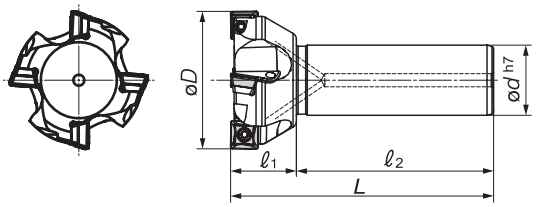

## ■ Recommended Cutting Conditions

| ISO | Work Material | Good | Cutting Speed | Feed Rate per Tooth | Depth of Cut | Grades |
|---|---|---|---|---|---|---|
| P | General Steel | ◎ | 150<br>**200**<br>250 | 0,1<br>**0,15**<br>0,2 | < 10 | ACP200<br>ACP300 |
| P | Soft Steel | ◎ | 180<br>**265**<br>350 | 0,1<br>**0,15**<br>0,2 | < 10 | ACP200<br>ACP300 |
| P | Die Steel | ○ | 100<br>**150**<br>200 | 0,1<br>**0,15**<br>0,2 | < 6 | ACP200<br>ACP300 |
| M | Stainless Steel | ○ | 160<br>**205**<br>250 | 0,1<br>**0,15**<br>0,2 | < 10 | ACP300 |
| K | Cast Iron | ○ | 100<br>**175**<br>250 | 0,1<br>**0,15**<br>0,2 | < 10 | ACK200<br>ACK300 |

Cutting Speed and Feed Rate: Min. - Optimum - Max.

## Shoulder Milling for Steel, Stainless Steel, Die Steel, Cast Iron, Non-Ferrous Alloys

P M K N S H







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

### ■ Body (Shank Type)

### ● Standard WFX-E Type

| Cat. No. | Stock | Dimension (mm) | | | | | No. of Teeth |
|---|---|---|---|---|---|---|---|
| | | øD | ød | L | ℓ1 | ℓ2 | |
| WFX 12040E | ● | 40 | 32 | 120 | 30 | 90 | 3 |
| WFX 12050E | ● | 50 | 32 | 120 | 30 | 90 | 3 |
| WFX 12063E | ● | 63 | 32 | 120 | 30 | 90 | 4 |
| WFX 12080E | ● | 80 | 32 | 120 | 30 | 90 | 4 |

### ● Close Pitch WFXF-E Type

| Cat. No. | Stock | Dimension (mm) | | | | | No. of Teeth |
|---|---|---|---|---|---|---|---|
| | | øD | ød | L | ℓ1 | ℓ2 | |
| WFXF 12050E | ● | 50 | 32 | 120 | 30 | 90 | 4 |
| WFXF 12063E | ● | 63 | 32 | 120 | 30 | 90 | 5 |
| WFXF 12080E | ● | 80 | 32 | 120 | 30 | 90 | 6 |

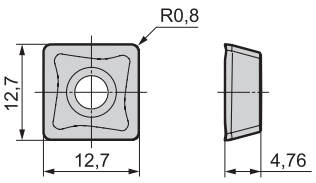
Inserts are not included.
ø 40 mm cutters do not have a seat.

● = Euro stock

### ■ Inserts

P Steel M Stainless Steel K Cast Iron

| Grade | | Coated Carbide | | | | |
|---|---|---|---|---|---|---|
| Application | High Speed / Light | P | | | K | |
| | General Purpose | | PM | M | K | |
| | | | PM | PM | | K |
| Cat. No. | | ACP 100 | ACP 200 | ACP 300 | ACK 200 | ACK 300 |
| SOMT 120408 PDER-L | | ● | ● | ● | ❍ | ● |
| SOMT 120408 PDER-G | | ● | ● | ● | ● | ● |
| SOMT 120408 PDER-H | | ❍ | ● | ● | ❍ | ● |



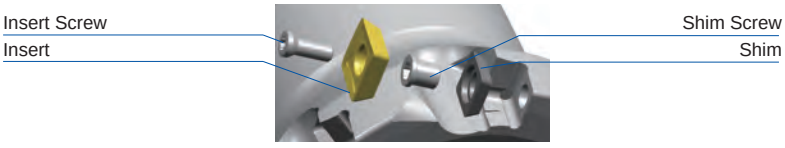

### ■ Identification of Cutter Body

**WFX F 12 050 E**

- WFX: Cutter type
- F: Fine pitch
- 12: Insert size
- 050: Diam.
- E: Endmill type

### ■ Spare Parts

| Applicable Cutters | Shim | Shim Screw | Insert Screw | Torque (Nm) | Wrench (insert) | Wrench (shim) |
|---|---|---|---|---|---|---|
| WFX 12040 E | - | - | BFTX03512IP | 3,0 N · m | TRDR15IP | - |
| WFX (F) 12000 E | WFXS4R | BW0507F | BFTX03512IP | 3,0 N · m | TRDR15IP | LH035 |




### ■ Recommended Cutting Conditions

| ISO | Work Material | Good | Cutting Speed | Feed Rate per Tooth | Depth of Cut | Grades |
|---|---|---|---|---|---|---|
| P | General Steel | ◎ | 150<br>**200**<br>250 | 0,1<br>**0,15**<br>0,2 | < 10 | ACP200<br>ACP300 |
| P | Soft Steel | ◎ | 180<br>**265**<br>350 | 0,1<br>**0,15**<br>0,2 | < 10 | ACP200<br>ACP300 |
| P | Die Steel | ○ | 100<br>**150**<br>200 | 0,1<br>**0,15**<br>0,2 | < 6 | ACP200<br>ACP300 |
| M | Stainless Steel | ○ | 160<br>**205**<br>250 | 0,1<br>**0,15**<br>0,2 | < 10 | ACP300 |
| K | Cast Iron | ○ | 100<br>**175**<br>250 | 0,1<br>**0,15**<br>0,2 | < 10 | ACK200<br>ACK300 |

Cutting Speed and Feed Rate: Min. - Optimum - Max.

# PWS(-F) Type




## Features

**Smooth and stable performance under rough milling conditions**
Tangentially mounted inserts, offering positive rake angle and unique curved cutting edge, realize stable and long lasting smooth cutting actions.

**Precision 4 cutting edge inserts**
The 4 cutting edge inserts offer maximum cost performance.

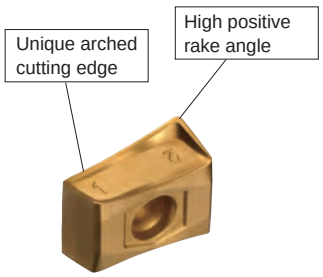
**Less vibration under unstable condition**
Optimized variable pitch design of the serrated inserts minimizes vibration during unstable conditions.

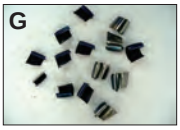
**Tough and durable body**
Cutter body shows excellent toughness and durability through special steel and surface treatment.

## Inserts - Design and Performance

### Comparison of Chip Shape

General Purpose: Type **G**

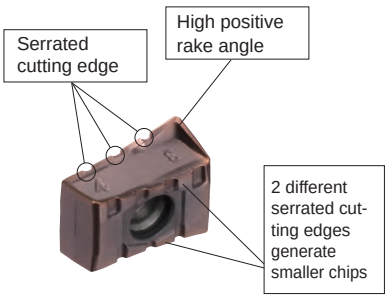


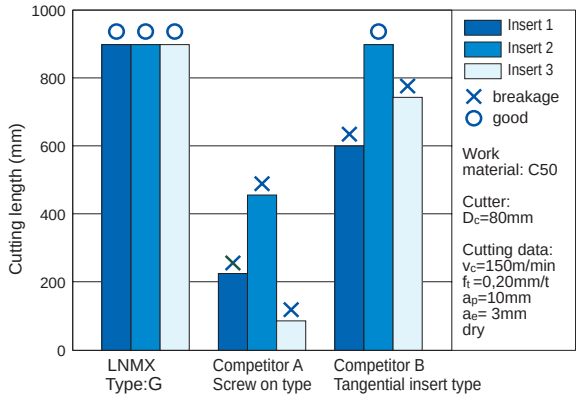

Work material: C50
Cutter: $D_c$ =100mm
Cutting data: $v_c$ =200m/min, $f_t$ =0,20mm/t, $a_p$ =20mm, $a_e$ =10mm
Coolant: dry
Evaluation: The serrated inserts achieve high efficient machining by reducing chattering.

Heavy Cut: Type **R**

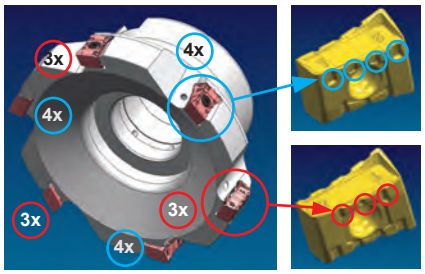



### Comparison of Cutting Edge Stability (Type G)



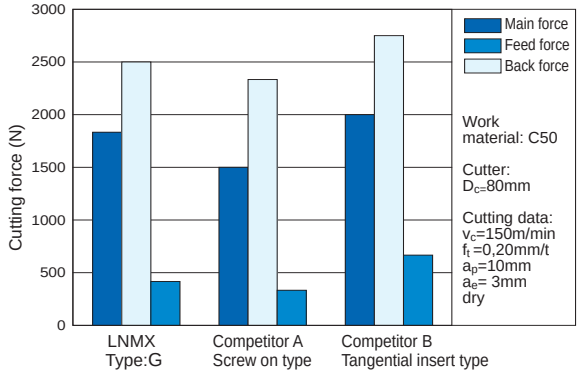

### Serrated Insert Application Guidance (Type R)



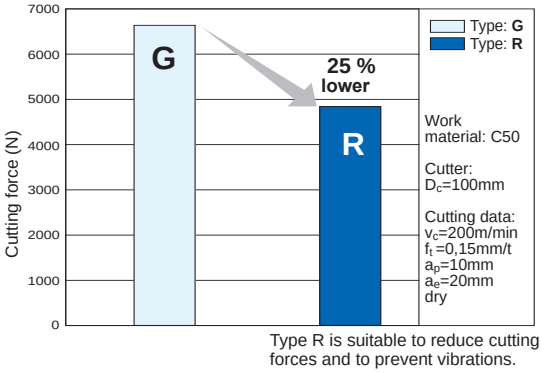

**Setting instruction:**
Please use two different serrated inserts (3x and 4x) as shown in the left figure.

**Remark about cutting conditions:**
Adjust feed rate up to $f_t$ = 0,25mm/tooth.

### Comparison of Cutting Force (Type G)




### Comparison of Cutting Force (Type G and R)




Type R is suitable to reduce cutting forces and to prevent vibrations.

## Body - Dimensions



New

| Rake Angle | Radial | -15° |
|---|---|---|
| | Axial | -6° |

16mm 90°

Fig. 1

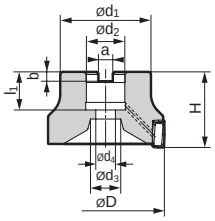



Fig. 2

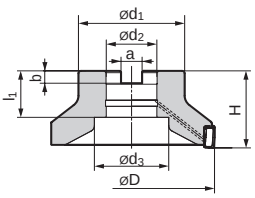



Fig. 3

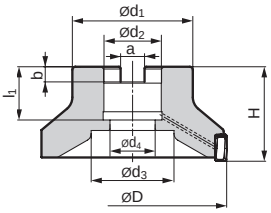



Fig. 4

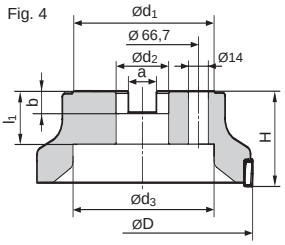
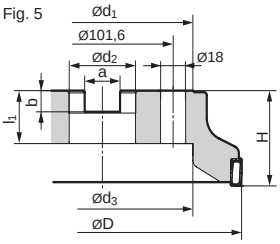



Fig. 5




Cutter body $ØD_c \geq 160$mm: no inner coolant
Cutter body $ØD_c \geq 200$mm: with seat PWSS4R

## Body (Type PWS, Standard)

| Type | Cat. No. | Stock | Dimension (mm) | | | Mounting | | | | | | No. of teeth | Weight (kg) | Fig. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | ØD | $Ød_1$ | H | $Ød_2$ | $Ød_3$ | $Ød_4$ | a | b | $l_1$ | | | |
| PWS 4000 | PWS 4080 RS | ● | 80 | 60 | 50 | 27 | 20 | 13,5 | 12,4 | 7 | 25 | 4 | 1,0 | 1 |
| | PWS 4100 RS | ● | 100 | 70 | 50 | 32 | 46 | - | 14,4 | 8,5 | 32 | 6 | 1,4 | 2 |
| | PWS 4125 RS | ● | 125 | 80 | 63 | 40 | 52 | 29 | 16,4 | 9,5 | 29 | 6 | 2,4 | 3 |
| | PWS 4160 RS | ● | 160 | 100 | 63 | 40 | 88 | - | 16,4 | 9,5 | 29 | 8 | 4,2 | 4 |
| | PWS 4200 RS | ❍ | 200 | 130 | 63 | 60 | 130 | - | 25,7 | 14 | 35 | 10 | 6,3 | 5 |
| | PWS 4250 RS | ❍ | 250 | 130 | 63 | 60 | 160 | - | 25,7 | 14 | 35 | 12 | 11,1 | 5 |

## Body (Type PWSF, Fine pitch)

| Type | Cat. No. | Stock | Dimension (mm) | | | Mounting | | | | | | No. of teeth | Weight (kg) | Fig. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | ØD | $Ød_1$ | H | $Ød_2$ | $Ød_3$ | $Ød_4$ | a | b | $l_1$ | | | |
| PWSF 4000 | PWSF 4080 RS | ● | 80 | 60 | 50 | 27 | 20 | 13,5 | 12,4 | 7 | 25 | 6 | 0,9 | 1 |
| | PWSF 4100 RS | ● | 100 | 70 | 50 | 32 | 46 | - | 14,4 | 8,5 | 32 | 8 | 1,3 | 2 |
| | PWSF 4125 RS | ● | 125 | 80 | 63 | 40 | 52 | 29 | 16,4 | 9,5 | 29 | 8 | 2,3 | 3 |
| | PWSF 4160 RS | ● | 160 | 100 | 63 | 40 | 88 | - | 16,4 | 9,5 | 29 | 10 | 4,1 | 4 |
| | PWSF 4200 RS | ❍ | 200 | 130 | 63 | 60 | 130 | - | 25,7 | 14 | 35 | 12 | 6,2 | 5 |
| | PWSF 4250 RS | ❍ | 250 | 130 | 63 | 60 | 160 | - | 25,7 | 14 | 35 | 14 | 11,0 | 5 |

Inserts are not included.

● = Euro stock
❍ = Delivery on request

## Inserts

| Application | Coated Carbide | | | | |
|---|---|---|---|---|---|
| High speed/Light cut | P | | | K | |
| General purpose | | P M | M | K | |
| Roughing | | P M | P M | | K |

| Cat. No. | ACP100 | ACP200 | ACP300 | ACK200 | ACK300 | Application | Remarks | Fig. |
|---|---|---|---|---|---|---|---|---|
| LNMX170808PNSR-**L** | ● | ● | ● | ● | ● | Light cut | | 6 |
| LNMX170808PNSR-**G** | ● | ● | ● | ● | ● | General purpose | 1st Choice | 6 |
| LNMX170808PNSR-**R** | ● | ● | ● | ● | ● | Heavy cut | Serrated design | 7 |

● = Euro stock

Fig. 6

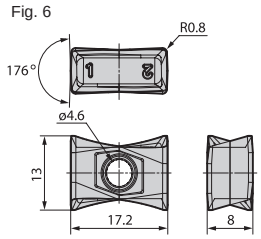
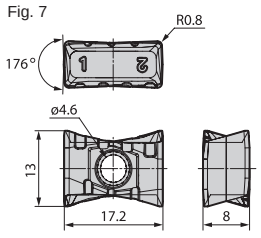



Fig. 7




## Recommended Cutting Conditions

| ISO | Work Material | Hardness | Cutting Speed $v_c$ (m/min) | Feed Rate $f_t$ (mm/t) | Grade |
|---|---|---|---|---|---|
| P | Carbon Steel | 180-280HB | 150-**250**-350 | 0,10-**0,23**-0,35 | ACP200 |
| | Alloy Steel | 180-280HB | 100-**175**-250 | 0,10-**0,18**-0,25 | ACP200 |
| M | Stainless Steel | - | 100-**150**-200 | 0,15-**0,18**-0,25 | ACP300 |
| K | Cast Iron Ductile Iron | 250HB | 100-**175**-250 | 0,10-**0,23**-0,35 | ACK200 |

Min.-**Optimum**-Max.

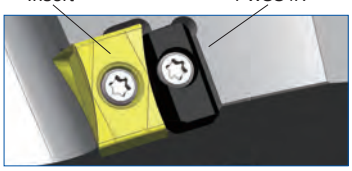
## Spare Parts

| Screw | Torx wrench | Sumi-Paste | Seat * |
|---|---|---|---|
|  |  |  |  |
| BFTX0412IP | TTR15IP | SUMI-P | PWSS4R |

* from $ØD_c \geq 200$mm

Cutter Body $ØD_c \geq 200$mm
Please use seat PWSS4R for protection of cutter body.

Insert *PWSS4R



## Special Cutter Type PWSR



| Rake Angle | Radial | -15° |
|---|---|---|
| | Axial | -6° |

31mm 90°

Delivery on request

# PWC Type

## Powerful Tangential Milling System for Cast Iron

| | | |
|---|---|---|
| Approach angle | : | 88° |
| Axial rake angle | : | + 5° |
| Radial rake angle | : | - 5° |



Fig. 1

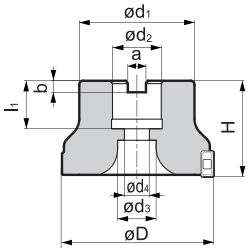



Fig. 2

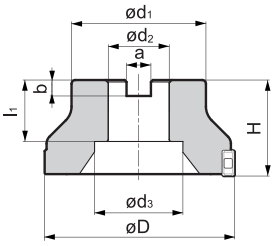
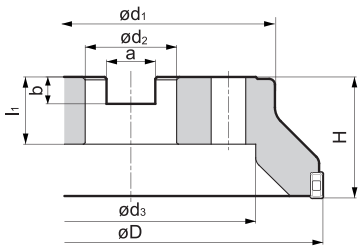



Fig. 3




### Body (Standard, PWC Type)

| Type | Cat. No. | Stock | | Dimensions (mm) | | | Mounting | | | | | | Number of teeth | Max. depth of cut | Weight (Kg) | Fig. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | R | L | ø D | ød1 | H | ød2 | ød3 | ød4 | a | b | l1 | | | | |
| PWC 4000 | PWC 4080 R/L-S | ● | ● | 80 | 60 | 50 | 27 | 29,5 | 13 | 12,4 | 7,0 | 25 | 7 | 12,0 | 0,9 | 1. |
| | PWC 4100 R/L-S | ● | ● | 100 | 70 | 50 | 32 | 46 | – | 14,4 | 8,5 | 29 | 8 | | 1,3 | 2. |
| | PWC 4125 R/L-S | ● | ● | 125 | 80 | 63 | 40 | 56 | – | 16,4 | 9,5 | 29 | 10 | | 2,5 | |
| | PWC 4160 R/L-S | ● | ● | 160 | 100 | 63 | 40 | 88 | – | 16,4 | 9,5 | 29 | 12 | | 4,2 | 3. |
| | PWC 4200 R/L-S | ● | ● | 200 | 150 | 63 | 60 | 130 | – | 25,7 | 14,0 | 35 | 16 | | 7,2 | |

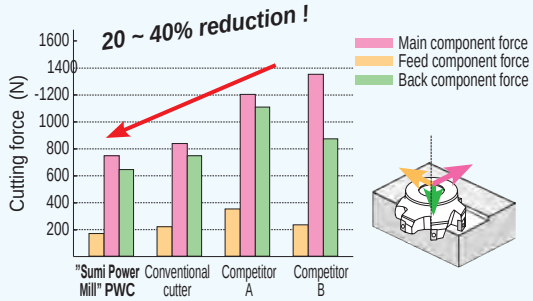
### Body (Close Pitch, PWCF Type)

| Type | Cat. No. | Stock | | Dimensions (mm) | | | Mounting | | | | | | Number of teeth | Max. depth of cut | Weight (Kg) | Fig. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | R | L | ø D | ød1 | H | ød2 | ød3 | ød4 | a | b | l1 | | | | |
| PWCF 4000 | PWCF 4080 R/L-S | ● | ● | 80 | 60 | 50 | 27 | 29,5 | 13 | 12,4 | 7,0 | 25 | 9 | 12,0 | 0,9 | 1. |
| | PWCF 4100 R/L-S | ● | ● | 100 | 70 | 50 | 32 | 46 | – | 14,4 | 8,5 | 29 | 12 | | 1,4 | 2. |
| | PWCF 4125 R/L-S | ● | ● | 125 | 80 | 63 | 40 | 56 | – | 16,4 | 9,5 | 29 | 15 | | 2,6 | |
| | PWCF 4160 R/L-S | ● | ● | 160 | 100 | 63 | 40 | 88 | – | 16,4 | 9,5 | 29 | 18 | | 4,3 | 3. |
| | PWCF 4200 R/L-S | ● | ● | 200 | 150 | 63 | 60 | 130 | – | 25,7 | 14,0 | 35 | 24 | | 7,4 | |

● = Euro stock

### Performance

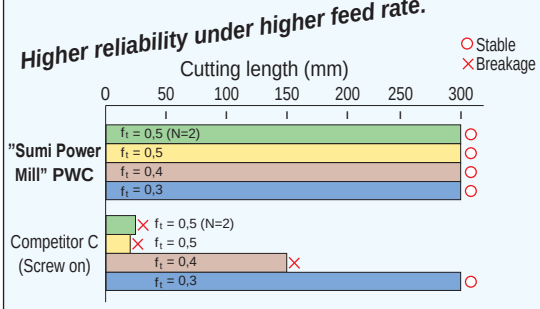
● Comparison of cutting force




Work material : GG25
Tool : PWC 4080 RS, ø80
Insert : LNMX160608PNSN-G
Grade : ACK200

Cutting conditions
$v_c$ = 200 m/min
$f_t$ = 0,1 mm/tooth
Depth of cut : 4,0 mm
Width of cut : 50 mm
Dry

● Comparison of cutting edge strength



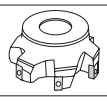

Work material : GG25
Tool : PWC 4080 RS, ø80
Insert : LNMX160608PNSN-G
Grade : ACK200

Cutting conditions
$v_c$ = 160 m/min
$f_t$ = 0,3 ~ 0,5 mm/tooth
Depth of cut : 5,0 mm
Width of cut : 80 mm
Dry

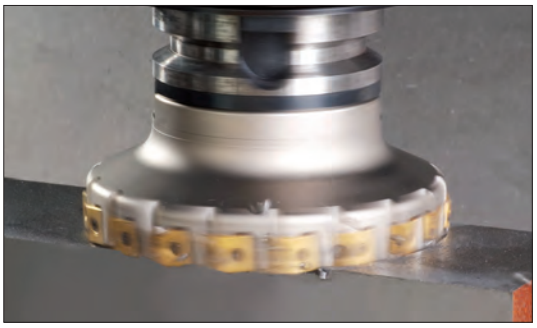
### Recommended cutting Conditions

| Material | Grey cast iron (GG) | Ductile cast iron (GGG) |
|---|---|---|
| Cutting speed (m/min) | 100 150 200 250 300 | 100 150 200 250 |
| Feed rate (mm/tooth) | 0,1 0,2 0,3 0,4 0,5 | 0,05 0,1 0,2 0,25 0,3 |
| Grade | ACK200, ACK300 | |

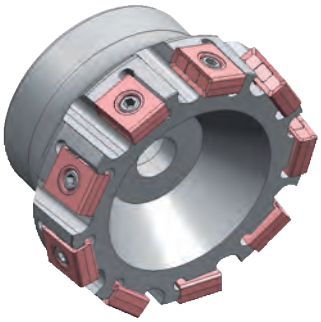
### Spare Parts

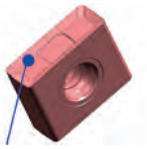
| Cutter | Screw | Wrench |
|---|---|---|
|  |  |  |
| PWC (F) 4000 | BFTX 0412 N | TTX 15 W |

High Metal Removal
High Volume Insert Capacity
High Performance Inserts



## ● Geometry





Rake angle
G type : 20°
H type : 15°



Wiper width = 2,4 mm

## ■ Advantages

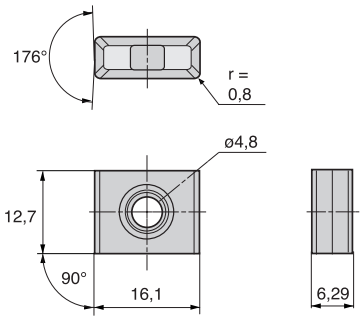
**● High volume insert capacity**
The tangential orientation of the strong carbide inserts increases the number of cutting edges (eg 3 edges /inch) maximising edge contact with the workpiece.

**● Cost effective tooling**
Using M Class precision sintered inserts with 8 cutting edges both acquisition and operating costs are substantially reduced.

**● Increased tool life**
New Cast Iron grades ACK200 for general cutting and ACK300 for heavy cutting provide increased tool life and high productivity

**● Durable cutter body**
The robust cutter body is manufactured from a special alloyed steel then coated with a hard surface to resist swarf damage, scratching, and corrosion.

## ■ Inserts



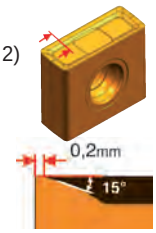

● G type insert
for light cutting

(Fig. 1)




● H type insert
with strong cutting edge

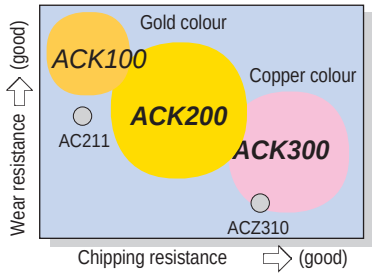
(Fig. 2)

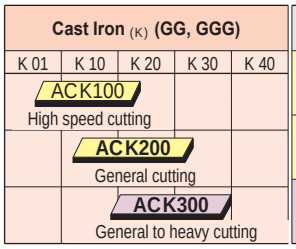



| Cat. No. | Nose Radius | CVD Coated | | PVD Coated | Fig. | Application | Remark |
|---|---|---|---|---|---|---|---|
| | | ACK100 | ACK200 | ACK300 | | | |
| LNMX 160608 PNSN-G | 0,8 | | ● | ● | 1 | General application | First remommendation |
| LNMX 160608 PNSN-H | 0,8 | ❍ | ● | ● | 2 | Instable machining Heavy interruption | Suitable for instable condition |

● = Euro stock
❍ = Delivery on request

## ■ New Coated Grade for Cast Iron




| Grade | Characteristic · Application |
|---|---|
| ACK100 | High wear resistance with special hard substrate and fine Ti-based $Al_2O_3$ CVD coating for high speed machining |
| ACK200 | Excellent wear resistance with fine Ti-based and tough $Al_2O_3$ CVD coating |
| ACK300 | Excellent toughness with fine grain carbide substrate. Cr added new PVD coating could improve hardness and oxidation resistance. |

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

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



Fig. 1

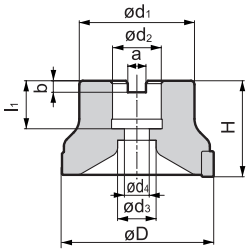



Fig. 2

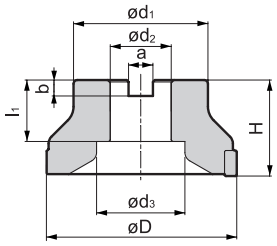
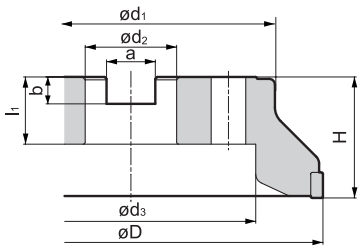



Fig. 3




### Body (Standard, CNP Type)

| Type | Cat. No. | Stock | Dimensions (mm) | | | Mounting | | | | | | Number of teeth | max. depth of cut | Weight (Kg) | Fig. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | ø D | ød1 | H | ød2 | ød3 | ød4 | a | b | l1 | | | | |
| CNP13000 | CNP 13040 RS | ● | 40 | 36 | 40 | 22 | 14 | 9 | 8,4 | 5,6 | 18 | 4 | 12,0 | 0,3 | 1. |
| | CNP 13050 RS | ● | 50 | 40 | 40 | 27 | 18 | 11 | 10,4 | 6,3 | 20 | 4 | | 0,4 | |
| | CNP 13063 RS | ● | 63 | 40 | 40 | 22 | 18 | 11 | 10,4 | 6,3 | 20 | 5 | | 0,4 | |
| | CNP 13080 RS | ● | 80 | 60 | 50 | 27 | 20 | 13 | 12,4 | 7,0 | 25 | 5 | | 0,9 | |
| | CNP 13100 RS | ● | 100 | 70 | 50 | 32 | – | – | 14,4 | 8,5 | 32 | 6 | | 1,3 | 2. |
| | CNP 13125 RS | ● | 125 | 80 | 63 | 40 | – | – | 16,4 | 9,5 | 38 | 7 | | 2,5 | |
| | CNP 13160 RS | ● | 160 | 100 | 63 | 40 | – | – | 16,4 | 9,5 | 38 | 8 | | 4,2 | |
| | 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 | 7 | 12,0 | 0,4 | 1. |
| | CNPF 13080 RS | ● | 80 | 60 | 50 | 27 | 20 | 13 | 12,4 | 7,0 | 25 | 7 | | 0,9 | |
| | CNPF 13100 RS | ● | 100 | 70 | 50 | 32 | – | – | 14,4 | 8,5 | 32 | 8 | | 1,4 | 2. |
| | CNPF 13125 RS | ● | 125 | 80 | 63 | 40 | – | – | 16,4 | 9,5 | 38 | 9 | | 2,4 | |
| | CNPF 13160 RS | ● | 160 | 100 | 63 | 40 | – | – | 16,4 | 9,5 | 38 | 11 | | 4,3 | |
| | CNPF 13200 RS | | 200 | 150 | 63 | 60 | – | – | 25,7 | 14,0 | 34 | 13 | | 7,4 | 3. |

● = Euro stock



### Inserts

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

Fig. 1

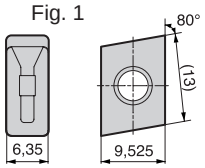
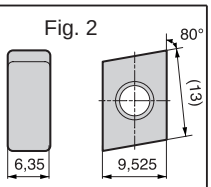



Fig. 2




| Cat. No. | Tolerance Class | Nose Radius | Coated carbide | | | | | Fig. |
|---|---|---|---|---|---|---|---|---|
| | | | ACP100 | ACP200 | ACP300 | ACK200 | ACK300 | |
| CNMU 130608 N-G | M | 0,8 | ● | ● | ● | ● | ● | 1. |
| CNMU 130608 N-H | M | 0,8 | ● | ● | ● | ● | ● | |
| CNMQ 130608 N | M | 0,8 | | | | | | 2. |
| CNMQ 130616 N | M | 1,6 | ● | ● | ● | ● | ● | |
| CNEQ 130608 N | E | 0,8 | | | | | | |

● = Stock item

### Spare Parts

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

### Recommended Cutting Conditions

[$v_c$ =m/min, $f_t$ =mm/tooth] [min.– **optimum** – max.]

| Insert type | | CNMU / CNMQ 1306○○ N / -G/ -H | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Grade | | ACP100 | | | ACP200 | | | ACP300 | | | ACK200 | | ACK300 | |
| Type / Work material | | Low carbon steel | Alloy steel | Die steel | Low carbon steel | Alloy steel | Die steel | Stainless steel | | | Cast iron | Ductile cast iron | Cast iron | Ductile cast iron |
| | | | | | | | | austenitic | | martensitic | | | | |
| CNP 13000 | $v_c$ | 100 - **250** - 400 | 80 - **220** - 280 | 80 - **150** - 250 | 80 - **200** - 370 | 70 - **150** - 250 | 60 - **130** - 220 | 120 - **180** - 240 | | 100 - **140** - 200 | 220 - **270** - 450 | 150 - **180** - 250 | 180 - **220** - 270 | 130 - **160** - 220 |
| | $f_t$ | 0,1 - **0,25** - 0,4 | 0,1 - **0,25** - 0,35 | 0,1 - **0,2** - 0,3 | 0,1 - **0,25** - 0,4 | 0,1 - **0,25** - 0,35 | 0,1 - **0,2** - 0,3 | 0,1 - **0,2** - 0,25 | | 0,1 - **0,2** - 0,25 | 0,1 - **0,25** - 0,4 | 0,1 - **0,25** - 0,4 | 0,1 - **0,25** - 0,4 | 0,1 - **0,25** - 0,4 |
| | $d_{oc}$ | ~**10** | | | ~**10** | | | ~**10** | | | ~**10** | | ~**10** | |

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



1,5 mm 20° (MSX 08000■■)　2,0 mm 20° (MSX 12000■■)　2,5 mm 20° (MSX 14000■■)

Fig. 1

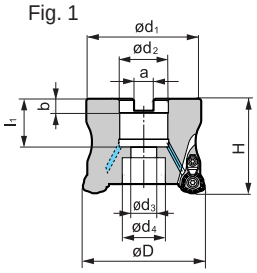
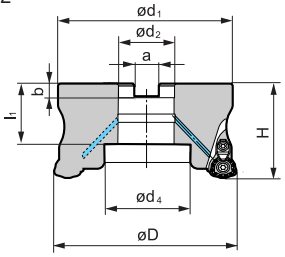



Fig. 2

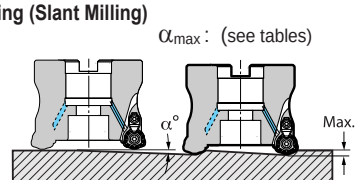



## ■ Body

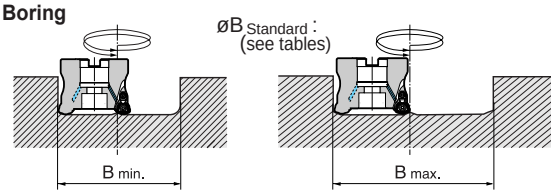
| Cat. No. | Stock | Dimensions (mm) | | | Mounting | | | | | | No. of teeth | Helical boring øB (max-min) | Ramping αmax. | Weight (Kg) | Fig. | Applicable Insert |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ø D | ød1 | H | a | b | ød2 | ød3 | ød4 | l1 | | | | | | |
| **MSX 08040 RS** | ● | 40 | 37 | 45 | 8,4 | 5,6 | 16 | 9 | 13,5 | 18 | 4 | 65 ~ 78 | 1°30´ | 0,2 | 1 | WDMT 0804 ZDTR/-H |
| **MSX 12050 RS** | ● | 50 | 47 | 50 | 10,4 | 6,3 | 22 | 11 | 18 | 20 | 4 | 78 ~ 99 | 2°30´ | 0,3 | | |
| **MSX 12052 RS** | ● | 52 | 47 | 50 | 10,4 | 6,3 | 22 | 11 | 18 | 20 | 4 | 82 ~ 103 | 2°00´ | 0,3 | | |
| **MSX 12063 RS** | ● | 63 | 60 | 50 | 10,4 | 6,3 | 22 | 11 | 18 | 20 | 5 | 104 ~ 125 | 1°30´ | 0,4 | 1 | WDMT 1205 ZDTR/-H |
| **MSX 12066 RS** | ● | 66 | 60 | 63 | 12,4 | 7,0 | 27 | 13,5 | 20 | 25 | 5 | 110 ~ 131 | 1°00´ | 0,4 | | |
| **MSX 14050 RS** | ● | 50 | 47 | 50 | 10,4 | 6,3 | 22 | 11 | 17 | 20 | 3 | 73 ~ 98 | 3°30´ | 0,3 | | |
| **MSX 14063 RS** | ● | 63 | 60 | 50 | 10,4 | 6,3 | 22 | 11 | 18 | 20 | 4 | 99 ~ 124 | 2°00´ | 0,6 | 1 | WDMT 1406 ZDTR/-H |
| **MSX 14066 RS** | ● | 66 | 60 | 63 | 12,4 | 7,0 | 27 | 13,5 | 20 | 25 | 4 | 107 ~ 132 | 2°00´ | 0,7 | | |
| **MSX 14080 RS** | ● | 80 | 76 | 63 | 12,4 | 7,0 | 27 | 13,5 | 20 | 25 | 5 | 133 ~ 158 | 1°30´ | 1,2 | | |
| **MSX 14100 RS** | ● | 100 | 96 | 63 | 14,4 | 8,5 | 32 | - | 44 | 32 | 6 | 173 ~ 198 | 1°00´ | 1,8 | 2 | |

● = Euro stock

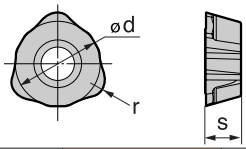
**Ramping (Slant Milling)**




**Helical Boring**




## ■ Inserts




| Cat. No. | Coated Carbide | | | Dimensions (mm) | | | Max. doc |
|---|---|---|---|---|---|---|---|
| | ACP200 | ACP300 | ACK300 | ød | s | r | |
| **WDMT 0804 ZDTR** | ● | ● | ● | 8,5 | 4,0 | 2,0 | 1,5 |
| **WDMT 0804 ZDTR-H** | ● | ● | ● | | | | |
| **WDMT 1205 ZDTR** | ● | ● | ● | 12 | 5,0 | 2,0 | 2,0 |
| **WDMT 1205 ZDTR-H** | ● | ● | ● | | | | |
| **WDMT 1406 ZDTR** | ● | ● | ● | 14 | 6,0 | 2,0 | 2,5 |
| **WDMT 1406 ZDTR-H** | ● | ● | ● | | | | |

● = Euro stock

ZDTR-H : Stronger cutting edge

## ■ Recommended Cutting Conditions

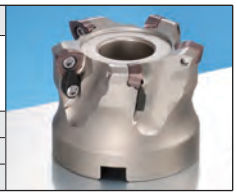
Depth of cut : doc (mm)
Feed rate : ft (mm/tooth)

| Work Material | Insert Type | Cutting Speed vc (m/min) | Insert Cat. No. | ø40 | | ø50 ~ 66 | | ø80 ~ 100 | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | doc | ft | doc | ft | doc | ft |
| General Steel (Below HB200) | ACP200 | 100-**150**-200 | **WDMT 0804** | 1,0 | 1,2 | – | – | – | – |
| | | | **WDMT 1205** | – | – | 1,2 | 1,4 | – | – |
| | | | **WDMT 1406** | – | – | 1,5 | 1,5 | 1,5 | 1,5 |
| Alloy Steel (Below HRC45) | ACP200 | 80-**130**-180 | **WDMT 0804** | 0,8 | 1,2 | – | – | – | – |
| | | | **WDMT 1205** | – | – | 1,0 | 1,4 | – | – |
| | | | **WDMT 1406** | – | – | 1,3 | 1,5 | 1,3 | 1,5 |
| Stainless Steel (X5CRNI1810) | ACP300 | 80-**120**-150 | **WDMT 0804** | 1,0 | 0,8 | – | – | – | – |
| | | | **WDMT 1205** | – | – | 1,2 | 1,2 | – | – |
| | | | **WDMT 1406** | – | – | 1,5 | 1,3 | 1,5 | 1,3 |
| Cast Iron GG, GGG | ACK300 | 100-**150**-200 | **WDMT 0804** | 1,0 | 1,4 | – | – | – | – |
| | | | **WDMT 1205** | – | – | 1,2 | 1,5 | – | – |
| | | | **WDMT 1406** | – | – | 1,5 | 1,8 | 1,5 | 1,8 |
| Hardened Steel (Below HRC50) | ACK300 | 40-**80**-100 | **WDMT 0804** | 0,5 | 0,8 | – | – | – | – |
| | | | **WDMT 1205** | – | – | 0,6 | 1,0 | – | – |
| | | | **WDMT 1406** | – | – | 1,0 | 1,2 | 1,0 | 1,2 |

- The above recommended cutting conditions may require adjustment according to machine rigidity and work rigidity.
- The above figures are guidelines for use with the BT50 machine tool.

## ■ Spare Parts

| Screw | Wrench | Clamp | C Ring | Cramp screw | Applicable endmill |
|---|---|---|---|---|---|
|  |  |  |  |  | |
| BFTX 0306 IP | TRDR 08 IP | CCH 3,5 | CR 03 | BFTX 03510 IP 08 | MSX 08000RS |
| BFTX 0409 IP | TRDR 15 IP | CCH 3,5 | CR 03 | BFTX 03510 IP 08 | MSX 12000RS |
| BFTX 0511 IP | TRDR 20 IP | CCH 4,5 | CR 03 | BFTX 03510 IP 08 | MSX 14000RS |



Remark: If depth-of-cut exceeds 5mm, reduce recommended feedrates by 50%.
The conditions above are meant as a guide, please adjust the cutting conditions according to actual work material and machine ridgidity.

# RF Type

## High Speed Finishing of Aluminium Alloy

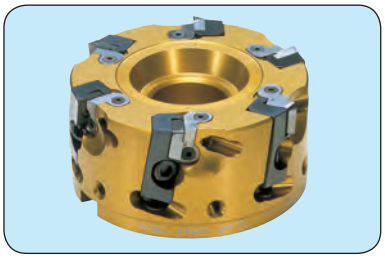


Fig. 1

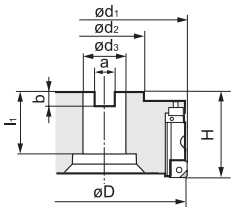



Fig. 2

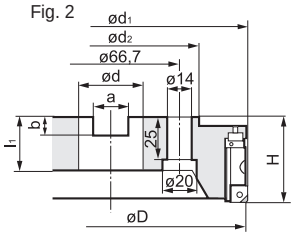
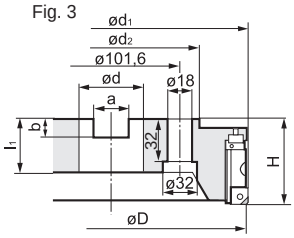



Fig. 3

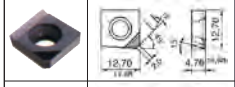



### Body

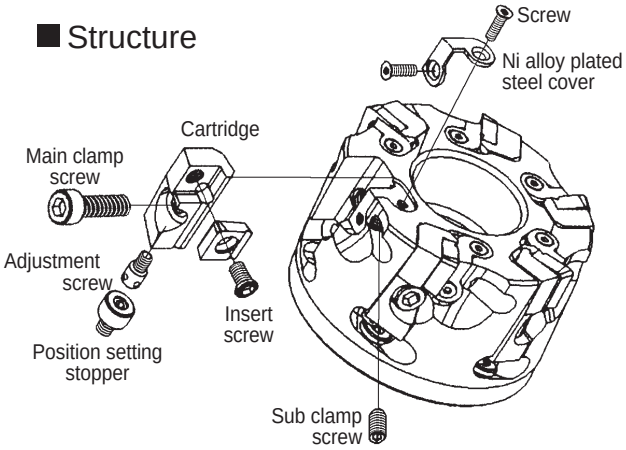
| Type | Cat. No. | Stock | Dimensions (mm) | | | | Mounting | | | | Number of teeth | max. depth of cut | Weight (Kg) | Fig. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | ø D | ø d1 | ø d2 | H | ø d3 | a | b | l1 | | | | |
| RF 4000 | **RF 4080 R-S** | ● | 80 | 82 | 60 | 50 | 27 | 12,4 | 7,0 | 29 | 6 | 3,0 | 0,7 | |
| | **RF 4100 R-S** | ● | 100 | 102 | 75 | 50 | 32 | 14,4 | 8,5 | 29 | 6 | | 1,0 | 1. |
| | **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 | |
| | **RF 4250 R-S** | ❍ | 250 | 252 | 130 | 63 | 60 | 25,7 | 14,0 | 38 | 16 | | 6,0 | 3. |
| | **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.

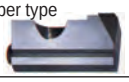
### Insert for Roughing and Finishing

| Shape | Cat. No. | Grade | Stock |
|---|---|---|---|
|  | Carbide insert **SDET 1204 ZDFR** | **H1** | ● |
|  | PCD insert **SNEW 1204 ADFR-NF** | **DA1000**<br>DA2200 | ●<br>❍ |
|  | PCD insert wiper type **SNEW 1204 ADFR-W-NF** | **DA1000**<br>DA2200 | ●<br>❍ |

### Structure




### "Sumidia" Blade

| PCD grade DA2200 | Cat. No. | Stock |
|---|---|---|
| Standard type  | **RFB** | ❍ |
| Wiper type  | **RFBW** | ❍ |

### Dummy Blade

| | | |
|---|---|---|
|  | **RFD** | ❍ |

### Cartridge

| Shape | Cat. No. | Stock |
|---|---|---|
| For carbide insert  | **RFR** | ❍ |
| For Sumidia insert  | **RFF** | ❍ |

● = Euro stock
❍ = Delivery on request

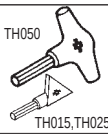
### Cutting Insert Selection

**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 stoper | 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 | TH015, TH025 TH050 | TTX20 |

### Setting Gauge



RF-SET

Dial-gauge is not included.

# High Speed Finishing of Aluminium Alloy



Fig. 1

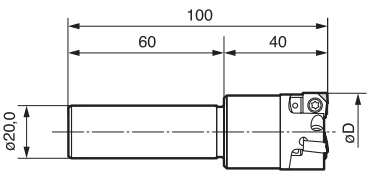
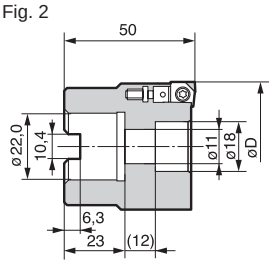



Fig. 2

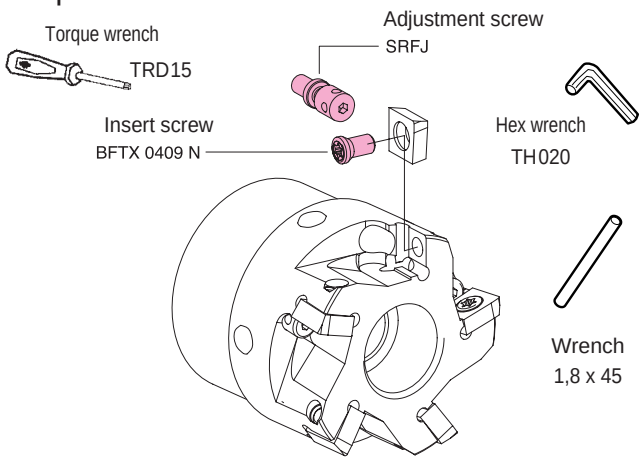



## Body

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

Inserts are sold seperately.
❍ = Delivery on request

## Spare Parts




## Insert

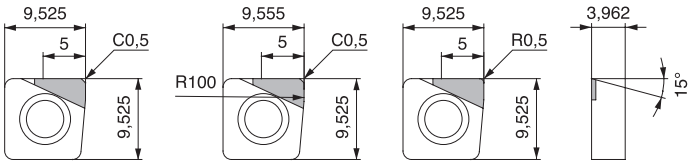



Fig. 1 Fig. 2 Fig. 3

| Cat. No. | Cutting Edge | SUMIDIA DA2200 | Fig. |
|---|---|---|---|
| **SNEW 09T3 ADTR-NF** | Standard | ❍ | 1 |
| **SNEW 09T3 ADTR-U-NF** | Wiper | ❍ | 2 |
| **SNEW 09T3 ADTR-R-NF** | Nose Radius | ❍ | 3 |

❍ = Delivery on request

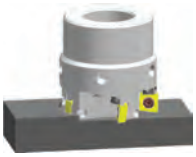
- Standard inserts and Wiper inserts can be used on the same cutter body.
- Standard inserts with nose radius should be used where vibration is present. As such, Wiper-inserts will not be applicable.
- Inserts can be regrind 3 times (up to minimum IC diameter 9,225mm).
- When using reground inserts, it is advisable to reconfirm insert height and cutting diameter with a tool pre-setter.
- Do not mix new and reground inserts, or even inserts with different regrind amount on the same cutter.

## 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.

| 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 | ○ | – | – |

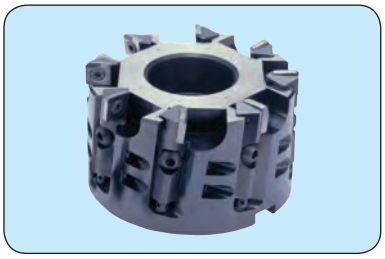
● Cutting Conditions
Cutter: SRF 50 RS
Insert: SNEW 09T3 ADFR-NF (DA2200)
n : 10.000 rpm
Width: 35mm at D.O.C. indicated above



## Recommended Cutting Conditions for RF and SRF Type Cutters

| Work Material | | 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 | – | | | |

## High Speed Finishing of Grey Cast Iron



### Features

- High speed machining $v_c$=1.500m/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 10µm
- Easy assembling method using the setting gauge
- Running cost is reduced because of economical insert

## SUMIBORON "BN Finish Mill"

### Application

GG25~GG30 (HB200~250) grey cast iron with pearlite matrix, and ferrite matrix (HB130~160)
Application examples: engine block, cylinder block, etc



### Specifications

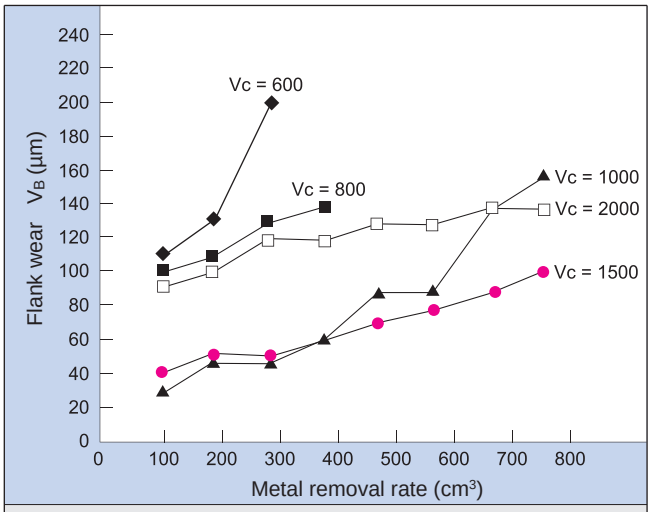
FMU Type: ø80 ~ ø315 mm
Insert: SNEW1203ADTR/L
Low cutting force type: SNEW1203ADTR/L-S

### Recommended Cutting Conditions

Speed: $v_c$ = 800 ~ 2000 m/min
Feed: $f_t$ = 0,1 ~ 0,3 mm/tooth
Depth: $d_{oc}$ = 0,5 mm or less
Dry cutting

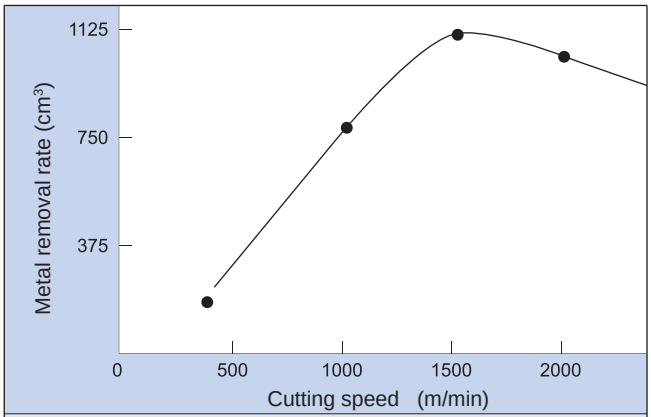
### Performance

● Tool Life Diagram




Work material : GG25 $H_B$240 (Pearlite)
Cutting speed : $v_c$ = 600 ~ 4000 m/min
Feed rate : $f_t$ = 0,15 mm/tooth
Depth of cut : $d_{oc}$ = 0,5 mm, Dry

● Estimated Tool Life



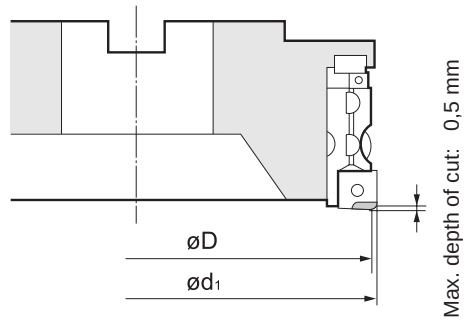

Work material : GG25 $H_B$240 (Pearlite)
Cutting speed : $v_c$ = 400 ~ 4000 m/min
Feed rate : $f_t$ = 0,15 mm/tooth
Depth of cut : $d_{oc}$ = 0,5 mm, Dry

● 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.

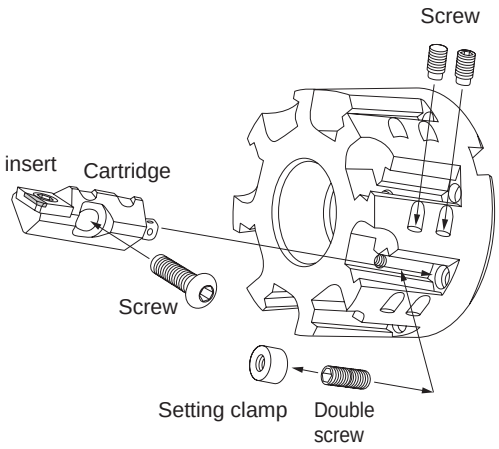
# FMU Type

## Specifications

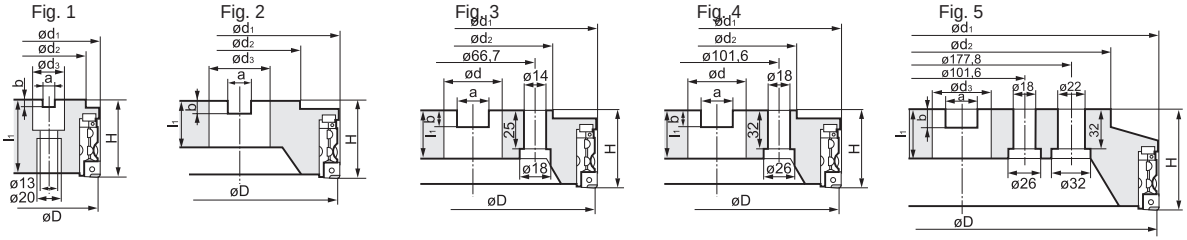
Approach angle: 90°
Axial rake angle: + 8°
Radial rake angle: + 2°




## Structure



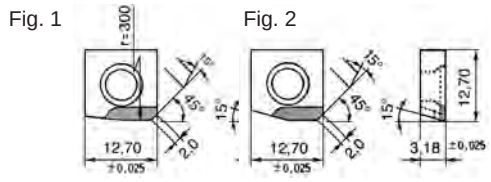

## Body




| Type | Cat. No. | Stock R | Stock L | Dimensions (mm) ø D | ø d1 | ø d2 | H | Mounting ø d3 | a | b | l1 | Number of teeth | max. depth of cut | Weight (Kg) | Fig. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 | |
| | **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 | 24 | | 27,8 | 5. |

● = Euro stock
❍ = Delivery on request

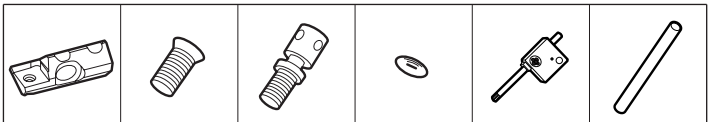
## Insert




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

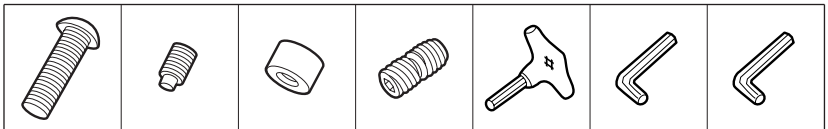
● = Euro stock

## 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



RF-SET

Dial-gauge is not included.

# Indexable Endmills

**H1 ~ H34**

H






Selection Guide — **"Wavemill"** ..... H 2 -3
Exchangeable Head Endmills — According to Work Materials / Applications
Modular Tools ..... H 4 -5

**Face Mills**

"Sumi Dual" Face Mill — **DGC** 13000 **EW** New ..... H 6
"Sumi Wave" Face Mill — **WGX** 13000 **EW** New ..... H 7

"Metal Slash" High Feed Multi-Function Mill — **MSX** 06000/08000/12000/14000 **E/RS** ..... H 8 -10
06000/08000/12000/12000 **M** ..... H11-12

**Shoulder Mills**

"Sumi Wave" Shoulder Mill — **WFX** 12000 **E** New ..... H13

"Wave Mill" Series — **WEX** 2000/3000/12000/14000 **E/EW/F** ..... H14-17
2000/3000 **M** ..... H18
"Wave Mill" for Aluminium — **WAX** 3000 **E/EL/RS** ..... H19-20
4000 **E/EL** New ..... H21

"Wave Multi-Function Mill" — **WMM(H)** 2000 / 3000 ..... H22-23
"Wave Repeater Mill" — **WRX** 2000 / 3000 ..... H24-27

**Others**

"Wave Ball-Mill" for Roughing — **WBMR** 2000 ..... H28-29
"Wave Ball-Mill" for Finishing — **WBMF** 1000 ..... H30-31

"Wave Radius Mill" — **WRCX** 08000/10000 **E** ..... H32
08000/10000/12000 **M** ..... H33

SEC-Chamferlng Endmill — **SCP** 300/400 ..... H34

# Selection Guide

| Application | Endmill Type | Series | Insert Type | Approach Angle / Max. Depth of Cut (mm) | External Diameter (mm) | Application: Face Milling: General Purpose | Face Milling: Finishing | Face Milling: High Feed | Shoulder Milling | Slot Milling | Ramping | Copying | Chamfering | Boring | Finishing | Work Material: P Carbon Steel / Alloy Steel | P Tempered Steel / Die Steel | M Stainless Steel | K Cast Iron / Ductile Cast Iron | N Non-Ferrous Metal | N Aluminium Alloy | S Ti Alloy / Heat Resistant Alloy | H Hardened Steel HRC 45 ~ 55 | Ref. Page |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Face Milling | DGC New | DGC 13000EW | SNMU13T6ANER-L/G/H<br>ONMU13T6ANER-L/G | 3 ~ 6 mm, 45° | ø40 (42,9) ~ ø63 (65,9) | ◎ | | | | ○ | | | ○ | | | ◎ | ◎ | ○ | ○ | | | | | H6 |
| | New | DGC (M/F) 13000RS | | 3 ~ 6 mm, 45° | ø40 (42,9) ~ ø250 (252,9) | ◎ | | | | ○ | | | ○ | | | ◎ | ◎ | ○ | ○ | | | | | G8 |
| | WGX New | WGX 13000EW | SEMT 13T3 AGSR - L / G / H / FG | 6 mm, 45° | ø32 ~ ø63 | ◎ | | | | ○ | | | ○ | | | ◎ | ◎ | ○ | ○ | | | | | H7 |
| | New | WGX (M/F) 13000RS | | | ø40 ~ ø250 | ◎ | | | | ○ | | | ○ | | | ◎ | ◎ | ○ | ○ | | | | | G10 |
| High Feed Milling | MSX | MSX 06000 08000 12000 14000 | WDMT0603ZDTR (d=6,35)<br>WDMT0804ZDTR (d=8,5)<br>WDMT1205ZDTR (d=12)<br>WDMT1406ZDTR (d=14) | 1,0 ~ 2,5 mm, 20° | ø16 ~ ø63 | | | ○ | | ○ | ○ | | | | | ◎ | ◎ | ◎ | ◎ | | | | ○ | H9 |
| | MSX-RS | MSX 08000RS 12000RS 14000RS | | 1,5 ~ 2,5 mm, 20° | ø40 ~ ø100 | ○ | | | ◎ | ◎ | ◎ | | | | | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | | H10<br>G29 |
| | MSX-M | MSX 06000M 08000M 12000M | | 1,0 ~ 2,0 mm, 20° | ø16 ~ ø40 | ○ | | | ◎ | ◎ | ◎ | | | | | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | | H11 |
| Shoulder Milling | WFX(-F)...E New | WFX (-F) 12000 E | SOMT 120408 | 10 mm, 90° | ø40 ~ ø80 | ○ | | | ◎ | ○ | | | | | | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | | | H13<br>G23 |
| | WFX(-F)...RS New | WFX (-F) 12000 RS | | | ø50 ~ ø160 | ○ | | | ◎ | ○ | | | | | | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | | | G22 |
| | WEX...E/EL | WEX2000-E/EL | AXMT123504PEER-G (WEX 2000 E/F/M) | 10 mm, 90° | ø14 ~ ø63 | ○ | | | ◎ | ◎ | ◎ | | | | | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | | H16<br>H17 |
| | | WEX3000-E/EL | | 14 mm, 90° | ø25 ~ ø63 | | | | | | | | | | | | | | | | | | | |
| | WEX...F | WEX2000-F | | 10 mm, 90° | ø40 ~ ø100 | ○ | | | ◎ | ◎ | ◎ | | | | | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | | H16<br>H17 |
| | | WEX3000-F | AXMT170508PEER-G (WEX 3000 E/F/M) | 14 mm, 90° | ø40 ~ ø100 | | | | | | | | | | | | | | | | | | | |
| | WEX...M | WEX2000-M | | 10 mm, 90° | ø16 ~ ø40 | ○ | | | ◎ | ◎ | ◎ | | | | | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | | H18 |
| | | WEX3000-M | | 14 mm, 90° | ø25 ~ ø40 | | | | | | | | | | | | | | | | | | | |

◎ : Best
○ : Good
□ : Not recommended

| Application | Endmill Type | Series | Insert Type | Approach Angle / Max. Depth of Cut (mm) | External Diameter (mm) | Application: Face Milling – General Purpose | Face Milling – Finishing | Face Milling – High Feed | Shoulder Milling | Slot Milling | Ramping | Copying | Chamfering | Boring | Finishing | Work Material: P – Carbon Steel / Alloy Steel | P – Tempered Steel / Die Steel | M – Stainless Steel | K – Cast Iron / Ductile Cast Iron | N – Non-Ferrous Metal | N – Aluminium Alloy | S – Ti Alloy / Heat Resistant Alloy | H – Hardened Steel HRC 45 ~ 55 | Ref. Page |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Shoulder Milling | WRX…E | WRX 2000-E 3000-E | AXMT123504PEER-G (WRX2000) | 18 ~ 36 mm, 90° | ø20 ~ ø50 | ○ | | | ◎ | ◎ | ◎ | | | | | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | | H25 H26 |
| | WRX…F | WRX 2000-F 3000-F | AXMT170508PEER-G (WRX3000) | 27 ~ 53 mm, 90° | ø32 ~ ø100 | ○ | | | ◎ | ◎ | ◎ | | | | | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | | H25 H26 |
| Multi-Purpose | WRCX…E | WRCX 08000-E 10000-E | QPMT 080330PPEN/-H 10T335PPEN/-H 120440PPEN/-H 160660PPEN/-H 200670PPEN/-H QPET 10T350PPFR-S 120460PPFR-S 160680PPFR-S | 4 ~ 5 mm | ø12 ~ ø32 | ◎ | | | | ○ | ◎ | ◎ | | | | ◎ | ◎ | ◎ | ◎ | | ◎ | ○ | ○ | H32 |
| | WRCX-RS | WRCX(-F/X) 12000RS 16000RS 20000RS | | 6 ~ 10 mm | ø40 ~ ø160 | ◎ | | | | ○ | ◎ | ◎ | | | | ◎ | ◎ | ◎ | ◎ | | ◎ | ○ | ○ | G19 |
| | WRCX…M | WRCX 08000-M 12000-M 16000-M | | 4 ~ 6 mm | ø20 ~ ø40 | ◎ | | | | ○ | ◎ | ◎ | | | | ◎ | ◎ | ◎ | ◎ | | ◎ | ○ | ○ | H33 |
| | WMM(-H) | WMM(-H) 2000 3000 | APMT 103504PDER/-H 160508PDER/-H APET 103504PDER-F/S 160508PDER-F/S | 17 ~ 26 mm, 90° | ø20 ~ ø25 | ◎ | | | ◎ | ◎ | ◎ | ◎ | | ◎ | | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | | H23 |
| | | | | 39 mm, 90° | ø32 ~ ø40 | | | | | | | | | | | | | | | | | | | |
| Alumimium | WAX | WAX 3000E/EL | AECT160404PEFRA (WAX 3000E/EL/RS) | 16 ~ 18 mm, 90° | ø20 ~ ø40 | ○ | | | ◎ | ◎ | ◎ | ◎ | | | | × | × | × | × | ○ | ◎ | | | H20 H21 |
| | | New 4000E/EL | | 22 ~ 24 mm, 90° | ø25 ~ ø40 | | | | | | | | | | | | | | | | | | | |
| | WAX-RS | WAX 3000RS | AECT220608PEFRA (WAX 4000E/EL) | 16 ~ 18 mm, 90° | ø50 ~ ø125 | ○ | | | ◎ | ◎ | ◎ | ◎ | | | | × | × | × | × | ○ | ◎ | | | H20 |
| 3D Profilling | WBMR | WBMR2000 | ZNMT 1804100-C 2004100-S | 20 ~ 43 mm | R10 (ø20) ~ R25 (ø50) | | | | | ◎ | | ◎ | | | | ◎ | ◎ | ◎ | ◎ | | | ○ | ○ | H29 |
| | | WBMR2000L | | | | | | | | | | | | | | | | | | | | | | |
| | WBMF | WBMF1000 | ZPGU 1551050 | 0,1 ~ 0,4 mm | R5 (ø10) ~ R15 (ø30) | | | | | ◎ | | ◎ | | | ◎ | ◎ | ◎ | ◎ | ◎ | | | | ○ | H31 |
| Chamfering | SCP | SCP | SDMA 090308 | 45° | ø8 ~ ø32 | | | | | | | | ○ | | | ○ | ○ | ○ | ○ | | | | | H34 |

◎ : Best
○ : Good
□ : Not recommended

# Modular Tools



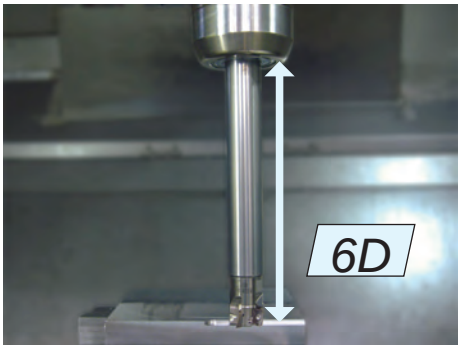
## General Features

- Exchangeable head endmills are available in 3 types !
  - High Efficiency Endmill
    **WEX** Type：15 Items
  - Multipurpose Radius Endmill
    **WRCX** Type：7 Items
  - Ultra-High Feed Endmill
    **MSX** Type：13 Items
- A wide variety of possible combinations with carbide arbors (16 items) and steel arbors (4 items) !

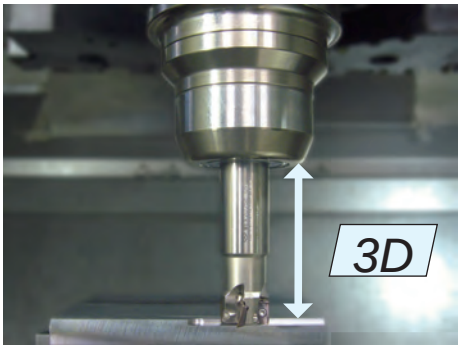
## Characteristics

● Up to 6 x D from Modular End Mill with Carbide Arbor

**Modular head + carbide arbor**




Standard shank type endmill

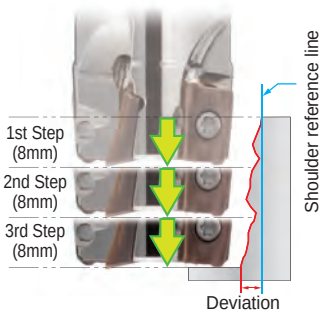



| | | |
|---|---|---|
| Work Material | : | C50 |
| Tool | : | WEX2025M12Z4 (øD=25, 4 teeth) |
| Cutting conditions | : | $v_c$ = 100m/min, $f_t$ = 0,1mm/tooth |
| | | $d_{oc}$ = 8mm x 3 passes, $w_{oc}$ = 2,0mm, Equipment: M/C BT50 |

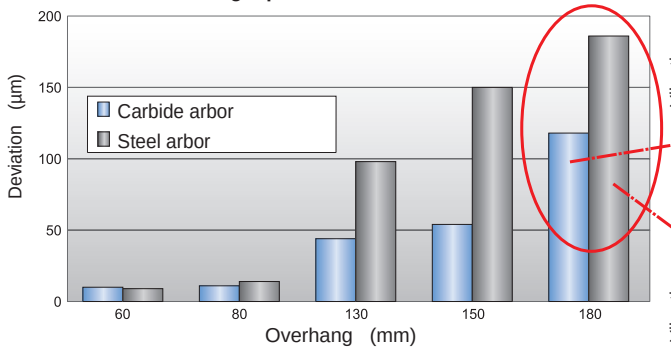
Note
Cutting conditions can vary according to cutter reach, rigidity of machine tool / workpiece etc.

## Performance

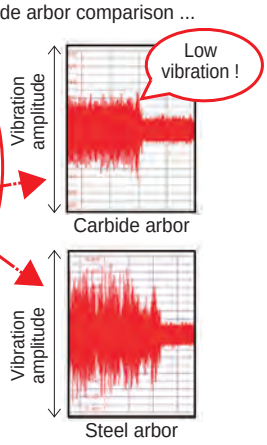
● A Carbide Arbor improves feed rates, surface finish, sizing, and tool life.




● **Shoulder milling squareness**



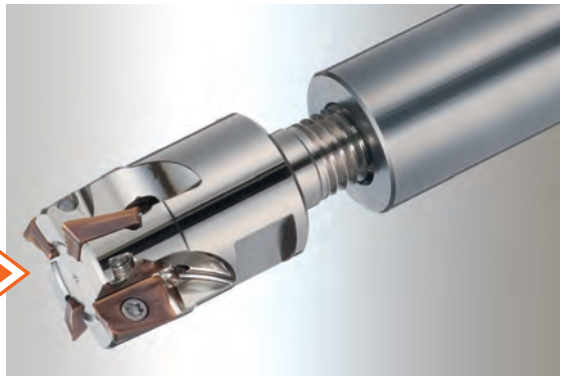

Carbide arbor comparison ...




| | | |
|---|---|---|
| Work Material | : | C50 |
| Tool | : | WEX2025M12Z4 (øD=25, 4 teeth) |
| Cutting conditions | : | $v_c$ = 100m/min, $f_t$ = 0,1mm/tooth |
| | | $d_{oc}$ = 8mm x 3 passes, $w_{oc}$ = 2,0mm, Equipment: M/C BT50 |

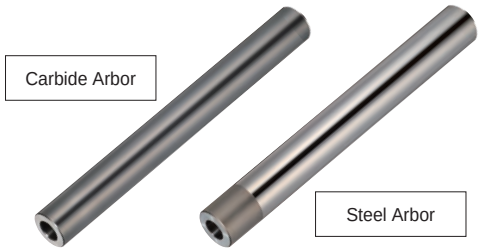
Suitable for milling with
**long overhangs** when
combined with carbide or steel arbors !

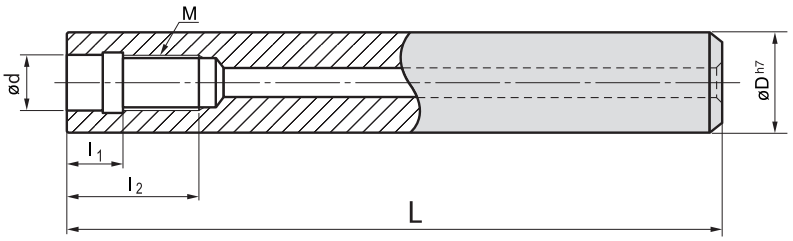
**Economically designed exchangeable head!**



Easy to change screw-on endmill type WEX and carbide arbor

## Carbide and Steel Arbor for Modular Tools




## Carbide Arbor

| Cat. No. | Stock | Dimensions (mm) | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | M | ød | øD | L | $l_1$ | $l_2$ | $L_M$ |
| MA 15 M08 L120C | ● | M8 | 8,5 | 15 | 120 | 10 | 18 | 145 |
| MA 15 M08 L160C | ● | M8 | 8,5 | 15 | 160 | 10 | 18 | 185 |
| MA 16 M08 L120C | ● | M8 | 8,5 | 16 | 120 | 10 | 18 | 145 |
| MA 16 M08 L160C | ● | M8 | 8,5 | 16 | 160 | 10 | 18 | 185 |
| MA 18 M10 L150C | ● | M10 | 10,5 | 18 | 150 | 10 | 20 | 180 |
| MA 18 M10 L200C | ● | M10 | 10,5 | 18 | 200 | 10 | 20 | 230 |
| MA 20 M10 L150C | ● | M10 | 10,5 | 20 | 150 | 10 | 20 | 180 |
| MA 20 M10 L200C | ● | M10 | 10,5 | 20 | 200 | 10 | 20 | 230 |
| MA 23 M12 L200C | ● | M12 | 12,5 | 23 | 200 | 10 | 22 | 235 |
| MA 23 M12 L250C | ● | M12 | 12,5 | 23 | 250 | 10 | 22 | 285 |
| MA 25 M12 L200C | ● | M12 | 12,5 | 25 | 200 | 10 | 22 | 235 |
| MA 25 M12 L250C | ● | M12 | 12,5 | 25 | 250 | 10 | 22 | 285 |
| MA 28 M16 L200C | ● | M16 | 17,0 | 28 | 200 | 10 | 24 | 240 |
| MA 28 M16 L300C | ● | M16 | 17,0 | 28 | 300 | 10 | 24 | 340 |
| MA 32 M16 L200C | ● | M16 | 17,0 | 32 | 200 | 10 | 24 | 240 |
| MA 32 M16 L300C | ● | M16 | 17,0 | 32 | 300 | 10 | 24 | 340 |

● = Euro stock

● Modular Tool System




## Steel Arbor

| Cat. No. | Stock | Dimensions (mm) | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | M | ød | øD | L | $l_1$ | $l_2$ | $L_M$ |
| MA 16 M08 L120S | ● | M8 | 8,5 | 16 | 120 | 10 | 18 | 145 |
| MA 20 M10 L150S | ● | M10 | 10,5 | 20 | 150 | 10 | 20 | 180 |
| MA 25 M12 L200S | ● | M12 | 12,5 | 25 | 200 | 10 | 22 | 235 |
| MA 32 M16 L200S | ● | M16 | 17,0 | 32 | 200 | 10 | 24 | 240 |

● = Euro stock

## Identification of catalogue No.

**MA 15 M08 L120 C**

- MA: Modular Arbor
- 15: Shank diameter
- M08: Mounting screw
- L120: Arbor length
- C: Material (C: Carbide, S: Steel)

## Recommended Tightening Torque

| Screw | Wrench | | Torque (N·m) |
|---|---|---|---|
| | W | S | |
| M 8 | 8 | 13 | 23 |
| M10 | 8 | 15 | 46 |
| M12 | 10 | 19 | 80 |
| M16 | 10 | 24 | 90 |




Notes about tightening the head:

- Refer to the Head Cat. No. chart on pages H10, H14 and H29 to select the arbor size in the table above.
- Check the mounting screw size of the head and arbor beforehand.
- When attaching head to an arbor, follow the standard tighting torque in the table above.

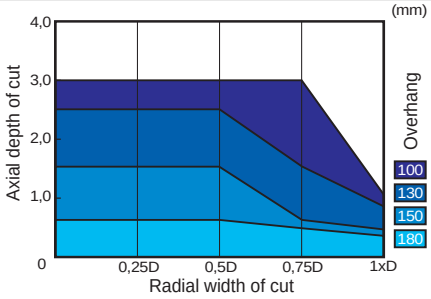
## Application Range

Work Material: C50, Equipment : Vertical Machine M/C BT50 (Dry)

***WEX2025M12Z4***

($v_c$ =180m/min, $f_t$ =0,1mm)

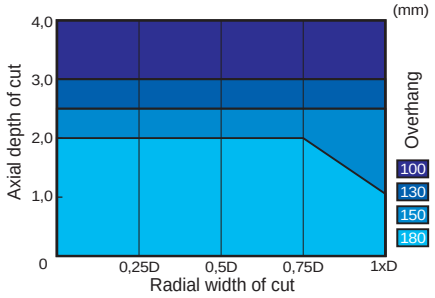



***WEX3035M16Z3***

($v_c$ =180m/min, $f_t$ =0,1mm)

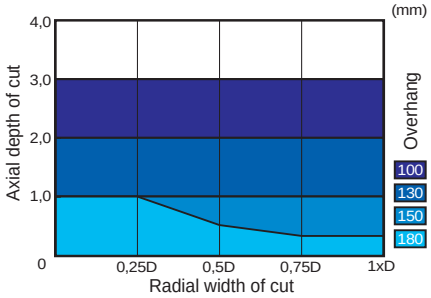



***WRCX10025M12Z2***

($v_c$ =160m/min, $f_t$ =0,2mm)

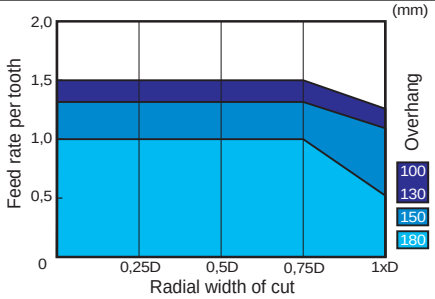



***MSX12032M16Z2***

($v_c$ =160m/min, $d_{oc}$ =1,2mm)




Note: These tables indicate reference machining conditions. Actual machining parameters should be adjusted based on machine rigidity and work clamp rigidity.

# "Sumi Dual" Face Mill
# DGC (EW) Type

## General Milling for Steel and Cast Iron

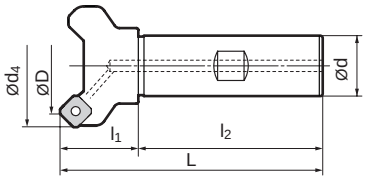
| Rake Angle | | |
|---|---|---|
| | Radial | -10° |
| | Axial | -5° |

SNMU: 6mm, 45°

ONMU: 3mm, 45°

## Body – Shank Type




## Body

| Cat. No. | Stock | Dimension (mm) | | | | | | No. of Teeth | Weight (kg) |
|---|---|---|---|---|---|---|---|---|---|
| | | ØD | Ød4 | Ød | l1 | l2 | L | | |
| DGC 13040 EW | ● | 40 (42,90) | 54 | 32 | 40 (38,44) | 85 | 125 | 3 | 0,7 |
| DGC 13050 EW | ● | 50 (52,90) | 65 | 32 | 40 (38,44) | 85 | 125 | 3 | 0,9 |
| DGC 13063 EW | ● | 63 (65,90) | 77 | 32 | 40 (38,44) | 85 | 125 | 4 | 1,1 |

● = Euro stock ( ) Figures in brackets indicate values for inserts of type ONMU

## Identification Details

| DGC | 13 | 040 | EW |
|---|---|---|---|
| Cutter Series | Insert Size | Cutter Diameter | Endmill Type Weldon |

## Inserts + Grades

| Application | Coated Carbide | | | | | |
|---|---|---|---|---|---|---|
| High Speed/Light cut | P | | | K | | |
| General Purpose | | PM | M | K | | |
| Roughing | | PM | PM | | K | |
| Cat. No. | ACP100 | ACP200 | ACP300 | ACK200 | ACK300 | Fig. |
| SNMU 13T6ANER L | | ● | ● | ● | | 1 |
| SNMU 13T6ANER G | ● | ● | ● | ● | ● | 1 |
| SNMU 13T6ANER H | | ● | ● | | ● | 1 |
| ONMU 05T6ANER L | | ● | ● | ● | | 2 |
| ONMU 05T6ANER G | ● | ● | ● | ● | ● | 2 |

● = Euro stock

Fig. 1

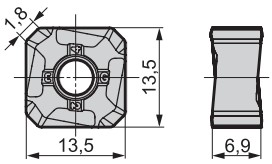
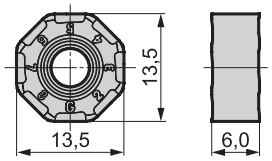



Fig. 2

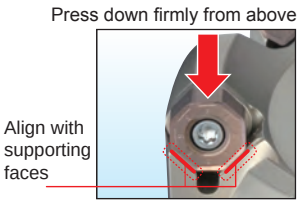




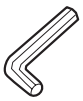


**Attaching Octagonal Inserts**

Firmly align insert with supporting face, press down in the direction of the arrow and tighten the screw to fix the insert.




## Spare Parts

| Shim | Shim Screw | L Type Wrench | Insert Srew | Spanner |
|---|---|---|---|---|
|  |  |  |  |  |
| DGCS 13 R | BW 0609 F | LH 040 | BFTX 0412 IP | TRDR 15 IP |

Optional

| Insert Srew (*) |
|---|
|  |
| BFTX 0418 IP |

*Corners can be changed simply by loosening the screw. (Only suitable for DGC / DGCM types with body size ≥ Ø80).

## SNMU – Recommended Cutting Conditions

| ISO | Work Material | Fit-ness | Cutting Speed $v_c$ (m/min) | Feed Rate $f_t$ (min/t) | Depth of Cut (mm) | Grade |
|---|---|---|---|---|---|---|
| P | General Steel | ⦿ | 150-**200**-250 | 0,10-**0,25**-0,40 | <4 | ACP200 ACP300 |
| P | Alloyed Steel | ⦿ | 180-**250**-350 | 0,10-**0,30**-0,45 | <4 | ACP200 ACP300 |
| P | Die Steel | ⦿ | 100-**150**-200 | 0,15-**0,25**-0,35 | <4 | ACP200 ACP300 |
| M | Stainless Steel | ⊙ | 160-**200**-250 | 0,15-**0,23**-0,30 | <3 | ACP300 |
| K | GG+GGG | ⦿ | 100-**200**-250 | 0,10-**0,25**-0,40 | <5 | ACK200 ACK300 |

Min. – **Optimum** – Max.

## ONMU – Recommended Cutting Conditions

| ISO | Work Material | Fit-ness | Cutting Speed $v_c$ (m/min) | Feed Rate $f_t$ (min/t) | Depth of Cut (mm) | Grade |
|---|---|---|---|---|---|---|
| P | General Steel | ⦿ | 150-**200**-250 | 0,10-**0,30**-0,50 | <2 | ACP200 ACP300 |
| P | Alloyed Steel | ⦿ | 180-**250**-350 | 0,10-**0,50**-0,50 | <2 | ACP200 ACP300 |
| P | Die Steel | ⦿ | 100-**150**-200 | 0,15-**0,25**-0,30 | <2 | ACP200 ACP300 |
| M | Stainless Steel | ⊙ | 160-**200**-250 | 0,15-**0,23**-0,30 | <2 | ACP300 |
| K | GG+GGG | ⦿ | 100-**200**-250 | 0,10-**0,30**-0,50 | <2 | ACK200 ACK300 |

⦿ Preferred choice ⊙ Suitable

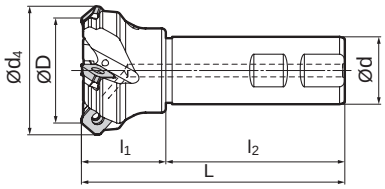
## General Milling for Steel and Cast Iron

| Rake Angle | | |
|---|---|---|
| | Radial | -20° ~ 24° |
| | Axial | 20° ~ 22° |

6mm 45°

### Body – Shank Type




### Body – Dimensions

| Cat. No. | Stock | Dimension (mm) | | | | | | No. of Teeth |
|---|---|---|---|---|---|---|---|---|
| | | øD | ød4 | ød | l1 | l2 | L | |
| WGX 13032 EW | ❍ | 32 | 44 | 32 | 40 | 85 | 125 | 3 |
| WGX 13040 EW | ❍ | 40 | 52 | 32 | 40 | 85 | 125 | 3 |
| WGX 13050 EW | ❍ | 50 | 62 | 32 | 40 | 85 | 125 | 4 |
| WGX 13063 EW | ❍ | 63 | 76 | 32 | 40 | 85 | 125 | 5 |

Inserts are not included.
ø32 mm cutters do not have a seat.

❍ = Japan stock

### Identification Details

| WGX | 13 | 032 | EW |
|---|---|---|---|
| Cutter Series | Insert Size | Cutter Diameter | Endmill Type Weldon |

### Insert Shape Characteristics

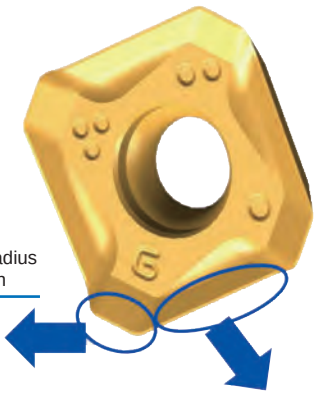
Unique wiper edge shape for improved surface roughness

General-purpose
G type chipbreaker

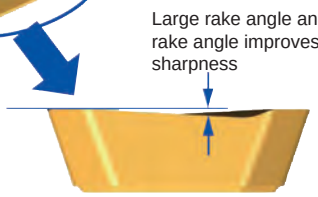
Optimal nose radius for high strength

Low-burr design
FG type chipbreaker

Optimised chamfer shape reduces burrs on cutting surface



Large rake angle and cutting edge rake angle improves cutting edge sharpness



### Inserts

| Application | Coated Carbide | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| High Speed/Light cut | P | | | K | | MS | | |
| General Purpose | | PM | M | K | | MS | MS | |
| Roughing | | PM | PM | | K | | MS | |
| Cat. No. | ACP100 | ACP200 | ACP300 | ACK200 | ACK300 | ACM200 | ACM300 | Fig. |
| SEMT 13T3 AGSR-L | ● | ● | ● | ● | ● | ● | ● | 1 |
| SEMT 13T3 AGSR-G | ● | ● | ● | ● | ● | ● | ● | |
| SEMT 13T3 AGSR-H | ● | ● | ● | ● | ● | ● | ● | |
| SEMT 13T3 AGSR-FG | ● | ● | ● | ● | ● | ● | ● | 2 |

● Euro stock

Fig. 1

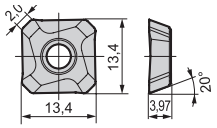
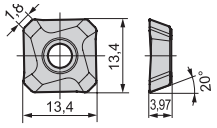
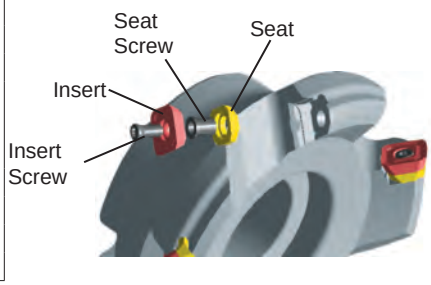



Fig. 2




### Spare Parts

| Applicable Cutters | Seat | Seat Screw | Insert Screw | Spanner (for Insert) | Torque (N·m) | Spanner (for Seat) |
|---|---|---|---|---|---|---|
| WGX 130□□EW |  |  |  |  | |  |
| øD = 32 | – | – | BFTX 03512 IP | TRDR 15 IP | 3,0 | – |
| øD = 40~63 | WGCS 13 R | BW 0507 F | BFTX 03512 IP | TRDR 15 IP | 3,0 | LH 035 |

### Recommended Cutting Conditions

| ISO | Work Material | Hardness | Cutting Speed $v_c$ (m/min) | Feed Rate $f_t$ (mm/tooth) | Grade |
|---|---|---|---|---|---|
| P | General Steel | 180~280HB | 150-**200**-250 | 0,15-**0,20**-0,25 | ACP200 |
| P | Soft Steel | ≤180HB | 180-**265**-350 | 0,10-**0,25**-0,40 | ACP200 |
| P | Die Steel | 200~220HB | 100-**150**-200 | 0,15-**0,20**-0,25 | ACP200 |
| M | Stainless Steel | - | 160-**205**-250 | 0,15-**0,23**-0,30 | ACM300 |
| K | Cast Iron | 250HB | 100-**175** -250 | 0,15-**0,23**-0,30 | ACK200 |
| S | Exotic Alloy | - | 30 - **50**- 80 | 0,10-**0,20**-0,30 | ACM300 |

Minimum-**Optimum**-Maximum

# MSX Type

## Ultra High Feed

## Boosts Productivity – Cuts Costs



## Features

The Metal Slash Mill type MSX is a new multi function high shear milling cutter with ultra high feed capability suitable for face milling, slotting, plunging and helical boring. At 50GPa the ultra hard Super ZX coated inserts feature a sharp cutting edge which demonstrates extreme resistance to wear and heat massively boosting productivity and tool life.

The vibration free cutting action ensures accurate sizing, improved surface finish, and protection of the machine tool/workpiece from damage. Inserts are double clamped in wide chip gullets to maximise rigidity and chip evacuation with temperature at the cutting edge being easily controlled via an optional air blast through integral coolant holes.The MSX cutter is readily applied to general purpose machining across the P (steel) M (stainless) and K (cast iron) range of workpiece materials with impressive results.

## Advantages

**Integral Coolant Hole**

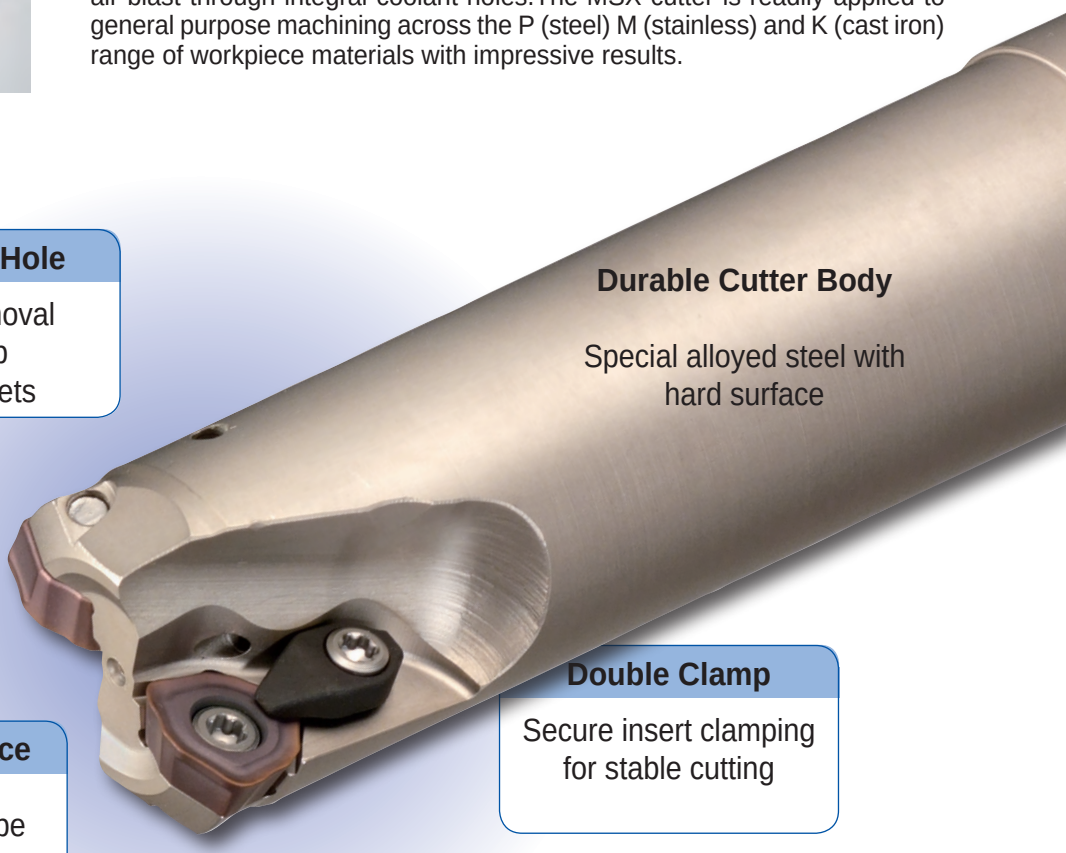
Otimised chip removal – massive chip avacuation pockets

**Wide Application Range**

Face milling, slotting, helical boring and plunging

**Low Cutting Force**

Unique insert shape reduces cutting force



**Durable Cutter Body**

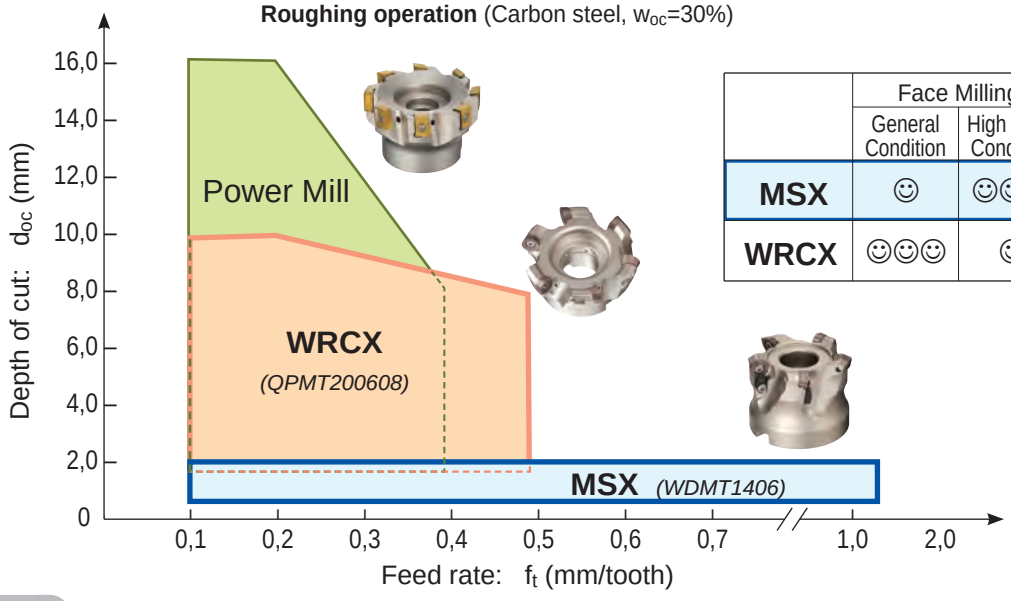
Special alloyed steel with hard surface

**Double Clamp**

Secure insert clamping for stable cutting

## Application Range

**Roughing operation** (Carbon steel, $w_{oc}$=30%)




| | Face Milling | | Slotting | Helical Boring | Profiling |
|---|---|---|---|---|---|
| | General Condition | High Feed Condition | | | |
| **MSX** | ☺ | ☺☺☺ | ☺ | ☺☺☺ | – |
| **WRCX** | ☺☺☺ | ☺ | ☺ | ☺☺ | ☺☺ |

☺☺☺ excellent
☺☺ very good
☺ good

# "METAL SLASH MILL"
# MSX 06000/08000 ES/EM/EW

# "METAL SLASH MILL"
# MSX 12000/14000 ES/EM/EW

1,0 mm 20° | 1,5 mm 20° | 2,0 mm 20° | 2,5 mm 20°



Fig. 1

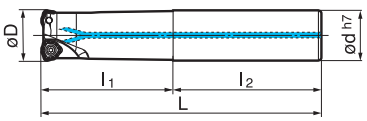
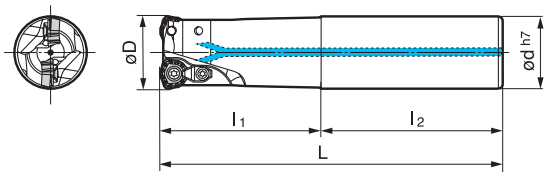



Fig. 2




## Body

For insert type : WDMT 0603

| Shank | Cat. No. | Stock | Dimensions (mm) øD | ød | l1 | l2 | L | No.of teeth | Fig. |
|---|---|---|---|---|---|---|---|---|---|
| | MSX 06016 ES | ❍ | 16 | 16 | 30 | 80 | 110 | 2 | 1 |
| | MSX 06016 EM | ● | 16 | 16 | 70 | 80 | 150 | 2 | 1 |
| | MSX 06016 EM15 | ❍ | 16 | 15 | 30 | 120 | 150 | 2 | 1 |
| | MSX 06017 EM | ❍ | 17 | 16 | 20 | 130 | 150 | 2 | 1 |
| | MSX 06018 EM | ❍ | 18 | 16 | 20 | 130 | 150 | 2 | 1 |
| | MSX 06020 ES | ● | 20 | 20 | 50 | 80 | 130 | 3 | 1 |
| | MSX 06020 EM | ● | 20 | 20 | 100 | 80 | 180 | 3 | 1 |
| | MSX 06020 EM19 | ❍ | 20 | 19 | 50 | 130 | 180 | 3 | 1 |
| | MSX 06022 EM | ❍ | 22 | 20 | 30 | 150 | 180 | 3 | 1 |
| | MSX 06025 ES | ● | 25 | 25 | 60 | 80 | 140 | 3 | 1 |
| | MSX 06025 ES24 | ❍ | 25 | 24 | 60 | 80 | 140 | 3 | 1 |
| | MSX 06025 EM | ● | 25 | 25 | 120 | 130 | 250 | 3 | 1 |
| | MSX 06025 EM24 | ❍ | 25 | 24 | 60 | 190 | 250 | 3 | 1 |
| | MSX 06020 EW | ● | 20 | 20 | 50 | 80 | 130 | 3 | 1 |
| | MSX 06025 EW | ● | 25 | 25 | 60 | 80 | 140 | 3 | 1 |

## Body

For insert type : WDMT 0804

| Shank | Cat. No. | Stock | Dimensions (mm) øD | ød | l1 | l2 | L | No.of teeth | Fig. |
|---|---|---|---|---|---|---|---|---|---|
| | MSX 08020 ES | ● | 20 | 20 | 50 | 80 | 130 | 2 | 1 |
| | MSX 08020 EM | ● | 20 | 20 | 100 | 80 | 180 | 2 | 1 |
| | MSX 08020 EM19 | ❍ | 20 | 19 | 50 | 130 | 180 | 2 | 1 |
| | MSX 08022 EM | ❍ | 22 | 20 | 30 | 150 | 180 | 2 | 1 |
| | MSX 08025 ES | ● | 25 | 25 | 60 | 80 | 140 | 2 | 2 |
| | MSX 08025 EM | ● | 25 | 25 | 120 | 130 | 250 | 2 | 2 |
| | MSX 08025 EM24 | ❍ | 25 | 24 | 60 | 190 | 250 | 2 | 2 |
| | MSX 08028 EM | ❍ | 28 | 25 | 40 | 210 | 250 | 2 | 2 |
| | MSX 08032 ES | ❍ | 32 | 32 | 70 | 80 | 150 | 3 | 2 |
| | MSX 08032 EM | ❍ | 32 | 32 | 120 | 130 | 250 | 3 | 2 |
| | MSX 08035 EM | ❍ | 35 | 32 | 50 | 200 | 250 | 3 | 2 |
| | MSX 08020 EW | ● | 20 | 20 | 50 | 80 | 130 | 2 | 1 |
| | MSX 08025 EW | ● | 25 | 25 | 60 | 80 | 140 | 2 | 2 |
| | MSX 08032 EW | ● | 32 | 32 | 70 | 80 | 150 | 3 | 2 |

ES : Short type with cylindrical shank
EM : Long type with cylindrical shank
EW : Short type with Weldon shank

● = Euro stock
❍ = Delivery on request

## Body

For insert type : WDMT 1205

| Shank | Cat. No. | Stock | Dimensions (mm) øD | ød | l1 | l2 | L | No.of teeth | Fig. |
|---|---|---|---|---|---|---|---|---|---|
| | MSX 12032 ES | ● | 32 | 32 | 70 | 80 | 150 | 2 | 2 |
| | MSX 12032 EM | ● | 32 | 32 | 120 | 130 | 250 | 2 | 2 |
| | MSX 12035 EM | ❍ | 35 | 32 | 50 | 200 | 250 | 2 | 2 |
| | MSX 12040 ES | ❍ | 40 | 32 | 50 | 100 | 150 | 3 | 2 |
| | MSX 12040 EM | ❍ | 40 | 32 | 50 | 200 | 250 | 3 | 2 |
| | MSX 12050 EM | ❍ | 50 | 42 | 50 | 200 | 250 | 4 | 2 |
| | MSX 12032 EW | ● | 32 | 32 | 70 | 80 | 150 | 2 | 2 |

## Body

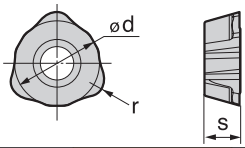
For insert type : WDMT 1406

| Shank | Cat. No. | Stock | Dimensions (mm) øD | ød | l1 | l2 | L | No.of teeth | Fig. |
|---|---|---|---|---|---|---|---|---|---|
| | MSX 14040 ES | ❍ | 40 | 32 | 50 | 100 | 150 | 2 | 2 |
| | MSX 14040 EM | ❍ | 40 | 32 | 50 | 200 | 250 | 2 | 2 |
| | MSX 14050 ES | ❍ | 50 | 42 | 50 | 100 | 150 | 3 | 2 |
| | MSX 14050 EM | ❍ | 50 | 42 | 50 | 200 | 250 | 3 | 2 |
| | MSX 14063 ES | ❍ | 63 | 42 | 50 | 100 | 150 | 4 | 2 |
| | MSX 14063 EM | ❍ | 63 | 42 | 50 | 200 | 250 | 4 | 2 |

ES : Short type with cylindrical shank
EM : Long type with cylindrical shank
EW : Short type with Weldon shank

● = Euro stock
❍ = Delivery on request

## Inserts




| Cat. No. | Coated Carbide ACP200 | ACP300 | ACK300 | Dimensions (mm) ød | s | r | Max. doc |
|---|---|---|---|---|---|---|---|
| WDMT 0603 ZDTR | ● | ● | ● | 6,35 | 2,0 | 1,5 | 1,0 |
| WDMT 0603 ZDTR-H | ● | ● | ● | | | | |
| WDMT 0804 ZDTR | ● | ● | ● | 8,5 | 4,0 | 2,0 | 1,5 |
| WDMT 0804 ZDTR-H | ● | ● | ● | | | | |
| WDMT 1205 ZDTR | ● | ● | ● | 12 | 5,0 | 2,0 | 2,0 |
| WDMT 1205 ZDTR-H | ● | ● | ● | | | | |
| WDMT 1406 ZDTR | ● | ● | ● | 14 | 6,0 | 2,0 | 2,5 |
| WDMT 1406 ZDTR-H | ● | ● | ● | | | | |

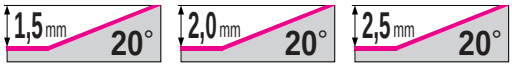
ZDTR-H : Stronger cutting edge

● = Euro stock

## Spare Parts

| Insert screw | Wrench | Clamp | C Ring | Clamp screw | Applicable endmill |
|---|---|---|---|---|---|
| | | | | | MSX - E❍  |
| BFTX 02505 IP | TRDR 08 IP | – | – | – | MSX 06000E❍ |
| BFTX 0306 IP | TRDR 08 IP | – | – | – | MSX 08020E❍, MSX 08022E❍ |
| BFTX 0306 IP | TRDR 08 IP | CCH 3,5 | CR 03 | BFTX 03510 IP 08 | MSX 08025E❍, MSX 08028E❍, MSX 08032E❍, MSX 08035E❍ |
| BFTX 0409 IP | TRDR 15 IP | CCH 3,5 | CR 03 | BFTX 03510 IP 15 | MSX 12000E❍ |
| BFTX 0511 IP | TRDR 20 IP | CCH 4,5 | CR 03 | BFTX 04513 IP 20 | MSX 14000E❍ |

# "METAL SLASH MILL"
# MSX 08000/12000/14000 RS




(MSX 08000■■) (MSX 12000■■) (MSX 14000■■)

Fig. 1

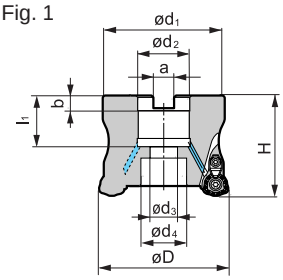
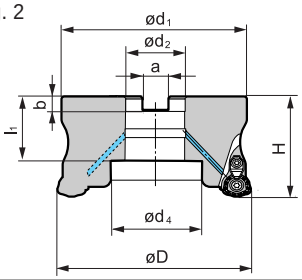
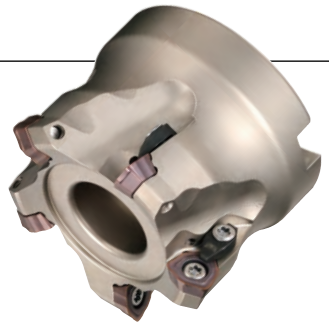



Fig. 2



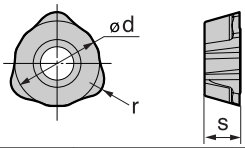



## ■ Body

| Cat. No. | Stock | Dimensions (mm) ø D | ød1 | H | Mounting a | b | ød2 | ød3 | ød4 | l1 | No. of teeth | Weight (Kg) | Fig. | Applicable Insert |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **MSX 08040 RS** | ● | 40 | 37 | 45 | 8,4 | 5,6 | 16 | 9 | 13,5 | 18 | 4 | 0,2 | 1 | WDMT 0804 ZDTR/-H |
| **MSX 12050 RS** | ● | 50 | 47 | 50 | 10,4 | 6,3 | 22 | 11 | 18 | 20 | 4 | 0,3 | 1 | WDMT 1205 ZDTR/-H |
| **MSX 12052 RS** | ● | 52 | 47 | 50 | 10,4 | 6,3 | 22 | 11 | 18 | 20 | 4 | 0,3 | | |
| **MSX 12063 RS** | ● | 63 | 60 | 50 | 10,4 | 6,3 | 22 | 11 | 18 | 20 | 5 | 0,4 | | |
| **MSX 12066 RS** | ● | 66 | 60 | 63 | 12,4 | 7,0 | 27 | 13,5 | 20 | 25 | 5 | 0,4 | | |
| **MSX 14050 RS** | ● | 50 | 47 | 50 | 10,4 | 6,3 | 22 | 11 | 17 | 20 | 3 | 0,3 | 1 | WDMT 1406 ZDTR/-H |
| **MSX 14063 RS** | ● | 63 | 60 | 50 | 10,4 | 6,3 | 22 | 11 | 18 | 20 | 4 | 0,6 | | |
| **MSX 14066 RS** | ● | 66 | 60 | 63 | 12,4 | 7,0 | 27 | 13,5 | 20 | 25 | 4 | 0,7 | | |
| **MSX 14080 RS** | ● | 80 | 76 | 63 | 12,4 | 7,0 | 27 | 13,5 | 20 | 25 | 5 | 1,2 | | |
| **MSX 14100 RS** | ● | 100 | 96 | 63 | 14,4 | 8,5 | 32 | - | 44 | 32 | 6 | 1,8 | 2 | |

● = Euro stock

## ■ Inserts




| Cat. No. | Coated Carbide ACP200 | ACP300 | ACK300 | Dimensions (mm) ød | s | r | Max. doc |
|---|---|---|---|---|---|---|---|
| **WDMT 0804 ZDTR** | ● | ● | ● | 8,5 | 4,0 | 2,0 | 1,5 |
| **WDMT 0804 ZDTR-H** | ● | ● | ● | | | | |
| **WDMT 1205 ZDTR** | ● | ● | ● | 12 | 5,0 | 2,0 | 2,0 |
| **WDMT 1205 ZDTR-H** | ● | ● | ● | | | | |
| **WDMT 1406 ZDTR** | ● | ● | ● | 14 | 6,0 | 2,0 | 2,5 |
| **WDMT 1406 ZDTR-H** | ● | ● | ● | | | | |

ZDTR-H : Stronger cutting edge

● = Euro stock
❍ = Stock item in Japan

| Class | Grade | P01 | P10 (M10) | P20 (M20) | P30 (M30) | P40 (M40) | Characteristic · Application |
|---|---|---|---|---|---|---|---|
| **P(Steel)** | **ACP200 ACP300** | | | ACP200 | | | Super ZX ultra hard coated grade for general steels and die steels |
| **M(Stainless)** | | | | | ACP300 | | Super ZX ultra hard coated grade for general steels and die steels |
| **K(Cast iron)** | **ACK300** | K01 | K10 | K20 | K30 | K40 | Super ZX ultra hard coated grade with tough fine grain substrate for cast and ductile irons |
| | | | | ACK300 | | | |

## ■ Spare Parts

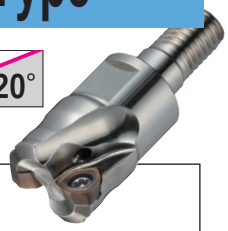
| Insert screw | Wrench | Clamp | C Ring | Clamp screw | Applicable endmill |
|---|---|---|---|---|---|
|  |  |  |  |  | MSX - RS  |
| BFTX 0306 IP | TRDR 08 IP | CCH 3,5 | CR 03 | BFTX 03510 IP 08 | MSX 08000RS |
| BFTX 0409 IP | TRDR 15 IP | CCH 3,5 | CR 03 | BFTX 03510 IP 15 | MSX 12000RS |
| BFTX 0511 IP | TRDR 20 IP | CCH 4,5 | CR 03 | BFTX 04513 IP 20 | MSX 14000RS |

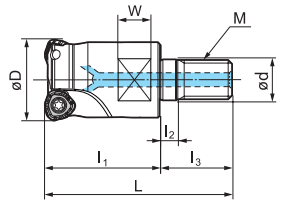
# Exchangeable Head Endmills
# MSX 06000/08000 M Type

## Modular Tools

1,0 mm 20°

High feed and high efficiency machining endmills






Axial rake angle: 8°
Radial rake angle: -3°~ -8°

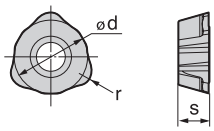
### Heads

For insert type : WDMT 0603

| Cat. No. | Stock | Dimensions (mm) | | | | | | | | | No. of teeth |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | øD | ød | M | L | $l_1$ | $l_2$ | $l_3$ | W | S | |
| MSX06016M08Z2 | ● | 16 | 8,5 | M8 | 42 | 25 | 5 | 17 | 8 | 13 | 2 |
| MSX06018M08Z2 | ❍ | 18 | 8,5 | M8 | 42 | 25 | 5 | 17 | 8 | 13 | 2 |
| MSX06020M10Z3 | ● | 20 | 10,5 | M10 | 49 | 30 | 5 | 19 | 8 | 15 | 3 |
| MSX06022M10Z3 | ❍ | 22 | 10,5 | M10 | 49 | 30 | 5 | 19 | 8 | 15 | 3 |
| MSX06025M12Z3 | ● | 25 | 12,5 | M12 | 56 | 35 | 5 | 21 | 10 | 19 | 3 |

Inserts are not included.

### Inserts for MSX 06000M Type




| Cat. No. | Coated Carbide | | | Dimensions (mm) | | | Max. $d_{oc}$ |
|---|---|---|---|---|---|---|---|
| | ACP 100 | ACP 200 | ACP 300 | ød | s | r | |
| WDMT 0603 ZDTR | ● | ● | ● | 6,35 | 3,0 | 1,5 | 1,0 |
| WDMT 0603 ZDTR-H | ● | ● | ● | | | | |

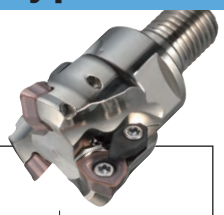
H – Strong Cutting Edge

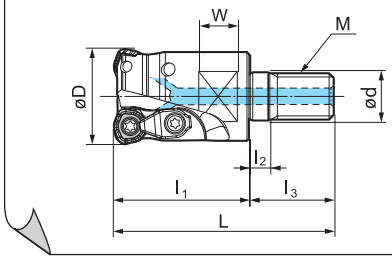
● = Euro stock
❍ = Delivery on request

# Exchangeable Head Endmills
# MSX 08000/12000 M Type

1,5 mm 20° (MSX 08000M)
2,0 mm 20° (MSX 12000 M)

High feed and high efficiency machining endmills






Axial rake angle: 8°
Radial rake angle: -3°~ -8°

### Heads

For insert type : WDMT 0804

| Cat. No. | Stock | Dimensions (mm) | | | | | | | | | No. of teeth |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | øD | ød | M | L | $l_1$ | $l_2$ | $l_3$ | W | S | |
| MSX08025M12Z2 | ● | 25 | 12,5 | M12 | 56 | 35 | 5 | 21 | 10 | 19 | 2 |
| MSX08028M12Z2 | ❍ | 28 | 12,5 | M12 | 56 | 35 | 5 | 21 | 10 | 19 | 2 |
| MSX08030M16Z3 | ❍ | 30 | 17,0 | M16 | 63 | 40 | 5 | 23 | 10 | 24 | 3 |
| MSX08032M16Z3 | ● | 32 | 17,0 | M16 | 63 | 40 | 5 | 23 | 10 | 24 | 3 |
| MSX08035M16Z3 | ❍ | 35 | 17,0 | M16 | 63 | 40 | 5 | 23 | 10 | 24 | 3 |

Inserts are not included.

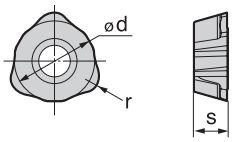
### Heads

For insert type : WDMT 1205

| Cat. No. | Stock | Dimensions (mm) | | | | | | | | | No. of teeth |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | øD | ød | M | L | $l_1$ | $l_2$ | $l_3$ | W | S | |
| MSX12032M16Z2 | ● | 32 | 17,0 | M16 | 63 | 40 | 5 | 23 | 10 | 24 | 2 |
| MSX12035M16Z2 | ❍ | 35 | 17,0 | M16 | 63 | 40 | 5 | 23 | 10 | 24 | 2 |
| MSX12040M16Z3 | ● | 40 | 17,0 | M16 | 63 | 40 | 5 | 23 | 10 | 24 | 3 |

Inserts are not included.

### Inserts for MSX 08000M/12000M Type




| Cat. No. | Coated Carbide | | | Dimensions (mm) | | | Max. $d_{oc}$ |
|---|---|---|---|---|---|---|---|
| | ACP 100 | ACP 200 | ACP 300 | ød | s | r | |
| WDMT 0804 ZDTR | ● | ● | ● | 8,5 | 4,0 | 2,0 | 1,5 |
| WDMT 0804 ZDTR-H | ● | ● | ● | | | | |
| WDMT 1205 ZDTR | ● | ● | ● | 12 | 5,0 | 2,0 | 2,0 |
| WDMT 1205 ZDTR-H | ● | ● | ● | | | | |

H – Strong Cutting Edge

● = Euro stock
❍ = Delivery on request

● Identification of Catalogue No.

**MSX 06 016 M08 Z2**

- MSX: Cutter type
- 06: insert size
- 016: Diameter
- M08: Mounting screw
- Z2: No. of teeth




### Spare Parts

| Clamp | C Ring | Clamp screw | Wrench | Insert screw | Required torque (N·m) | Applicable endmill |
|---|---|---|---|---|---|---|
| – | – | – | TRDR 08 IP | BFTX 02505 IP | 1,5 | MSX 06016M ~ MSX 06025M |
| CCH 3,5 | CR 03 | BFTX 03510 IP 08 | TRDR 08 IP | BFTX 0306 IP | 2,0 | MSX 08025M ~ MSX 08035M |
| CCH 3,5 | CR 03 | BFTX 03510 IP 15 | TRDR 15 IP | BFTX 0409 IP | 3,0 | MSX 12032M ~ MSX 12040M |

# MSX Type

## Recommended Cutting Conditions

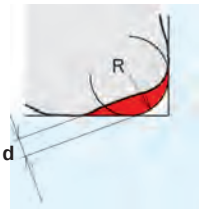
| Work Material | Coated Carbide Grade | Cutting Speed $v_c$ (m/min) | Insert Cat. No. | Endmill Type (øD) | | | | | | | | | | Shell Type (øD) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | ø16 | | ø20 | | ø25 | | ø32 | | ø40 | | ø50~66 | | ø80~100 | |
| | | | | $d_{oc}$ (mm) | Feed rate (mm/tooth) | $d_{oc}$ (mm) | Feed rate (mm/tooth) | $d_{oc}$ (mm) | Feed rate (mm/tooth) | $d_{oc}$ (mm) | Feed rate (mm/tooth) | $d_{oc}$ (mm) | Feed rate (mm/tooth) | $d_{oc}$ (mm) | Feed rate (mm/tooth) | $d_{oc}$ (mm) | Feed rate (mm/tooth) |
| General Steel (Below HB200) | ACP200 | 100-**150**-200 | **WDMT 0603** | 0,8 | 0,8 | 0,8 | 0,8 | 0,8 | 0,8 | – | – | – | – | – | – | – | – |
| | | | **WDMT 0804** | – | – | 1,0 | 1,0 | 1,0 | 1,2 | 1,0 | 1,2 | – | – | – | – | – | – |
| | | | **WDMT 1205** | – | – | – | – | – | – | 1,2 | 1,4 | 1,2 | 1,4 | 1,2 | 1,4 | – | – |
| | | | **WDMT 1406** | – | – | – | – | – | – | – | – | 1,5 | 1,5 | 1,5 | 1,5 | 1,5 | 1,5 |
| Alloy Steel (Below HRC45) | ACP200 | 80-**130**-180 | **WDMT 0603** | 0,7 | 0,8 | 0,7 | 0,8 | 0,7 | 0,8 | – | – | – | – | – | – | – | – |
| | | | **WDMT 0804** | – | – | 0,8 | 1,0 | 0,8 | 1,2 | 0,8 | 1,2 | – | – | – | – | – | – |
| | | | **WDMT 1205** | – | – | – | – | – | – | 1,0 | 1,4 | 1,0 | 1,4 | 1,0 | 1,4 | – | – |
| | | | **WDMT 1406** | – | – | – | – | – | – | – | – | 1,3 | 1,5 | 1,3 | 1,5 | 1,3 | 1,5 |
| Stainless Steel X5CRNI1810, Others | ACP300 | 80-**120**-150 | **WDMT 0603** | 0,8 | 0,7 | 0,8 | 0,7 | 0,8 | 0,7 | – | – | – | – | – | – | – | – |
| | | | **WDMT 0804** | – | – | 1,0 | 0,8 | 1,0 | 0,8 | 1,0 | 0,8 | – | – | – | – | – | – |
| | | | **WDMT 1205** | – | – | – | – | – | – | 1,2 | 1,2 | 1,2 | 1,2 | 1,2 | 1,2 | – | – |
| | | | **WDMT 1406** | – | – | – | – | – | – | – | – | 1,5 | 1,3 | 1,5 | 1,3 | 1,5 | 1,3 |
| Cast Iron GG, GGG | ACK300 | 100-**150**-200 | **WDMT 0603** | 0,8 | 1,0 | 0,8 | 1,0 | 0,8 | 1,0 | – | – | – | – | – | – | – | – |
| | | | **WDMT 0804** | – | – | 1,0 | 1,2 | 1,0 | 1,4 | 1,0 | 1,4 | – | – | – | – | – | – |
| | | | **WDMT 1205** | – | – | – | – | – | – | 1,2 | 1,5 | 1,2 | 1,5 | 1,2 | 1,5 | – | – |
| | | | **WDMT 1406** | – | – | – | – | – | – | – | – | 1,5 | 1,8 | 1,5 | 1,8 | 1,5 | 1,8 |
| Hardened Steel (Below HRC50) | ACK300 | 40-**80**-100 | **WDMT 0603** | 0,5 | 0,5 | 0,5 | 0,5 | 0,5 | 0,5 | – | – | – | – | – | – | – | – |
| | | | **WDMT 0804** | – | – | 0,5 | 0,6 | 0,5 | 0,8 | 0,5 | 0,8 | – | – | – | – | – | – |
| | | | **WDMT 1205** | – | – | – | – | – | – | 0,6 | 1,0 | 0,6 | 1,0 | 0,6 | 1,0 | – | – |
| | | | **WDMT 1406** | – | – | – | – | – | – | – | – | 1,0 | 1,2 | 1,0 | 1,2 | 1,0 | 1,2 |

| Insert Cat. No. | Max $d_{oc}$ | r |
|---|---|---|
| WDMT 0603.... | 1,0 | 1,5 |
| WDMT 0804.... | 1,5 | 2,0 |
| WDMT 1205.... | 2,0 | 2,0 |
| WDMT 1406.... | 2,5 | 2,0 |

- The above recommended cutting conditions may require adjustment according to machine rigidity and work rigidity.
  The above figures are guidelines for use with the BT50 machine tool.
- The above cutting conditions assume a tool overhang length of L/D=3 (i.e. overhang length is 3 times tool diameter) or less.
  When tool overhang is **more than L/D=3 and less than or equal L/D=5**, settings should be adjusted to approximately **70 to 80%** of those indicated in the above cutting conditions (i.e. $d_{oc}$ and Feed Rate).
  When tool overhang is **more than L/D=5 and less than or equal L/D=8**, settings should be adjusted to approximately **50 to 60%** of those indicated in the above cutting conditions (i.e. $d_{oc}$ and Feed Rate).

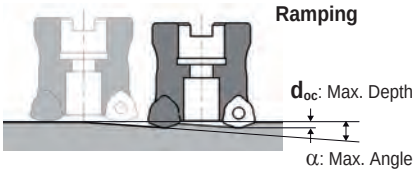
## Information for Programming

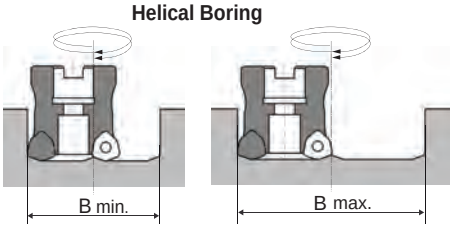
For machine programming, please use the theoretical corner radius (R) shown in the list.
Maximum depth (d) between theoretical radius and actual profile will be left on the finished surface, as shown below.




| Body | Insert | Theoretical Radius (R) | Remaining Depth (d) |
|---|---|---|---|
| MSX **06**000 | WDMT **06**03.... | 2,0 | 0,403 |
| MSX **08**000 | WDMT **08**04.... | 2,5 | 0,593 |
| MSX **12**000 | WDMT **12**05.... | 3,0 | 1,030 |
| MSX **14**000 | WDMT **14**06.... | 3,5 | 1,219 |

## Plunging and Helical Boring




| Cutter Ø | WDMT0603ZDTR | | | WDMT0804ZDTR | | | WDMT1205ZDTR | | | WDMT1406ZDTR | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $d_{oc}$ : max 1,0 | | | $d_{oc}$ : max 1,5 | | | $d_{oc}$ : max 2,0 | | | $d_{oc}$ : max 2,5 | | |
| | Ramping | Helical boring | | Ramping | Helical boring | | Ramping | Helical boring | | Ramping | Helical boring | |
| | α max. | min. øB | max. øB | α max. | min. øB | max. øB | α max. | min. øB | max. øB | α max. | min. øB | max. øB |
| **16** | **6°00'** | **21** | **31** | | | | | | | | | |
| 17 | 5°00' | 23 | 33 | | | | | | | | | |
| 18 | 4°30' | 25 | 35 | | | | | | | | | |
| **20** | **3°30'** | **29** | **39** | **7°30'** | **25** | **38** | | | | | | |
| 22 | 3°00' | 33 | 43 | 5°30' | 29 | 42 | | | | | | |
| **25** | **2°00'** | **39** | **48** | **4°00'** | **35** | **48** | | | | | | |
| 28 | | | | 3°00' | 41 | 54 | | | | | | |
| **32** | | | | **2°30'** | **49** | **62** | **6°30'** | **42** | **63** | | | |
| 35 | | | | 2°00' | 55 | 68 | 5°00' | 48 | 69 | | | |
| **40** | | | | **1°30'** | **65** | **78** | **4°00'** | **58** | **79** | **6°00'** | **53** | **78** |
| **50** | | | | | | | **2°30'** | **78** | **99** | **3°30'** | **73** | **98** |
| **63** | | | | | | | **2°00'** | **103** | **124** | **2°00'** | **99** | **124** |
| 66 | | | | | | | 1°30' | 109 | 130 | 1°45' | 105 | 130 |
| **80** | | | | | | | | | | **1°30'** | **133** | **158** |
| **100** | | | | | | | | | | **1°00'** | **173** | **198** |

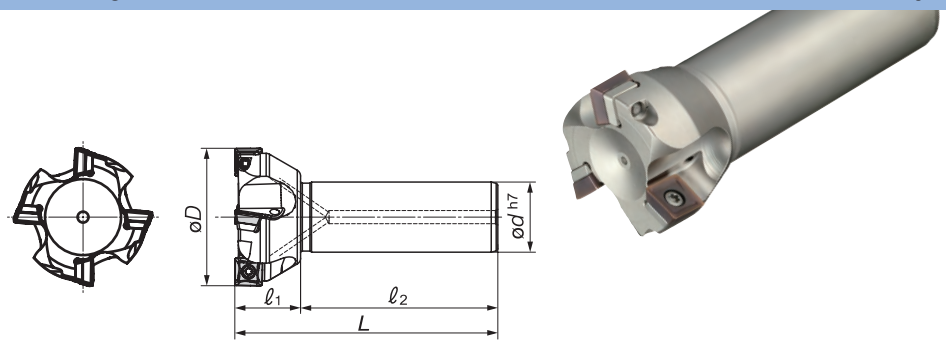
New

# "Sumi Wave" Shoulder Mill
# WFX (F) 12000 E Type

## Shoulder Milling for Steel, Stainless Steel, Die Steel, Cast Iron, Non-Ferrous Alloys

| P | M | K | N | S | H |
|---|---|---|---|---|---|
| ◎ | ○ | ○ | ○ | | |

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




## ■ Body (Shank Type)

### ● Standard WFX-E Type

| Cat. No. | Stock | Dimension (mm) | | | | | No. of Teeth |
|---|---|---|---|---|---|---|---|
| | | øD | ød | L | ℓ1 | ℓ2 | |
| WFX 12040E | ● | 40 | 32 | 120 | 30 | 90 | 3 |
| WFX 12050E | ● | 50 | 32 | 120 | 30 | 90 | 3 |
| WFX 12063E | ● | 63 | 32 | 120 | 30 | 90 | 4 |
| WFX 12080E | ● | 80 | 32 | 120 | 30 | 90 | 4 |

### ● Close Pitch WFXF-E Type

| Cat. No. | Stock | Dimension (mm) | | | | | No. of Teeth |
|---|---|---|---|---|---|---|---|
| | | øD | ød | L | ℓ1 | ℓ2 | |
| WFXF 12050E | ● | 50 | 32 | 120 | 30 | 90 | 4 |
| WFXF 12063E | ● | 63 | 32 | 120 | 30 | 90 | 5 |
| WFXF 12080E | ● | 80 | 32 | 120 | 30 | 90 | 6 |

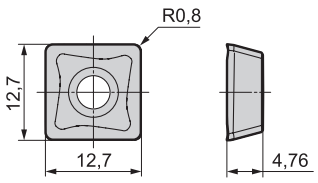
Inserts are not included.
ø40 mm cutters do not have a seat.

● = Euro stock

## ■ Inserts

P Steel M Stainless Steel K Cast Iron

| Grade | | Coated Carbide | | | | |
|---|---|---|---|---|---|---|
| Application | High Speed / Light | P | | | K | |
| | General Purpose | | PM | M | K | |
| | | | PM | PM | | K |
| Cat. No. | | ACP 100 | ACP 200 | ACP 300 | ACK 200 | ACK 300 |
| SOMT 120408 PDER-L | | ● | ● | ● | ○ | ● |
| SOMT 120408 PDER-G | | ● | ● | ● | ● | ● |
| SOMT 120408 PDER-H | | ○ | ● | ● | ○ | ● |



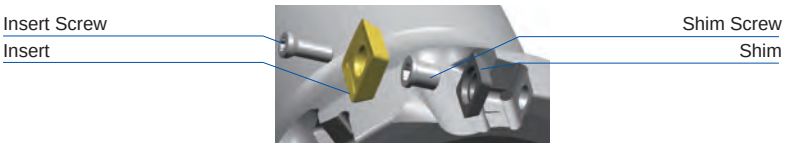

## ■ Identification of Cutter Body

**WFX F 12 050 E**

- WFX: Cutter type
- F: Fine pitch
- 12: Insert size
- 050: Diam.
- E: Endmill type

## ■ Spare Parts

| Applicable Cutters | Shim | Shim Screw | Insert Screw | Torque (Nm) | Wrench (insert) | Wrench (shim) |
|---|---|---|---|---|---|---|
| WFX 12040E | - | - | BFTX03512IP | 3,0 N · m | TRDR15IP | - |
| WFX (F) 12000E | WFXS4R | BW0507F | BFTX03512IP | 3,0 N · m | TRDR15IP | LH035 |




## ■ Recommended Cutting Conditions

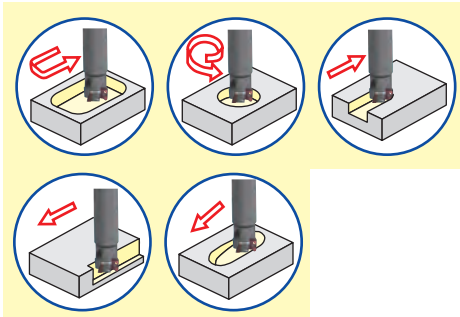
| ISO | Work Material | Good | Cutting Speed | Feed Rate per Tooth | Depth of Cut | Grades |
|---|---|---|---|---|---|---|
| P | General Steel | ◎ | 150<br>**200**<br>250 | 0,1<br>**0,15**<br>0,2 | < 10 | ACP200<br>ACP300 |
| P | Soft Steel | ◎ | 180<br>**265**<br>350 | 0,1<br>**0,15**<br>0,2 | < 10 | ACP200<br>ACP300 |
| P | Die Steel | ○ | 100<br>**150**<br>200 | 0,1<br>**0,15**<br>0,2 | < 6 | ACP200<br>ACP300 |
| M | Stainless Steel | ○ | 160<br>**205**<br>250 | 0,1<br>**0,15**<br>0,2 | < 10 | ACP300 |
| K | Cast Iron | ○ | 100<br>**175**<br>250 | 0,1<br>**0,15**<br>0,2 | < 10 | ACK200<br>ACK300 |

Cutting Speed and Feed Rate: Min. - Optimum - Max.



## General Features

### Wide Application Range



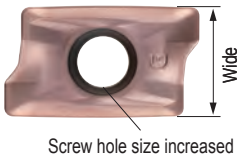
## Ramping (Slant Milling)

| Tool diam. Ø D | Max. ramping angle | |
|---|---|---|
| | Type 2000 | Type 3000 |
| Ø 14 | 5° | |
| Ø 16 | 4° | |
| Ø 20 | 4° | |
| Ø 25 | 2° | |
| Ø 32 | 1°30' | |
| Ø 40 | 1° | 2° |
| Ø 50 | 0°30' | 1° |
| Ø 63 | | 0°30' |
| Ø 80 | | 0°30' |
| Ø100 | | – |

Maximum ramping angle ($\alpha$ max. max.) depends on cutter diameter.

### Precision insert with strong cutting edge and low cutting force

- Wave shaped cutting edge lowers cutting force – improves edge strength
- High quality surface finish from precision tolerance cutting edge
- Smooth cutting action even when deep grooving
- Suitable for low rigidity machines




**High rake wave shaped cutting edge**




**High precision curved cutting edge**



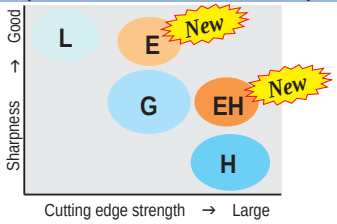
### Internal coolant hole

- Improves chip evacuation suitable for air or coolant

### Wide variety of inserts

- 6 types of chipbreaker (Type: L, G, H, E, EH and S )
- 5 new milling grades for wide application range
- Auroracoat DLC (diamond like carbon) anti weld coated inserts for Aluminium machining

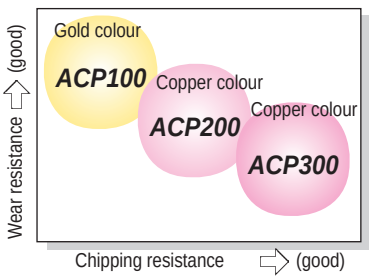
### Chipbreaker Selection Map




### Highly durable body

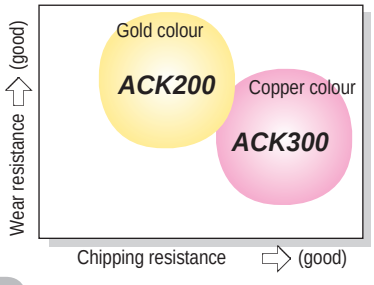
- Special surface treatment improves corrosion resistance and scratch resistance.
- Increased screw size improves clamping force and durability.

## Coated Grade for Steel



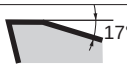
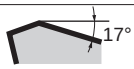
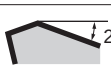
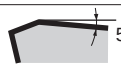
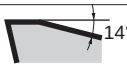
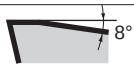

| Steel (P), Stainless Steel (M) | | | | | Grade | Characteristic · Application |
|---|---|---|---|---|---|---|
| P 01 | P 10 (M 10) | P 20 (M 20) | P 30 (M 30) | P 40 (M 40) | | |
| | ACP100 | | | | ACP100 | Excellent wear and thermal crack resistance with new CVD coating contains fine grain Ti-based layer |
| General to high speed and wet cutting | | | | | | |
| | | ACP200 | | | ACP200 | Excellent balance of wear and chipping resistance from PVD coating with Cr on tough carbide substrate |
| | | General grade for steel | | | | |
| | | | ACP300 | | ACP300 | Excellent toughness from PVD coating with Cr on extremely tough carbide substrate |
| | | | Very tough grade for steel | | | |

## Coated Grade for Cast Iron




| Cast Iron (K) (GG, GGG) | | | | | Grade | Characteristic · Application |
|---|---|---|---|---|---|---|
| K 01 | K 10 | K 20 | K 30 | K 40 | | |
| | ACK200 | | | | ACK200 | Excellent wear resistance from fine Ti base and tough etc etc |
| | General cutting | | | | | |
| | | | ACK300 | | ACK300 | Excellent toughness from fine grain carbide substrate and PVD coating with added Cr improves hardness and resistance to oxidation |
| | | | General to heavy cutting | | | |

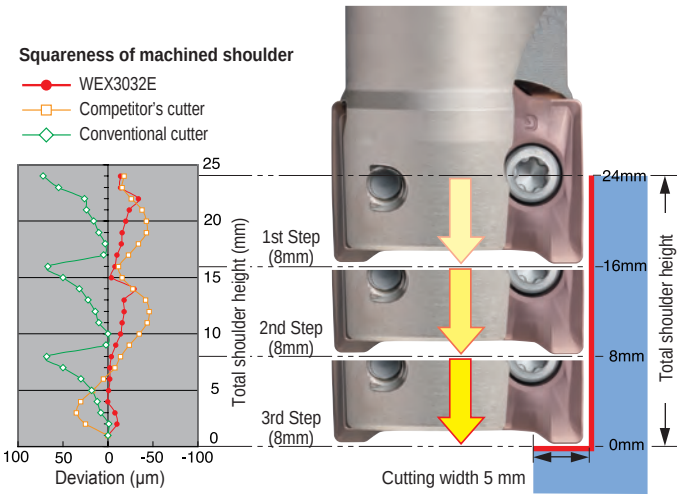
## Chipbreaker Selection

| Work Material | Steel, Cast Iron | | | Stainless Steel | | Aluminium |
|---|---|---|---|---|---|---|
| Chipbreaker Type | L | G | H | E | EH | S |
| |  |  |  |  |  |  |
| Feature | Low cutting force | General purpose | Strong cutting edge | E type for smooth cutting | Strong cutting edge | Sharp cutting edge |
| 2000 Type Figure | — |  28° |  20° |  17° |  17° |  27° |
| 3000 Type Figure |  25° |  20° |  5° |  14° |  8° |  30° |
| Application | Light cut, low rigidity milling and less burrs | General to Interrupted milling | Roughing, heavy interrupted and hardened steel milling | Light cutting to general purpose | Heavy interrupted machining | Aluminium alloy and non-ferrous metal |

## Cutting Performance

### ❶ Shoulder Milling

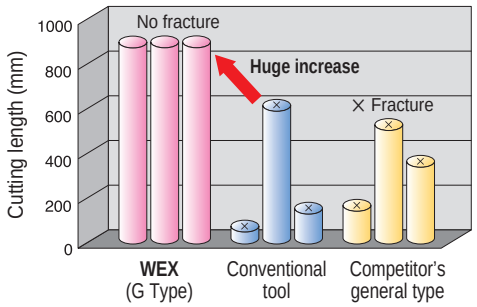
Precision cutting edges double the accuracy of a 90 degree square shoulder reducing the usual step marks to just witness marks.




(Cutting conditions)
Work: USt42-2
Tool: WEX3032E(ø32)
Insert: AXMT170508PEER-G
Grade: ACP200
$v_c$ = 150 m/min
$f_t$ = 0,15 mm/tooth
( $v_f$ = 675 mm/min )
$d_{oc}$ = 8 mm x 3 passes
$w_{oc}$ = 5 mm

### ❸ Fracture Resistance

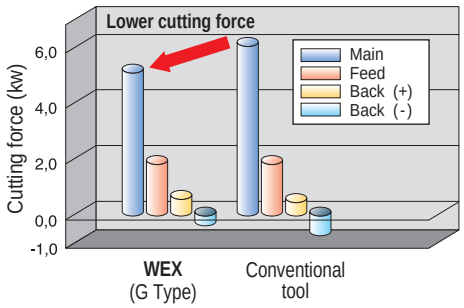
Huge increase in fracture resistance with improved cutting edge strength.




(Conditions)
Work: 42CrMo4
Tool: WEX3032E(ø32)
Insert: AXMT170508PEER-G
Grade: ACP200
Cutting data:
$v_c$ = 100m/min
$f_t$ = 0,4mm/tooth
$v_f$ = 1.260mm/min
$d_{oc}$ = 3mm
$w_{oc}$ = 25mm

### ❷ Cutting Force

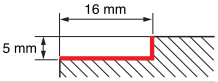
Main Force is 15% lower than a conventional tool.




(Conditions)
Work: C50
Tool: WEX3032E(ø32)
Insert: AXMT170508PEER-G
Grade: ACP200
Cutting data:
$v_c$ = 200m/min
$f_t$ = 0,2mm/tooth
$v_f$ = 1.200mm/min
$d_{oc}$ = 10mm
$w_{oc}$ = 8mm

## Recommended Cutting Conditions

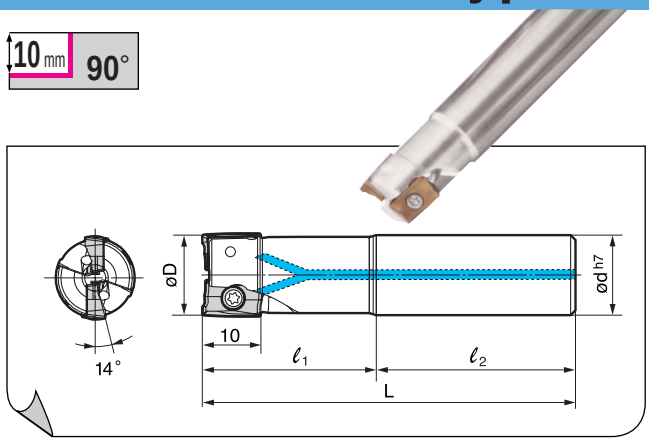
Tool: WEX 3032 E (ø32)
Insert: AXMT170508PEER-G




| ISO | Material | HB | Geometry | Coated Carbide | | | | | | | | | | | | "Diamond Like Carbon" Coated Carbide | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | ACP100 | | | ACP200 | | | ACP300 | | | ACK200 | | | ACK300 | | | DL1000 | | |
| | | | | Feed rate (mm/tooth) | | | | | | | | | | | | | | | | | |
| | | | | 0,12 | 0,25 | 0,35 | 0,12 | 0,25 | 0,35 | 0,12 | 0,25 | 0,35 | 0,12 | 0,25 | 0,35 | 0,12 | 0,25 | 0,35 | 0,05 | 0,12 | 0,25 |
| | | | | Cutting speed (m/min) | | | | | | | | | | | | | | | | | |
| P | Unalloyed steel, <0,15%C, annealed | 125 | G | 400 | 370 | 350 | 370 | 350 | 330 | 350 | 330 | 310 | | | | | | | | | |
| | „ , <0,45%C, annealed | 190 | G | 300 | 270 | 250 | 270 | 250 | 230 | 250 | 230 | 210 | | | | | | | | | |
| | „ , <0,45%C, tempered | 250 | G | 250 | 220 | 200 | 220 | 200 | 180 | 200 | 180 | 160 | | | | | | | | | |
| | „ , <0,75%, annealed | 270 | G | 200 | 170 | 150 | 180 | 160 | 140 | 160 | 140 | 120 | | | | | | | | | |
| | „ , <0,75%, tempered | 300 | G | 150 | 120 | 100 | 120 | 100 | 80 | 100 | 80 | 60 | | | | | | | | | |
| | Low alloyed steel ,annealed | 180 | G | 280 | 250 | 230 | 250 | 230 | 210 | 230 | 210 | 190 | | | | | | | | | |
| | „ ,tempered | 275 | G | 180 | 150 | 130 | 160 | 140 | 120 | 140 | 120 | 100 | | | | | | | | | |
| | „ ,tempered | 300 | G | 160 | 130 | 110 | 140 | 120 | 100 | 120 | 100 | 80 | | | | | | | | | |
| | „ ,tempered | 350 | G | 130 | 100 | 80 | 110 | 90 | 70 | 90 | 70 | 50 | | | | | | | | | |
| | High alloyed and tool steel, annealed | 200 | G | 250 | 220 | 200 | 220 | 200 | 180 | 200 | 180 | 160 | | | | | | | | | |
| | „ , tempered | 325 | G | 130 | 100 | 80 | 100 | 80 | 60 | 80 | 60 | 40 | | | | | | | | | |
| M | Stainless steel, ferritic/martensitic, annealed | 200 | G | 210 | 180 | 160 | 180 | 160 | 140 | 160 | 140 | 120 | | | | | | | | | |
| | Martensitic, tempered | 240 | G | 180 | 150 | 130 | 150 | 130 | 110 | 130 | 110 | 90 | | | | | | | | | |
| | Austenitic, plunged | 180 | G | 230 | 200 | 180 | 200 | 180 | 160 | 180 | 160 | 140 | | | | | | | | | |
| K | Gray cast iron | 180 | G | | | | | | | | | | 300 | 270 | 250 | 270 | 250 | | | | 230 |
| | Nodular cast iron | 250 | G | | | | | | | | | | 200 | 170 | 150 | 170 | 150 | | | | 130 |
| S | High temperature resist. alloys, Fe base, annealed | 200 | G | | | | | | | | | | 50 | 30 | | 50 | 30 | | | | |
| | „ hardened | 280 | G | | | | | | | | | | 50 | 30 | | 50 | 30 | | | | |
| N | Aluminium wrought alloy | 60 | S | | | | | | | | | | | | | | | | 1200 | 800 | 600 |
| | Aluminium alloy < 12% Si | 90 | S | | | | | | | | | | | | | | | | 600 | 400 | 250 |

# Wavemill Series
# WEX 2000E/EW Type

10 mm 90°




## Body (Short Type "E")

| Shank | Cat. No. | Stock | Dimensions (mm) øD | ød | $l_1$ | $l_2$ | L | No.of teeth |
|---|---|---|---|---|---|---|---|---|
| | 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 | 20 | 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 | 25 | 35 | 85 | 120 | 4 |
| | WEX 2032 E | ● | 32 | 32 | 40 | 90 | 130 | 5 |
| | WEX 2040 E | | 40 | 32 | 30 | 120 | 150 | 6 |
| | WEX 2050 E | | 50 | 32 | 30 | 120 | 150 | 7 |
| | WEX 2063 E | | 63 | 32 | 30 | 120 | 150 | 8 |

## Body (Long Type "EL")

| Shank | Cat. No. | Stock | Dimensions (mm) øD | ød | $l_1$ | $l_2$ | L | No.of teeth |
|---|---|---|---|---|---|---|---|---|
| | 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 | 30 | 120 | 150 | 2 |
| | WEX 2025 EL | ● | 25 | 25 | 50 | 120 | 170 | 2 |
| | WEX 2030 EL | | 30 | 25 | 30 | 140 | 170 | 2 |
| | WEX 2032 EL | | 32 | 32 | 60 | 120 | 180 | 2 |
| | WEX 2040 EL | | 40 | 32 | 30 | 150 | 180 | 2 |

## Body (Long Type "EL" + Small Shank)

| Shank | Cat. No. | Stock | Dimensions (mm) øD | ød | $l_1$ | $l_2$ | L | No.of teeth |
|---|---|---|---|---|---|---|---|---|
| | WEX 2016 EL15 | ● | 16 | 15 | 25 | 120 | 145 | 2 |
| | WEX 2020 EL19 | ● | 20 | 19 | 40 | 110 | 150 | 2 |
| | WEX 2025 EL24 | ● | 25 | 24 | 50 | 120 | 170 | 2 |
| | WEX 2025 EL24z3 | | 25 | 24 | 50 | 120 | 170 | 3 |
| | WEX 3032 EL30 | | 32 | 30 | 60 | 120 | 180 | 2 |

## Body (Weldon Shank Short Type)

| Shank | Cat. No. | Stock | Dimensions (mm) øD | ød | $l_1$ | $l_2$ | L | No.of teeth |
|---|---|---|---|---|---|---|---|---|
| | WEX 2016 EW | ● | 16 | 16 | 25 | 75 | 100 | 2 |
| | WEX 2020 EW | ● | 20 | 20 | 30 | 80 | 110 | 3 |

● = Euro stock
❍ = Delivery on request

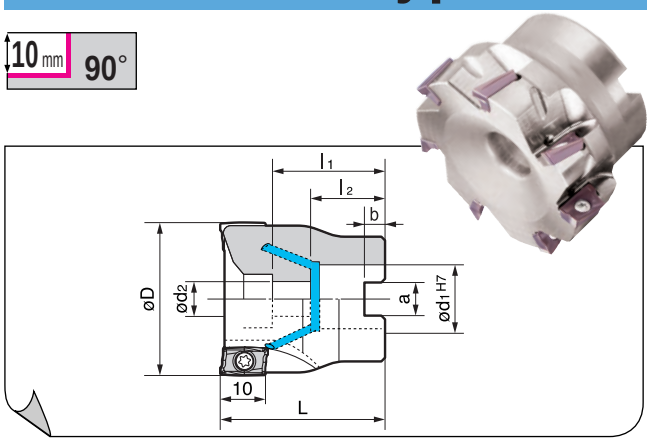
## Spare Parts

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

Anti-seizure cream SUMI-P included in the package.

# Wavemill Series
# WEX 2000F Type

10 mm 90°

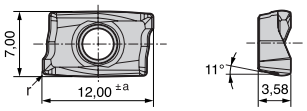



## Body (Shell Type "F")

| Cat. No. | Stock | Dimensions (mm) øD | $ød_1$ | $ød_2$ | a | b | L | $l_1$ | $l_2$ | No.of teeth |
|---|---|---|---|---|---|---|---|---|---|---|
| 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 | 10 |
| WEX 2100 F | | 100 | 32 | 32 | 14,4 | 8,5 | 50 | 32 | 26 | 12 |

● = Euro stock

## Inserts for WEX 2000 Type




| Cat. No. | Coated Carbide ACP 100 | ACP 200 | ACP 300 | ACK 200 | ACK 300 | DLC Coated DL1000 | Un Coated H1 | Dimensions (mm) r | a |
|---|---|---|---|---|---|---|---|---|---|
| AXMT 123504 PEER-G | ● | ● | ● | ● | ● | | | 0,4 | 0,08 |
| 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 |
| AXMT 123508 PEER-E | | | ● | | | | | 0,8 | 0,08 |
| AXMT 123508 PEER-EH | | | ● | | | | | 0,8 | 0,08 |
| AXET 123502 PEFR-S | | | | | | ● | ● | 0,2 | 0,025 |
| AXET 123504 PEFR-S | | | | | | ● | ● | 0,4 | 0,025 |
| AXET 123508 PEFR-S | | | | | | ● | ● | 0,8 | 0,025 |

G – General type
H – Strong cutting edge
E – For stainless steel
EH – Strong edge for stainless steel
S – For aluminium

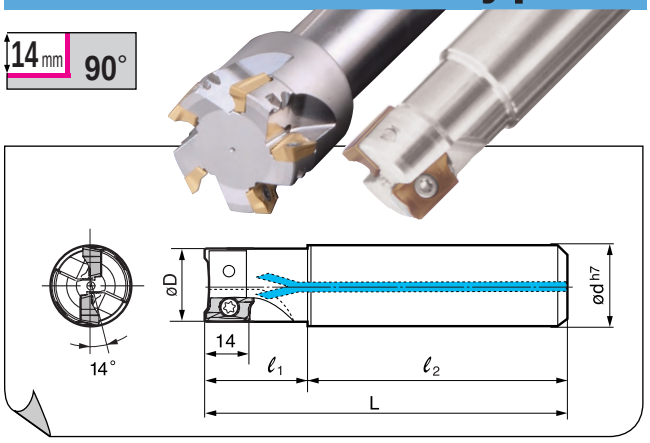
● = Euro stock

## Spare Parts

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

# Wavemill Series
# WEX 3000E/EW Type

14 mm 90°




## 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 | 60 | 120 | 180 | 2 |
| | WEX 3032 EL | ● | 32 | 32 | 60 | 120 | 180 | 2 |
| | WEX 3040 EL | ● | 40 | 32 | 80 | 140 | 220 | 2 |

## 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

∗**ATTENTION**: If nose radius of inserts is 2,0 mm or more please modify cutter body as indicated.



Standard Chamfer is 0,5 mm by 45 degrees

Increase Chamfer to 1mm x 45 degrees
when using 2,0mm radius inserts
AXMT 170520PEER

Increase chamfer to 1,5mm x 45 degrees
when using 3,0 mm radius inserts
AXMT 170530 PEER

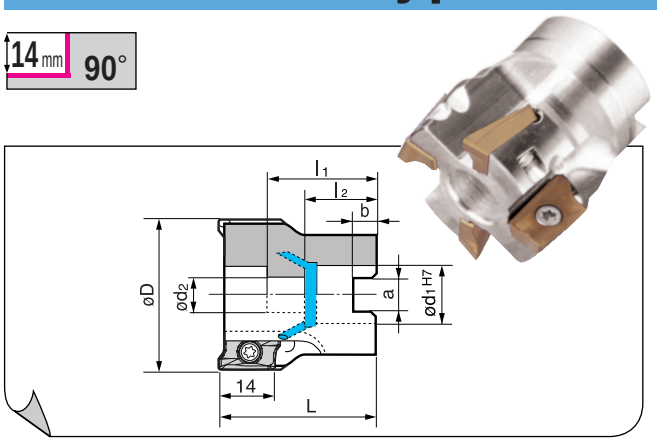
## Spare Parts

| Screw | Wrench | Applicable endmill |
|---|---|---|
|  |  | |
| BFTX 0407 IP | TRDR 15 IP | WEX 3025 ~ WEX 3030 |
| BFTX 0409 IP | | WEX 3032 ~ WEX 3063 |

Anti-seizure cream SUMI-P included in the package.

# Wavemill Series
# WEX 3000F Type

14 mm 90°

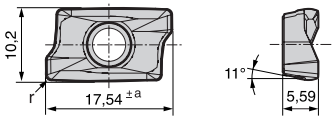



## Body (Shell Type "F")

| Cat. No. | Stock | Dimensions (mm) | | | | | | | | No.of teeth |
|---|---|---|---|---|---|---|---|---|---|---|
| | | øD | $ød_1$ | $ød_2$ | a | b | L | $l_1$ | $l_2$ | |
| 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 | 32 | 14,4 | 8,5 | 50 | 32 | 26 | 8 |

● = Euro stock

## Inserts for WEX 3000 Type




| Cat. No. | Coated Carbide | | | | | DLC Coated | Un Coated | Dimensions (mm) | |
|---|---|---|---|---|---|---|---|---|---|
| | ACP 100 | ACP 200 | ACP 300 | ACK 200 | ACK 300 | DL1000 | H1 | r | a |
| AXMT 170508 PEER-L | ● | ● | ● | ● | ● | | | 0,8 | 0,08 |
| AXMT 170504 PEER-G | ● | ● | ● | ● | ● | | | 0,4 | 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 170520 PEER-G* | ● | ● | ● | ● | ● | | | 2,0 | 0,08 |
| AXMT 170530 PEER-G* | ● | ● | ● | ● | ● | | | 3,0 | 0,08 |
| AXMT 170508 PEER-H | ● | ● | ● | ● | ● | | | 0,8 | 0,08 |
| AXMT 170512 PEER-H | ❍ | ● | ● | ❍ | ❍ | | | 1,2 | 0,08 |
| AXMT 170508 PEER-E | | | ● | | | | | 0,8 | 0,08 |
| AXMT 170508 PEER-EH | | | ● | | | | | 0,8 | 0,08 |
| AXET 170502 PEFR-S | | | | | | ● | ● | 0,2 | 0,025 |
| AXET 170504 PEFR-S | | | | | | ● | ● | 0,4 | 0,025 |
| AXET 170508 PEFR-S | | | | | | ● | ● | 0,8 | 0,025 |

L – Low cutting force
G – General type
H – Strong cutting edge
E – For stainless steel
EH – Strong edge for stainless steel
S – For aluminium

● = Euro stock
❍ = Delivery on request

## Spare Parts

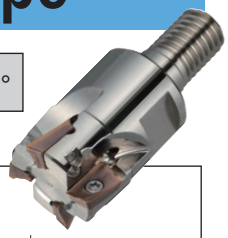
| Screw | Wrench | Applicable endmill |
|---|---|---|
|  |  | |
| BFTX 0409 IP | TRDR 15 IP | WEX3000 F |

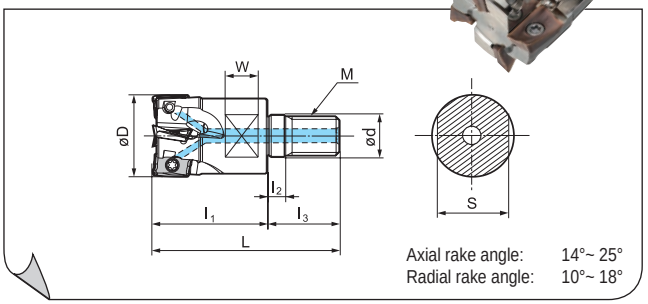
# Exchangeable Head Endmills
# WEX 2000M Type

## Modular Tools

10 mm 90°

High speed and high efficiency machining endmills





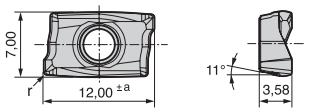

Axial rake angle: 14°~ 25°
Radial rake angle: 10°~ 18°

### ■ Heads

| Cat. No. | Stock | Dimensions (mm) | | | | | | | | | No. of teeth |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | øD | ød | M | L | $l_1$ | $l_2$ | $l_3$ | W | S | |
| WEX2016M08Z2 | ● | 16 | 8,5 | M8 | 42 | 25 | 5 | 17 | 8 | 13 | 2 |
| WEX2018M08Z2 | ❍ | 18 | 8,5 | M8 | 42 | 25 | 5 | 17 | 8 | 13 | 2 |
| WEX2020M10Z3 | ● | 20 | 10,5 | M10 | 49 | 30 | 5 | 19 | 8 | 15 | 3 |
| WEX2022M10Z3 | ❍ | 22 | 10,5 | M10 | 49 | 30 | 5 | 19 | 8 | 15 | 3 |
| WEX2025M12Z4 | ● | 25 | 12,5 | M12 | 56 | 35 | 5 | 21 | 10 | 19 | 4 |
| WEX2028M12Z4 | ❍ | 28 | 12,5 | M12 | 56 | 35 | 5 | 21 | 10 | 19 | 4 |
| WEX2030M16Z4 | ❍ | 30 | 17,0 | M16 | 63 | 40 | 5 | 23 | 10 | 24 | 4 |
| WEX2032M16Z5 | ● | 32 | 17,0 | M16 | 63 | 40 | 5 | 23 | 10 | 24 | 5 |
| WEX2040M16Z6 | ❍ | 40 | 17,0 | M16 | 63 | 40 | 5 | 23 | 10 | 24 | 6 |

Inserts are not included.

### ■ Inserts for WEX 2000 Type




| Cat. No. | Coated Carbide | | | | | DLC Coated | Un Coated | Dimensions (mm) | |
|---|---|---|---|---|---|---|---|---|---|
| | ACP 100 | ACP 200 | ACP 300 | ACK 200 | ACK 300 | DL1000 | H1 | r | a |
| AXMT 123504 PEER-G | ● | ● | ● | ● | ● | | | 0,4 | 0,08 |
| 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 |
| AXMT 123508 PEER-E | | | ● | | | | | 0,8 | 0,08 |
| AXMT 123508 PEER-EH | | | ● | | | | | 0,8 | 0,08 |
| AXET 123502 PEFR-S | | | | | | ● | ● | 0,2 | 0,025 |
| AXET 123504 PEFR-S | | | | | | ● | ● | 0,4 | 0,025 |
| AXET 123508 PEFR-S | | | | | | ● | ● | 0,8 | 0,025 |

G – General type
H – Strong cutting edge
E – For stainless steel
EH – Strong edge for stainless steel
S – For aluminium

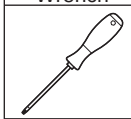
● = Euro stock

● Identification of Catalogue No.

**WEX 2 016 M08 Z2**

- WEX: Cutter type
- 2: insert size
- 016: Diameter
- M08: Mounting screw
- Z2: No. of teeth

### ■ Spare Parts

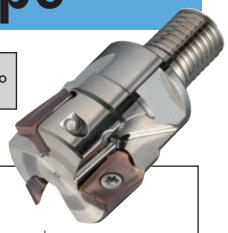
| Wrench | Screw | Required torque (N·m) | Applicable endmill |
|---|---|---|---|
|  |  | | |
| TRDR 08 IP | BFTX 0305 IP | 2,0 | WEX 2016M ~ WEX 2018M |
| | BFTX 0306 IP | 2,0 | WEX 2020M ~ WEX 2040M |

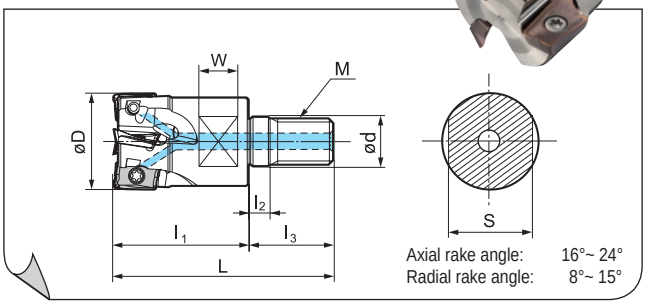
# Exchangeable Head Endmills
# WEX 3000M Type

## Modular Tools

14 mm 90°

High speed and high efficiency machining endmills





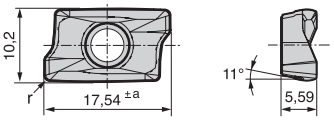

Axial rake angle: 16°~ 24°
Radial rake angle: 8°~ 15°

### ■ Heads

| Cat. No. | Stock | Dimensions (mm) | | | | | | | | | No. of teeth |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | øD | ød | M | L | $l_1$ | $l_2$ | $l_3$ | W | S | |
| WEX3025M12Z2 | ❍ | 25 | 12,5 | M12 | 56 | 35 | 5 | 21 | 10 | 19 | 2 |
| WEX3028M12Z2 | ❍ | 28 | 12,5 | M12 | 56 | 35 | 5 | 21 | 10 | 19 | 2 |
| WEX3030M16Z3 | ❍ | 30 | 17,0 | M16 | 63 | 40 | 5 | 23 | 10 | 24 | 3 |
| WEX3032M16Z3 | ❍ | 32 | 17,0 | M16 | 63 | 40 | 5 | 23 | 10 | 24 | 3 |
| WEX3035M16Z3 | ❍ | 35 | 17,0 | M16 | 63 | 40 | 5 | 23 | 10 | 24 | 3 |
| WEX3040M16Z4 | ❍ | 40 | 17,0 | M16 | 63 | 40 | 5 | 23 | 10 | 24 | 4 |

Inserts are not included.

### ■ Inserts for WEX 3000 Type




| Cat. No. | Coated Carbide | | | | | DLC Coated | Un Coated | Dimensions (mm) | |
|---|---|---|---|---|---|---|---|---|---|
| | ACP 100 | ACP 200 | ACP 300 | ACK 200 | ACK 300 | DL1000 | H1 | r | a |
| AXMT 170508 PEER-L | ● | ● | ● | ● | ● | | | 0,8 | 0,08 |
| AXMT 170504 PEER-G | ● | ● | ● | ● | ● | | | 0,4 | 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 170520 PEER-G* | ● | ● | ● | ● | ● | | | 2,0 | 0,08 |
| AXMT 170530 PEER-G* | ● | ● | ● | ● | ● | | | 3,0 | 0,08 |
| AXMT 170508 PEER-H | ● | ● | ● | ● | ● | | | 0,8 | 0,08 |
| AXMT 170512 PEER-H | ❍ | ● | ● | ❍ | ❍ | | | 1,2 | 0,08 |
| AXMT 170508 PEER-E | | | ● | | | | | 0,8 | 0,08 |
| AXMT 170508 PEER-EH | | | ● | | | | | 0,8 | 0,08 |
| AXET 170502 PEFR-S | | | | | | ● | ● | 0,2 | 0,025 |
| AXET 170504 PEFR-S | | | | | | ● | ● | 0,4 | 0,025 |
| AXET 170508 PEFR-S | | | | | | ● | ● | 0,8 | 0,025 |

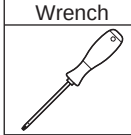
L – Low cutting force
G – General use
H – Strong edge
E – For stainless steel
EH – Strong edge for stainless steel
S – For aluminium

● = Euro stock
❍ = Delivery on request

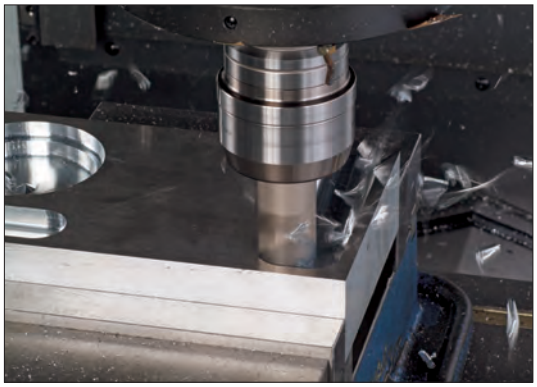



* **ATTENTION**: If nose radius of inserts is 2,0 mm or more please modify cutter body as indicated.
H17

### ■ Spare Parts

| Wrench | Screw | Required torque (N·m) | Applicable endmill |
|---|---|---|---|
|  |  | | |
| TRDR 15 IP | BFTX 0407 P | 3,0 | WEX 3025M ~ WEX 3030M |
| | BFTX 0409 P | 3,0 | WEX 3032M ~ WEX 3040M |

# Wavemill Series
# WAX Type

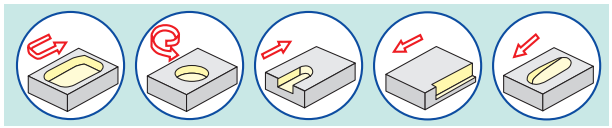


## Overview

Based on our proven Wavemill design this new range of WAX cutters is capable of rough and finishing Aluminium Alloys and other Non Ferrous Metals. It is ideal for high productivity Aluminium machining to exacting tolerances in the Aircraft, Electronics, and Automotive industries. The award winning Auroracoat DLC (diamond like carbon) inserts resist chip adhesion and substantially increase both tool life and productivity when dry machining Aluminium helping customers boost compliance with ISO14001 accreditation standards

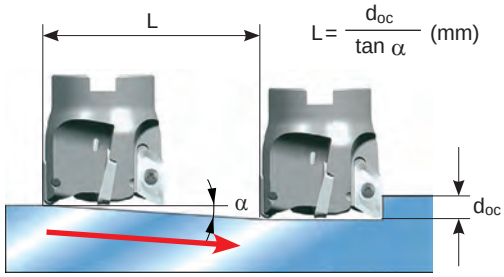
## Advantages

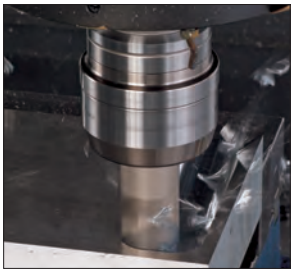
- **High Productivity**
- **Dry machining capability** with MQL system
- **DLC (diamond like carbon) inserts**
- **True 90 degree shoulder milling**
- **Chip adhesion resistance**
- **Wide range of nose radius**



## Ramping (Slant Milling)

Maximum ramping angle ($\alpha$ max. max.) depends on cutter diameter.
Minimum milling length (L min) is the ramping distance required to reach the maximum cutting depth ($d_{oc}$ max) at the maximum ramping angle of that cutter.
Minimum milling length (L) for any depth can be calculated by the equation below:



### WAX3000 E/EL Type

(mm)

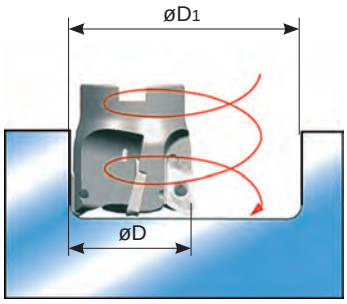
| Cutter diameter øD | Ramping angle α max. | Depth- of cut $d_{oc}$ max. | Milling Distance L min. |
|---|---|---|---|
| 20 | 8° | 10 | 72 |
| 25 | 17° | 10 | 33 |
| 32 | 12° | 10 | 47 |
| 40 | 9° | 10 | 64 |

### WAX3000 RS Type

(mm)

| Cutter diameter øD | Ramping angle α max. | Depth- of cut $d_{oc}$ max. | Milling Distance L min. |
|---|---|---|---|
| 50 | 7° | 10 | 82 |
| 60 | 5° | 10 | 115 |
| 80 | 3° | 10 | 191 |
| 100 | 3° | 10 | 191 |
| 125 | 2° | 10 | 287 |

## Helical Milling






### Helical Milling Diameter

(mm)

| Cutter diameter øD | Milling diameter $øD_1$ | |
|---|---|---|
| | Min. | Max. |
| 20 | 22 | 33 |
| 25 | 29 | 43 |
| 32 | 43 | 57 |
| 40 | 59 | 73 |
| 50 | 79 | 93 |
| 63 | 105 | 119 |
| 80 | 139 | 153 |
| 100 | 179 | 193 |
| 125 | 229 | 243 |

## Maximum Allowable Spindle Speed

| Cutter diameter øD | Spindle revolution n (min$^{-1}$) | Cutting speed $v_c$ (m/min) |
|---|---|---|
| 20 | 14.000 | 880 |
| 25 | 29.000 | 2.200 |
| 32 | 25.000 | 2.500 |
| 40 | 23.000 | 2.900 |
| 50 | 20.000 | 3.100 |
| 63 | 18.000 | 3.500 |
| 80 | 16.000 | 4.000 |
| 100 | 14.000 | 4.400 |
| 125 | 13.000 | 5.100 |

## Recommended Cutting Conditions

| Work material | Aluminum alloy |
|---|---|
| Cutting speed | 600 ~ 1.200 m/min |
| Feed rate | 0,05 ~ 0,25 mm/tooth |

# Wavemill Series
# WAX 3000 E/EL Type

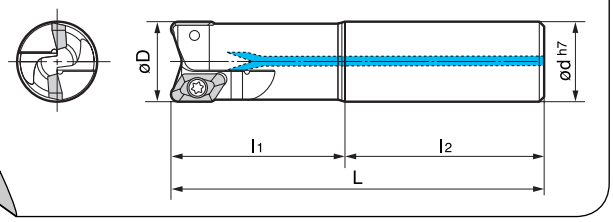
16-18 mm | 90°

| | |
|---|---|
| Axial rake angle | 6° |
| Radial rake angle | 19~25° |



**(Endmill)**

Short Type "E"
Long Type "EL"




## Body (For inserts with nose radius 3,2 mm and less)

| Cat. No. | Stock | Dimensions (mm) | | | | | No.of teeth | Weight (Kg) |
|---|---|---|---|---|---|---|---|---|
| | | øD | ød | L | $\ell_1$ | $\ell_2$ | | |
| **WAX 3020 E -3.2** | ● | **20** | 20 | 130 | 60 | 70 | 1 | 0,25 |
| **WAX 3025 E -3.2** | ● | **25** | 25 | 140 | 60 | 80 | 2 | 0,42 |
| **WAX 3025 EL-3.2** | ● | **25** | 25 | 200 | 60 | 140 | 2 | 0,63 |
| **WAX 3032 E -3.2** | ● | **32** | 32 | 150 | 70 | 80 | 2 | 0,75 |
| **WAX 3032 EL-3.2** | ● | **32** | 32 | 220 | 70 | 150 | 2 | 1,2 |
| **WAX 3040 E -3.2** | ● | **40** | 32 | 160 | 70 | 90 | 3 | 1,0 |
| **WAX 3040 EL-3.2** | ● | **40** | 32 | 220 | 70 | 150 | 3 | 1,4 |

## Body (For inserts with nose radius 4,0 mm and more)

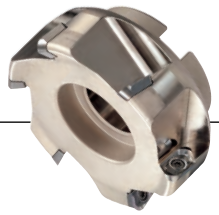
| Cat. No. | Stock | Dimensions (mm) | | | | | No.of teeth | Weight (Kg) |
|---|---|---|---|---|---|---|---|---|
| | | øD | ød | L | $\ell_1$ | $\ell_2$ | | |
| **WAX 3020 E -4.0** | ● | **20** | 20 | 130 | 60 | 70 | 1 | 0,25 |
| **WAX 3025 E -4.0** | ● | **25** | 25 | 140 | 60 | 80 | 2 | 0,42 |
| **WAX 3025 EL-4.0** | ● | **25** | 25 | 200 | 60 | 140 | 2 | 0,63 |
| **WAX 3032 E -4.0** | ● | **32** | 32 | 150 | 70 | 80 | 2 | 0,75 |
| **WAX 3032 EL-4.0** | ● | **32** | 32 | 220 | 70 | 150 | 2 | 1,2 |
| **WAX 3040 E -4.0** | ● | **40** | 32 | 160 | 70 | 90 | 3 | 1,0 |
| **WAX 3040 EL-4.0** | ● | **40** | 32 | 220 | 70 | 150 | 3 | 1,4 |

● = Euro stock

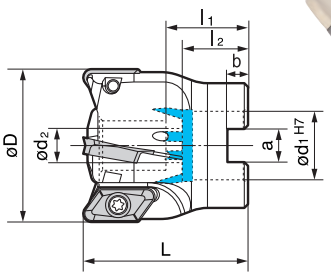
# Wavemill Series
# WAX 3000 RS Type

16-18 mm | 90°

| P | M | K | N Aluminium | S | H |
|---|---|---|---|---|---|
| × | × | × | ◎ | | × |



**(Shellmill)**




## Body (For inserts with nose radius 3,2 mm and less)

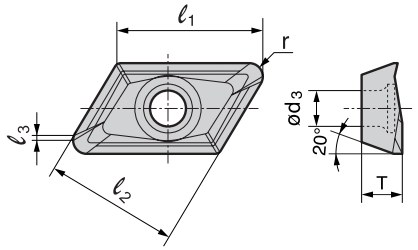
| Cat. No. | Stock | Dimensions (mm) | | | | | | | | No.of teeth | Weight (Kg) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | øD | $ød_1$ | L | $ød_2$ | a | b | $\ell_1$ | $\ell_2$ | | |
| **WAX 3050 RS-3.2** | ● | **50** | 22 | 50 | 11 | 10,4 | 6.3 | 26 | 21 | 4 | 0,34 |
| **WAX 3050 RS-3.2** | ● | **63** | 22 | 50 | 11 | 10,4 | 6.3 | 26 | 21 | 5 | 0,6 |
| **WAX 3050 RS-3.2** | ● | **80** | 27 | 50 | 13,5 | 12,4 | 7 | 30 | 23 | 5 | 1,0 |
| **WAX 3050 RS-3.2** | ● | **100** | 32 | 63 | 18 | 14,4 | 8 | 32 | 26 | 6 | 2,2 |
| **WAX 3050 RS-3.2** | ● | **125** | 40 | 63 | 22 | 16,4 | 9 | 35 | 29 | 7 | 3,5 |

## Body (For inserts with nose radius 4,0 mm and more)

| Cat. No. | Stock | Dimensions (mm) | | | | | | | | No.of teeth | Weight (Kg) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | øD | $ød_1$ | L | $ød_2$ | a | b | $\ell_1$ | $\ell_2$ | | |
| **WAX 3050 RS-4.0** | ● | **50** | 22 | 50 | 11 | 10,4 | 6.3 | 26 | 21 | 4 | 0,34 |
| **WAX 3050 RS-4.0** | ● | **63** | 22 | 50 | 11 | 10,4 | 6.3 | 26 | 21 | 5 | 0,6 |
| **WAX 3050 RS-4.0** | ● | **80** | 27 | 50 | 13,5 | 12,4 | 7 | 30 | 23 | 5 | 1,0 |
| **WAX 3050 RS-4.0** | ● | **100** | 32 | 63 | 18 | 14,4 | 8 | 32 | 26 | 6 | 2,2 |
| **WAX 3050 RS-4.0** | ● | **125** | 40 | 63 | 22 | 16,4 | 9 | 35 | 29 | 7 | 3,5 |

● = Euro stock

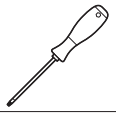
## Inserts for WAX 4000 Type




| Cat. No. | DLC Coated DL 1000 | Carbide H1 | Dimensions (mm) $\ell_1$ | $\ell_2$ | $\ell_3$ | r | T | $ød_1$ |
|---|---|---|---|---|---|---|---|---|
| **AECT 160404 PEFRA** | ● | ● | 18 | 16,4 | 1,4 | 0,4 | 5 | 4,4 |
| **160408 PEFRA** | ● | ● | 18 | 16,4 | 1 | 0,8 | 5 | 4,4 |
| **160412 PEFRA** | ● | ● | 18 | 16,4 | 0,6 | 1,2 | 5 | 4,4 |
| **160416 PEFRA** | ● | ● | 17,5 | 16,4 | 0,5 | 1,6 | 5 | 4,4 |
| **160420 PEFRA** | ● | ● | 17,5 | 16,4 | 0,5 | 2 | 5 | 4,4 |
| **160430 PEFRA** | ● | ● | 17 | 16,4 | 0,7 | 3 | 5 | 4,4 |
| **160432 PEFRA** | ● | ● | 17 | 16,4 | 0,5 | 3,2 | 5 | 4,4 |
| **AECT 160440 PEFRA** | ● | ● | 16,5 | 16,4 | 0,5 | 4 | 5 | 4,4 |
| **160450 PEFRA** | ● | ● | 16 | 16,4 | 0,4 | 5 | 5 | 4,4 |

● = Euro stock

## Spare Parts

| Screw | Wrench | Required torque | Applicable endmill |
|---|---|---|---|
|  |  | **3,0** (N·m) | WAX 3000 E/EL<br>3000 RS |
| BFTX 0408 | TRD 15 | | |

# Wavemill Series
# WAX 4000 E/EL Type

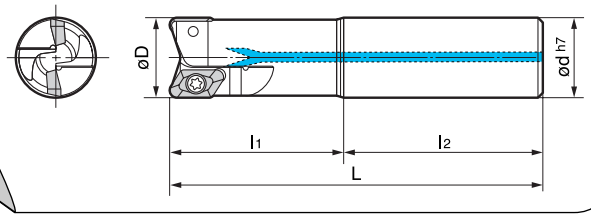
22-24 mm | 90°

| | |
|---|---|
| Axial rake angle | 6° |
| Radial rake angle | 19~25° |




**(Endmill)**

Short Type "E"
Long Type "EL"




## Body (For inserts with nose radius 3,2 mm and less)

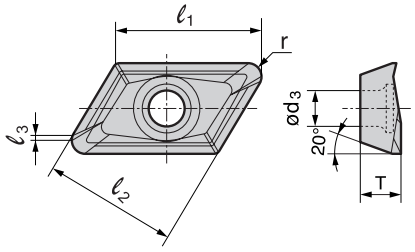
| Cat. No. | Stock | Dimensions (mm) | | | | | No.of teeth | Weight (Kg) |
|---|---|---|---|---|---|---|---|---|
| | | øD | ød | L | $\ell_1$ | $\ell_2$ | | |
| **WAX 4025E -3.2** | ❍ | **25** | 25 | 140 | 60 | 80 | 1 | 0,41 |
| **4025EL-3.2** | ❍ | **25** | 25 | 200 | 60 | 140 | 1 | 0,63 |
| **4032E -3.2** | ❍ | **32** | 32 | 150 | 70 | 80 | 1 | 0,72 |
| **4032EL-3.2** | ❍ | **32** | 32 | 220 | 70 | 150 | 1 | 1,2 |
| **WAX 4040E -3.2** | ❍ | **40** | 32 | 160 | 70 | 90 | 2 | 0,88 |
| **4040EL-3.2** | ❍ | **40** | 32 | 220 | 70 | 150 | 2 | 1,2 |

## Body (For inserts with nose radius 4,0 mm and more)

| Cat. No. | Stock | Dimensions (mm) | | | | | No.of teeth | Weight (Kg) |
|---|---|---|---|---|---|---|---|---|
| | | øD | ød | L | $\ell_1$ | $\ell_2$ | | |
| **WAX 4025E -4.0** | ❍ | **25** | 25 | 140 | 60 | 80 | 1 | 0,41 |
| **4025EL-4.0** | ❍ | **25** | 25 | 200 | 60 | 140 | 1 | 0,63 |
| **4032E -4.0** | ❍ | **32** | 32 | 150 | 70 | 80 | 1 | 0,72 |
| **4032EL-4.0** | ❍ | **32** | 32 | 220 | 70 | 150 | 1 | 1,2 |
| **WAX 4040E -4.0** | ❍ | **40** | 32 | 160 | 70 | 90 | 2 | 0,88 |
| **4040EL-4.0** | ❍ | **40** | 32 | 220 | 70 | 150 | 2 | 1,2 |

❍ = Delivery on request

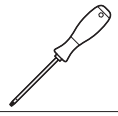
## Inserts for WAX 4000 Type




| Cat. No. | DLC Coated | Carbide | Dimensions (mm) | | | | | |
|---|---|---|---|---|---|---|---|---|
| | DL 1000 | H1 | $\ell_1$ | $\ell_2$ | $\ell_3$ | r | T | $ød_1$ |
| **AECT 220604 PEFRA** | ❍ | ❍ | 24 | 21,8 | 0,8 | 1,2 | 6,35 | 6,0 |
| **220608 PEFRA** | ❍ | ❍ | 24 | 21,8 | 1,2 | 0,8 | 6,35 | 6,0 |
| **220612 PEFRA** | ❍ | ❍ | 24 | 21,8 | 0,8 | 1,2 | 6,35 | 6,0 |
| **220616 PEFRA** | ❍ | ❍ | 24 | 21,8 | 0,4 | 1,6 | 6,35 | 6,0 |
| **220620 PEFRA** | ❍ | ❍ | 24 | 21,8 | 0,5 | 2,0 | 6,35 | 6,0 |
| **220630 PEFRA** | ❍ | ❍ | 23 | 21,8 | 0,6 | 3,0 | 6,35 | 6,0 |
| **220632 PEFRA** | ❍ | ❍ | 23 | 21,8 | 0,4 | 3,2 | 6,35 | 6,0 |
| **AECT 220640 PEFRA** | ❍ | ❍ | 22 | 21,8 | 1,2 | **4,0** | 6,35 | 6,0 |
| **220650 PEFRA** | ❍ | ❍ | 22 | 21,8 | 0,4 | **5,0** | 6,35 | 6,0 |

❍ = Delivery on request

## Spare Parts

| Screw | Wrench | Required torque | Applicable endmill |
|---|---|---|---|
|  |  | **5,0** (N·m) | WAX 4000 E/EL |
| BFTX 0509 N | TRD 20 | | ø25 ~ ø32 |
| BFTX 0511 N | TRD 20 | | ø40 |

# Wave Multi-Function Mill
# WMM Type



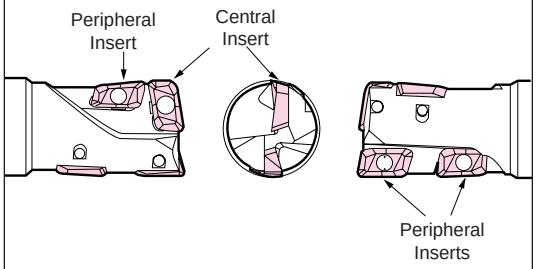
## Features

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.

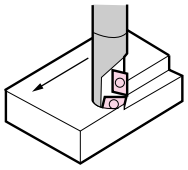
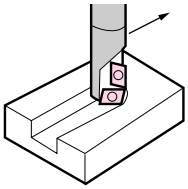
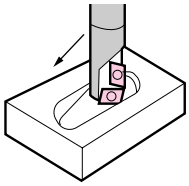
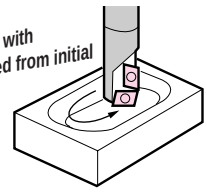
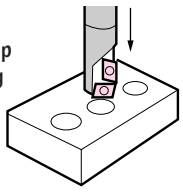
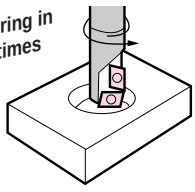
## Advantages

- 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 | ● Slotting | ● Ramping (Slant Milling) |
|---|---|---|
| DIN X5CrNi810<br>Cutting of stainless steel tool<br>  | GG25<br>Deep grooving can be performed easily. Easy chip removal<br>  | C50<br>Capable of tapered recess cutting of a prepared hole<br>  |
| Tool dia. : 25mm<br>Insert : APMT103504PDER (Grade : ACZ350)<br>$v_c$ =200m/min, $f_t$ =0,1mm/tooth<br>Axial $d_{oc}$ : 15mm, Radial $w_{oc}$ : 25mm, Air blow | Tool dia. : 25mm<br>Insert : APMT103504PDER (Grade : ACZ310)<br>$v_c$ =180m/min, $f_t$ =0,12mm/tooth<br>Axial $d_{oc}$ : 15mm, Radial $w_{oc}$ : 25mm, Air blow | Tool dia. : 25mm<br>Insert : APMT103504PDER (Grade : ACZ310)<br>$v_c$ =180m/min, $f_t$ =0,12mm/tooth<br>Axial $d_{oc}$ : 15mm, Radial $w_{oc}$ : 25mm, Air blow |
| **● Pocketing** | **● Drilling** | **● Helical cutting** |
| C50<br>Capable of pocketing with continuous lateral feed from initial drilling or taper cutting process<br>  | C50<br>Capable of easy chip removal and drilling without tool damage<br>  | C50<br>Capable of large boring in diameter of 1,2-1,8 times the cutter diameter without prepared hole<br>  |
| Tool dia. : 25mm<br>Insert : APMT103504PDER (Grade : ACZ350)<br>$v_c$ =200m/min, $f_t$ =0.1mm/tooth<br>Axial $d_{oc}$ : 15mm, Radial $w_{oc}$ : 25mm<br>Air blow | Tool dia. : 25mm<br>Insert : APMT103504PDER (Grade : ACZ350)<br>Bore size : 25mm, Depth : d=15mm<br>$v_c$ =200m/ min, f =0.1mm/ rev<br>Step feed : 0,5mm, Air blow | Tool dia. : 25mm<br>Insert : APMT103504PDER (Grade : ACZ350)<br>Bore size : 40mm, Depth : d=30mm<br>$v_c$ =300m/ min, f =0.1mm/ rev<br>Axial feed : t=15mm/pitch, Air blow |

## Recommended Cutting Conditions for WMM(H)2000

| øD (mm) \ Material | | Type of milling | Carbon steel (ex. C50) | Stainless steel (ex. 10CrNiS189) | Cast iron (ex. GG20) | Aluminium alloy |
|---|---|---|---|---|---|---|
| 20 ~ 26 | $v_c$ | — | 80-**120**-160 | 80-**100**-120 | 70-**150**-180 | 200-**300**-500 |
| | $f_t$ | Shoulder milling | 0,05-0,20 | 0,05-0,15 | 0,05-0,20 | 0,1-0,15-0,2 |
| | | Slotting | 0,05-0,12 | 0,05-0,10 | 0,05-0,12 | 0,05-0,10 |
| | | Drilling | 0,05-0,18 | 0,05-0,12 | 0,05-0,18 | 0,05-0,10 |
| Grade | | | ACZ330 | ACZ350 | ACZ310 | DL1000 (H1) |

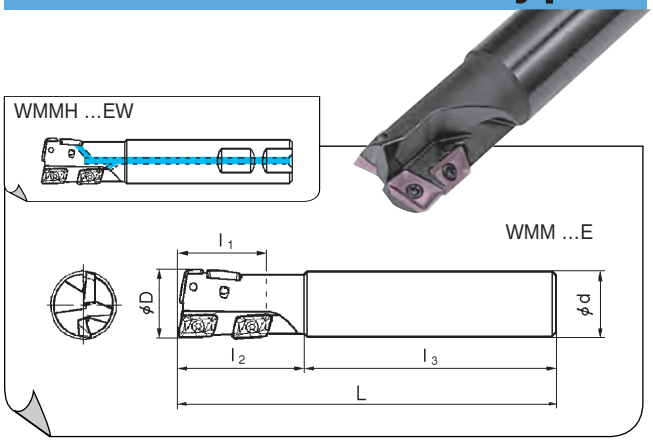
[$v_c$ =m/min, $f_t$ =mm/tooth] [min.– optimum – max.]

## Recommended Cutting Conditions for WMM(H)3000

| øD (mm) \ Material | | Type of milling | Carbon steel (ex. C50) | Stainless steel (ex. 10CrNiS189) | Cast iron (ex. GG20) | Aluminium alloy |
|---|---|---|---|---|---|---|
| 32 ~ 40 | $v_c$ | — | 80-**120**-160 | 80-**100**-120 | 70-**150**-180 | 200-**300**-500 |
| | $f_t$ | Shoulder milling | 0,05-0,25 | 0,05-0,20 | 0,05-0,25 | 0,1-0,15-0,2 |
| | | Slotting | 0,05-0,15 | 0,05-0,12 | 0,05-0,15 | 0,05-0,10 |
| | | Drilling | 0,05-0,20 | 0,05-0,18 | 0,05-0,20 | 0,05-0,10 |
| Grade | | | ACZ330 | ACZ350 | ACZ310 | DL1000 (H1) |

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

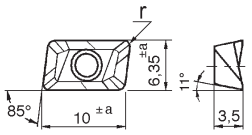
# Wavemill Series
# WMM (H) 2000 E/EL EW/ELW Type




## Body

| Shank | Cat. No. | Stock | Dimensions (mm) øD | ød | L | $l_1$ | $l_2$ | $l_3$ | Total teeth | Efective teeth |
|---|---|---|---|---|---|---|---|---|---|---|
| | **WMM 2020E** | ● | 20 | 20 | 130 | 17 | 35 | 95 | 3 | 1 |
| | **WMM 2025E** | ● | 25 | 25 | 140 | 26 | 40 | 100 | 4 | 1 |
| (Long type) | | | | | | | | | | |
| | **WMM 2020EL** | ● | 20 | 20 | 185 | 17 | 60 | 125 | 3 | 1 |
| | **WMM 2025EL** | ● | 25 | 25 | 220 | 26 | 75 | 145 | 4 | 1 |
| (Weldon shank type) | | | | | | | | | | |
| | **WMM 2020EW** | ● | 20 | 20 | 130 | 17 | 35 | 95 | 3 | 1 |
| | **WMM 2025EW** | ● | 25 | 25 | 140 | 26 | 40 | 100 | 4 | 1 |
| (Long type with weldon shank) | | | | | | | | | | |
| | **WMM 2020ELW** | ● | 20 | 20 | 185 | 17 | 60 | 125 | 3 | 1 |
| | **WMM 2025ELW** | ● | 25 | 25 | 220 | 26 | 75 | 145 | 4 | 1 |
| (**WMMH** Standard type with coolant holes and weldon shank) | | | | | | | | | | |
| | **WMMH 2020EW** | ● | 20 | 20 | 130 | 17 | 35 | 95 | 3 | 1 |
| | **WMMH 2025EW** | ● | 25 | 25 | 140 | 26 | 40 | 100 | 4 | 1 |
| (**WMMH** Long type with coolant holes and weldon shank) | | | | | | | | | | |
| | **WMMH 2020ELW** | ● | 20 | 20 | 185 | 17 | 60 | 125 | 3 | 1 |
| | **WMMH 2025ELW** | ● | 25 | 25 | 220 | 26 | 75 | 145 | 4 | 1 |

## Inserts for WMM 2000 Series

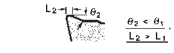



| Cat. No. | Coated ACZ310 | ACZ330 | ACZ350 | Diamond coated DL1000 | Un-coated H1 | Dimensions r | a |
|---|---|---|---|---|---|---|---|
| **APMT 103504 PDER** | ● | ● | ● | – | – | 0,4 | 0,08 |
| **APMT 103508 PDER** | ● | ● | ● | – | – | 0,8 | 0,08 |
| **APMT 103512 PDER** | ❍ | ❍ | ❍ | – | – | 1,2 | 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



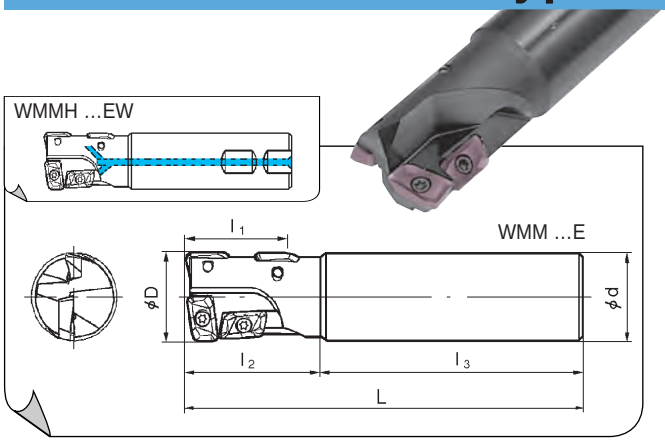

● = Euro stock
❍ = Delivery on request

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 |

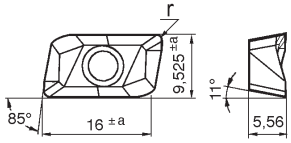
# Wavemill Series
# WMM (H) 3000 E/EL EW/ELW Type




## Body

| Shank | Cat. No. | Stock | Dimensions (mm) øD | ød | L | $l_1$ | $l_2$ | $l_3$ | Total teeth | Efective teeth |
|---|---|---|---|---|---|---|---|---|---|---|
| | **WMM 3032E** | ● | 32 | 32 | 150 | 39 | 50 | 100 | 4 | 1 |
| | **WMM 3040E** | ● | 40 | 32 | 160 | 39 | 55 | 105 | 4 | 1 |
| (Long type) | | | | | | | | | | |
| | **WMM 3032EL** | ● | 32 | 32 | 230 | 39 | 90 | 140 | 4 | 1 |
| | **WMM 3040EL** | ● | 40 | 32 | 230 | 39 | 55 | 185 | 4 | 1 |
| (Weldon shank type) | | | | | | | | | | |
| | **WMM 3032EW** | ● | 32 | 32 | 150 | 39 | 50 | 100 | 4 | 1 |
| | **WMM 3040EW** | ● | 40 | 32 | 160 | 39 | 55 | 105 | 4 | 1 |
| (Long type with weldon shank) | | | | | | | | | | |
| | **WMM 3032ELW** | ● | 32 | 32 | 230 | 39 | 90 | 140 | 4 | 1 |
| | **WMM 3040ELW** | ● | 40 | 32 | 230 | 39 | 55 | 185 | 4 | 1 |
| (**WMMH** Standard type with coolant holes and weldon shank) | | | | | | | | | | |
| | **WMMH 3032EW** | ● | 32 | 32 | 150 | 39 | 50 | 100 | 4 | 1 |
| | **WMMH 3040EW** | ● | 40 | 32 | 160 | 39 | 55 | 105 | 4 | 1 |
| (**WMMH** Long type with coolant holes and weldon shank) | | | | | | | | | | |
| | **WMMH 3032ELW** | ● | 32 | 32 | 230 | 39 | 90 | 140 | 4 | 1 |
| | **WMMH 3040ELW** | ● | 40 | 32 | 230 | 39 | 55 | 185 | 4 | 1 |

## Inserts for WMM 3000 Series




| Cat. No. | Coated ACZ310 | ACZ330 | ACZ350 | Diamond coated DL1000 | Un-coated H1 | Dimensions 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



## General Features

The WRX Wave repeater end mill system features AXMT style inserts vertically mounted and positioned to provide a long continuous cutting edge suitable for deep shoulder milling. Designed to run at elevated feed rates the soft cutting action reduces cutting resistance, vibration and noise to substantially improve tool life and surface finish.

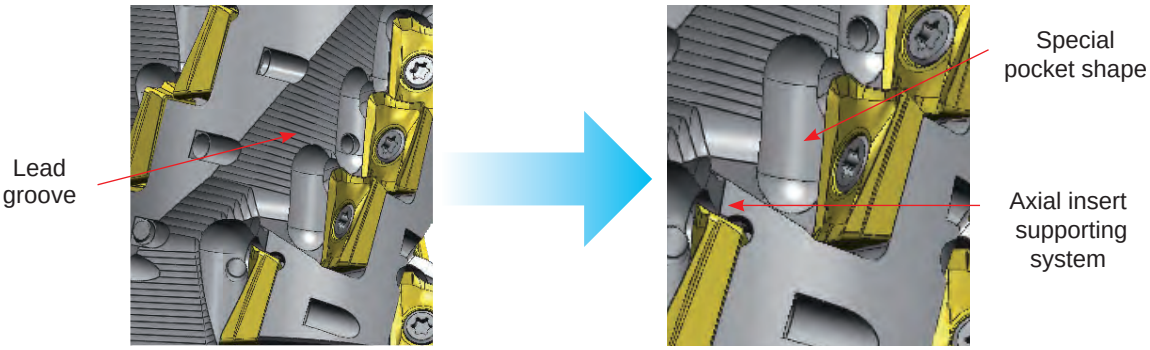
Available with our new generation Super FF and Super ZX coated inserts for unbeatable performance.

## Product Range

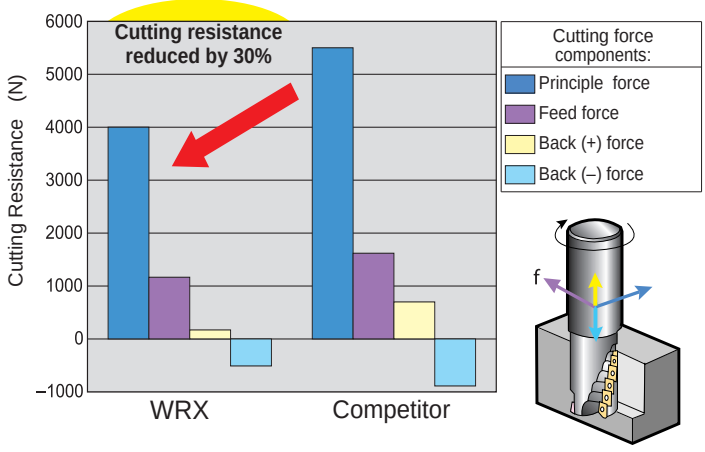
- WRX 2000 series with 12 mm inserts
- WRX 3000 series with 17mm inserts
- Cutter Diameters - 20mm ($d_{oc}$ = 18mm) to 100mm ($d_{oc}$ = 53mm)
- Special Order Options – WRX Cutter with integrated arbor
  Shell type with detachable head
- Wide ISO Application Range – P/M/K/N classification

## Advantages

- Optimised insert positions reduce cutting resistance and vibration
- Integral coolant improves chip flow
- Primary chip slot for smooth and fast chip evacuation
- Optimised insert pocket maximises rigidity
- Bottom edge support improves tool life and cutting performance

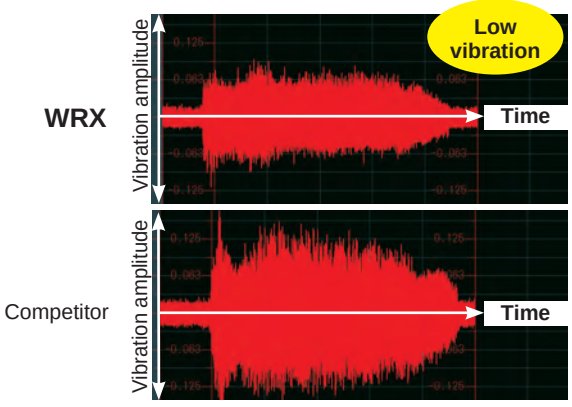



## Cutting Resistance Comparison



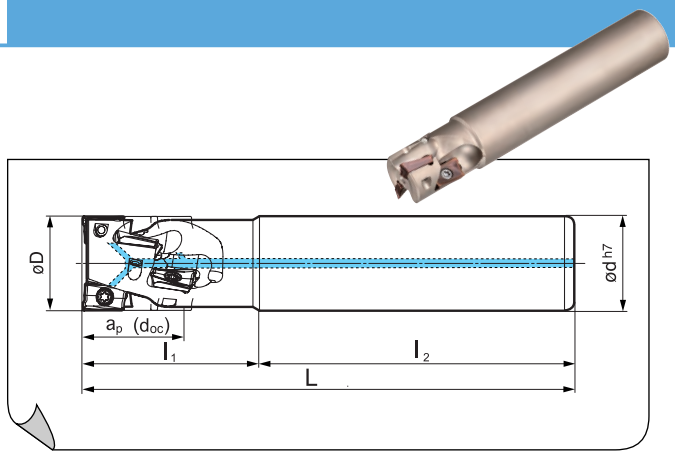

| | |
|---|---|
| Work Material: | C50 |
| Tool: | WRX2025RH27E25 |
| Cutting conditions: | $v_c$ = 100m/min, $f_t$ = 0,15mm/tooth |
| | $d_{oc}$ = 25mm, $w_{oc}$ = 10mm, Dry |

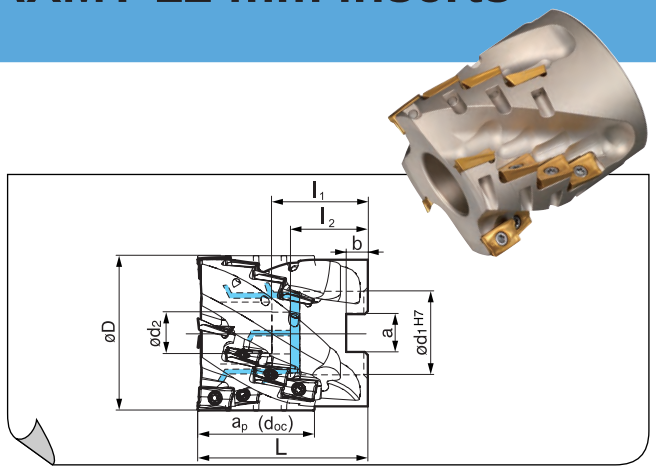
## Vibration Comparison




| | |
|---|---|
| Work Material: | C50 |
| Tool: | WRX3080RH53F32 |
| Cutting conditions: | $v_c$ = 150m/min, $f_t$ = 0,15mm/tooth |
| | $d_{oc}$ = 25mm, $w_{oc}$ = 10mm, Dry |

# WRX 2000 Series with AXMT 12 mm inserts




## Body (Cylindrical Shank Type)

| Shaft | Cat. No. | Stock | Depth of cut (doc) | Dimensions (mm) øD | ød | l | l2 | l3 | No. of teeth | No. of rows | Effective teeth |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | **WRX2020RH18E20** | ● | 18 | 20 | 20 | 120 | 40 | 80 | 4 | 2 | 2 |
| | **WRX2020RH36E20** | | 36 | 20 | 20 | 130 | 45 | 85 | 4 | 4 | 1 |
| | **WRX2025RH18E25** | ● | 18 | 25 | 25 | 130 | 45 | 85 | 6 | 2 | 3 |
| | **WRX2025RH27E25** | ● | 27 | 25 | 25 | 130 | 45 | 85 | 6 | 3 | 2 |
| | **WRX2032RH18E32** | ● | 18 | 32 | 32 | 140 | 50 | 90 | 8 | 2 | 4 |
| | **WRX2032RH27E32** | ● | 27 | 32 | 32 | 130 | 45 | 85 | 9 | 3 | 3 |
| | **WRX2040RH18E40** | | 18 | 40 | 40 | 160 | 40 | 120 | 10 | 2 | 5 |
| | **WRX2040RH36E40** | ● | 36 | 40 | 40 | 130 | 45 | 85 | 16 | 4 | 4 |

## Body (Weldon Shank Type)

| Shaft | Cat. No. | Stock | Depth of cut (doc) | Dimensions (mm) øD | ød | ℓ1 | ℓ2 | ℓ3 | No. of teeth | No. of rows | Effective teeth |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | **WRX2020RH18W20** | ● | 18 | 20 | 20 | 120 | 40 | 80 | 4 | 2 | 2 |
| | **WRX2020RH36W20** | | 36 | 20 | 20 | 130 | 45 | 85 | 4 | 4 | 1 |
| | **WRX2025RH18W25** | ● | 18 | 25 | 25 | 130 | 45 | 85 | 6 | 2 | 3 |
| | **WRX2025RH27W25** | ● | 27 | 25 | 25 | 130 | 45 | 85 | 6 | 3 | 2 |
| | **WRX2032RH18W32** | ● | 18 | 32 | 32 | 140 | 50 | 90 | 8 | 2 | 4 |
| | **WRX2032RH27W32** | ● | 27 | 32 | 32 | 130 | 45 | 85 | 9 | 3 | 3 |
| | **WRX2040RH18W40** | | 18 | 40 | 40 | 160 | 40 | 120 | 10 | 2 | 5 |
| | **WRX2040RH36W40** | ● | 36 | 40 | 40 | 130 | 45 | 85 | 16 | 4 | 4 |

## Spare Parts (WRX 2000)

| Screw | Wrench |
|---|---|
| |  |
| BFTX 0306 IP | TRDR 08 IP |

## Desciption Rule

WRX 20 25 R H 27 W 25

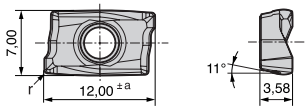
- 20 — Insert size
- 25 — Tool øD
- R — Cutting direction
- H — Inner coolant
- 27 — Cutting edge lengh
- W — Arbor type
- 25 — Arbor diameter

**E** - Straight shank
**W** - Weldon shank
**F** - Shell type

## Body (Shell Type)

| Cat. No. | Stock | Depth of cut (doc) | Dimensions (mm) øD | ød1 | ød2 | a | b | l1 | l | l | No. of teeth | No. of rows | Effective teeth |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **WRX2040RH18F16** | | 18 | 40 | 16 | 9 | 8, | 5, | 50 | 39 | 18 | 10 | 2 | 5 |
| **WRX2040RH36F16** | ● | 36 | 40 | 16 | 9 | 8, | 5, | 55 | 44 | 18 | 16 | 4 | 4 |
| **WRX2050RH18F22** | | 18 | 50 | 22 | 11 | 10 | 6, | 50 | 36 | 20 | 10 | 2 | 5 |
| **WRX2050RH36F22** | ● | 36 | 50 | 22 | 11 | 10 | 6,3 | 55 | 41,5 | 20 | 16 | 4 | 4 |

## Inserts (Same as for Wavemill WEX 2000 Type)




| Cat. No. | Coated Carbide ACP 100 | ACP 200 | ACP 300 | ACK 200 | ACK 300 | DLC Coated DL1000 | Un Coated H1 | Dimensions (mm) r | a |
|---|---|---|---|---|---|---|---|---|---|
| **AXMT 123504 PEER-G** | ● | ● | ● | ● | ● | | | 0,4 | 0,08 |
| **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 |
| **AXMT 123508 PEER-E** | | | ● | | | | | 0,8 | 0,08 |
| **AXMT 123508 PEER-EH** | | | ● | | | | | 0,8 | 0,08 |
| **AXET 123502 PEFR-S** | | | | | | ● | ● | 0,2 | 0,025 |
| **AXET 123504 PEFR-S** | | | | | | ● | ● | 0,4 | 0,025 |
| **AXET 123508 PEFR-S** | | | | | | ● | ● | 0,8 | 0,025 |

G – General type
H – Strong cutting edge
E – For stainless steel
EH – Strong edge for stainless steel
S – For aluminium

● = Euro stock

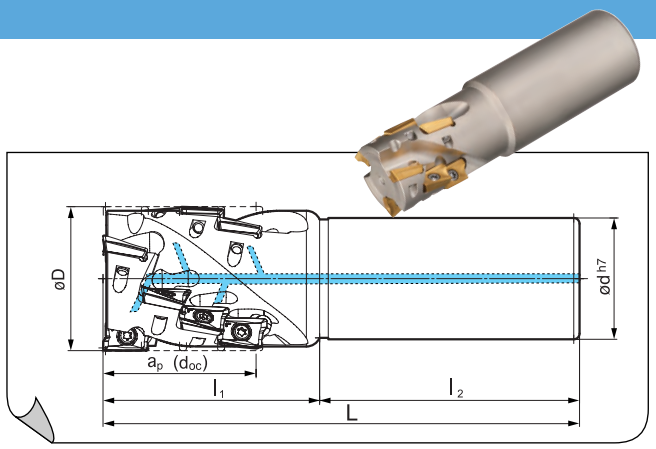
## Application Examples

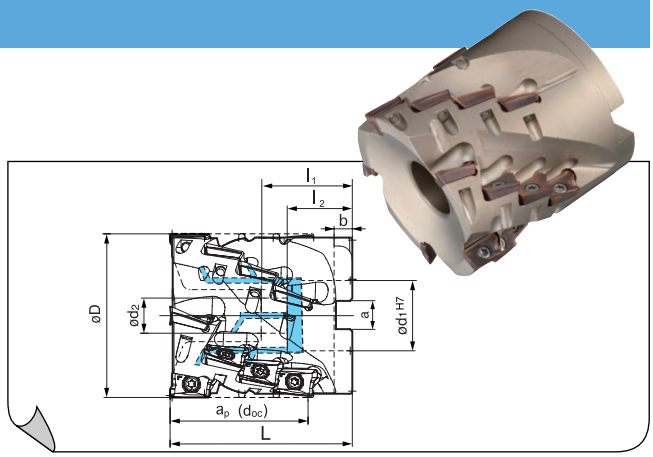
Example



| Work Material | Construction Machine Parts (USt.42-2) | | |
|---|---|---|---|
| Tool | Body | Sumitomo | Competitor |
| | | WRX2000 Weldon shank | Ø 38,1 |
| | Insert | AXMT | 18 mm |
| | Insert grade | ACP200 | PVD Type |
| | Tool dia. (mm) | 38,1 | 38,1 |
| | Total teeth | 24 | 16 |
| | Effective teeth | 4 | 4 |
| Cutting data | Cutting speed (m/min) | 180 | 137 |
| | Feed (mm/t) | 0,09 | 0,1 |
| | Axial depth of cut (mm) | 38,1 | 38,1 |
| | Radial width of cut (mm) | 3,2 | 3,2 |
| | Coolant | Wet | Wet |
| Result | Tool life / Cutting edge | 60 | 40 |
| Benefits | **1,5 times longer tool life 30%increased productivity** | | |

# WRX 3000 Series with AXMT 17 mm inserts




## Body (Cylindrical Shank Type)

| Shaft | Cat. No. | Stock | Depth of cut ($d_{oc}$) | Dimensions (mm) | | | | | No. of teeth | No. of rows | Effective teeth |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | øD | ød | l | $l_2$ | $l_3$ | | | |
| | WRX3032RH40E32 | | 40 | 32 | 32 | 150 | 65 | 85 | 6 | 3 | 2 |
| | WRX3040RH27E40 | | 27 | 40 | 40 | 180 | 60 | 120 | 6 | 2 | 3 |
| | WRX3040RH40E40 | ● | 40 | 40 | 40 | 150 | 65 | 85 | 9 | 3 | 3 |
| | WRX3050RH27E40 | | 27 | 50 | 40 | 180 | 60 | 120 | 8 | 2 | 4 |
| | WRX3050RH53E40 | ● | 53 | 50 | 40 | 165 | 75 | 90 | 12 | 4 | 3 |

## Body (Weldon Shank Type)

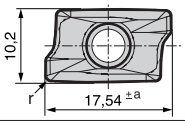
| Shaft | Cat. No. | Stock | Depth of cut ($d_{oc}$) | Dimensions (mm) | | | | | No. of teeth | No. of rows | Effective teeth |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | øD | ød | l | $l_2$ | $l_3$ | | | |
| | WRX3040RH27W40 | | 27 | 40 | 40 | 180 | 60 | 120 | 6 | 2 | 3 |
| | WRX3040RH40W40 | ● | 40 | 40 | 40 | 150 | 65 | 85 | 9 | 3 | 3 |
| | WRX3050RH27W40 | | 27 | 50 | 40 | 180 | 60 | 120 | 8 | 2 | 4 |
| | WRX3050RH53W40 | ● | 53 | 50 | 40 | 165 | 75 | 90 | 12 | 4 | 3 |

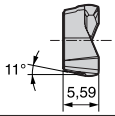
● = Euro stock
❍ = Delivery on request

## Spare Parts (WRX 2000)

| Screw | Wrench |
|---|---|
|  |  |
| BFTX 0409 IP | TRDR 15 IP |

## Inserts (Same as for Wavemill WEX 3000 Type)




| Cat. No. | Coated Carbide | | | | | DLC Coated | Un Coated | Dimensions (mm) | |
|---|---|---|---|---|---|---|---|---|---|
| | ACP 100 | ACP 200 | ACP 300 | ACK 200 | ACK 300 | DL1000 | H1 | r | a |
| AXMT 170508 PEER-L | ● | ● | ● | ● | ● | | | 0,8 | 0,08 |
| AXMT 170504 PEER-G | ● | ● | ● | ● | ● | | | 0,4 | 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 170520 PEER-G* | ● | ● | ● | ● | ● | | | 2,0 | 0,08 |
| AXMT 170530 PEER-G* | ● | ● | ● | ● | ● | | | 3,0 | 0,08 |
| AXMT 170508 PEER-H | ● | ● | ● | ● | ● | | | 0,8 | 0,08 |
| AXMT 170512 PEER-H | ❍ | ● | ● | ❍ | ❍ | | | 1,2 | 0,08 |
| AXMT 170508 PEER-E | | | ● | | | | | 0,8 | 0,08 |
| AXMT 170508 PEER-EH | | | ● | | | | | 0,8 | 0,08 |
| AXET 170502 PEFR-S | | | | | | ● | ● | 0,2 | 0,025 |
| AXET 170504 PEFR-S | | | | | | ● | ● | 0,4 | 0,025 |
| AXET 170508 PEFR-S | | | | | | ● | ● | 0,8 | 0,025 |

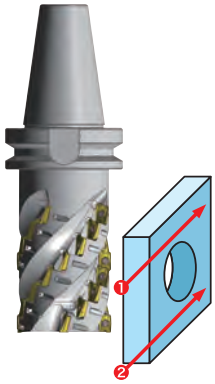
L: Low cutting force, G: General purpose, H: Strong cutting edge
E: For stainless steel, EH: Storong edge for stainless steel, S: For aluminium
* Cutter body modification is required.
☞ H9

## Body (Shell Type)

| Cat. No. | Stock | Depth of cut ($d_{oc}$) | Dimensions (mm) | | | | | | | | No. of teeth | No. of rows | Effective teeth |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | øD | $ød_1$ | $ød_2$ | a | b | $l_1$ | l | l | | | |
| WRX3050RH27F27 | | 27 | 50 | 22 | 11 | 10 | 6, | 50 | 36 | 20 | 8 | 2 | 4 |
| WRX3050RH53F22 | ● | 53 | 50 | 22 | 11 | 10 | 6, | 70 | 56 | 20 | 12 | 4 | 3 |
| WRX3063RH27F27 | | 27 | 63 | 27 | 13,5 | 12 | 7 | 70 | 34 | 2 | 10 | 2 | 5 |
| WRX3063RH53F27 | ● | 53 | 63 | 27 | 13,5 | 12 | 7 | 70 | 54 | 2 | 16 | 4 | 4 |
| WRX3080RH27F32 | | 27 | 80 | 32 | 17 | 14 | 8 | 50 | 30 | 2 | 12 | 2 | 6 |
| WRX3080RH53F32 | ● | 53 | 80 | 32 | 17 | 14 | 8 | 85 | 63 | 2 | 20 | 4 | 5 |
| WRX3100RH27F40 | | 27 | 100 | 40 | 21 | 16 | 9, | 85 | 40 | 30 | 14 | 2 | 7 |
| WRX3100RH53F40 | ● | 53 | 100 | 40 | 21 | 16 | 9, | 85 | 59 | 30 | 24 | 4 | 6 |

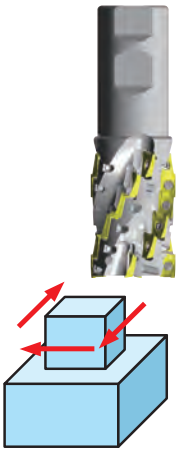
## Application Examples

### Example 1




| Work Material | Automotive Component / Cast Iron | | |
|---|---|---|---|
| Tool | Body | Sumitomo | Competitor |
| | | WRX3000 Type Integrated Arbor | Ø 50 |
| | Insert | AXMT | 18 mm |
| | Insert grade | ACK300 | PVD Type |
| | Tool dia. (mm) | 50 | 50 |
| | Total teeth | 15 | 12 |
| | Effective teeth | 3 | 3 |
| Cutting data | Cutting speed (m/min) | 78 | 78 |
| | Feed (mm/t) | 0,13 | 0,13 |
| | Axial depth of cut (mm) | 45 | 45 |
| | Radial width of cut (mm) | 5 | 5 |
| | Coolant | Dry | Dry |
| Result | Tool life / Cutting edge | 500 min. | 300 min. |
| Benefits | **1,7 times longer tool life** | | |

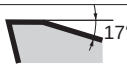
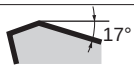
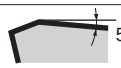
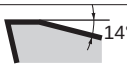
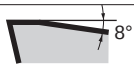
### Example 2



| Work Material | Machine Parts / Stainless Steel | | |
|---|---|---|---|
| Tool | Body | Sumitomo | Competitor |
| | | WRX3040RH40E40 | Ø 40 |
| | Insert | AXMT | 18 mm |
| | Insert grade | ACP 300 | PVD Type |
| | Tool dia. (mm) | 40 | 40 |
| | Total teeth | 9 | 6 |
| | Effective teeth | 3 | 2 |
| Cutting data | Cutting speed (m/min) | 125 | 125 |
| | Feed (mm/t) | 0,2 | 0,2 |
| | Axial depth of cut (mm) | 40 | 40 |
| | Radial width of cut (mm) | 5 | 5 |
| | Coolant | Wet | Wet |
| Result | Tool life / Cutting edge | 20 | 5 ~ 10 |
| Benefits | **Stable machining, double tool life with no breakage** | | |

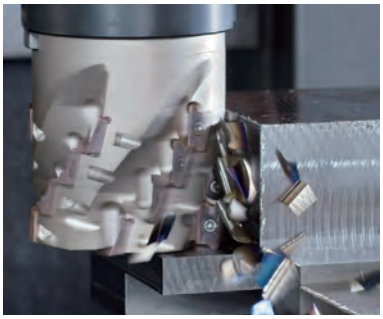
# Wave Repeater Mill
# WRX Type

## Chipbreaker Selection

| Work Material | Steel, Cast Iron | | | Stainless Steel | | Aluminium |
|---|---|---|---|---|---|---|
| Chipbreaker Type | **L** | **G** | **H** | **E** | **EH** | **S** |
| |  |  |  |  |  |  |
| Feature | Low cutting force | General purpose | Strong cutting edge | E type for smooth cutting | Strong cutting edge | Sharp cutting edge |
| 2000 Type Figure | — |   |   |   |   |   |
| 3000 Type Figure |   |   |   |   |   |   |
| Application | Light cut, low rigidity milling and less burrs | General to Interrupted milling | Roughing, heavy interrupted and hardened steel milling | Light cutting to general purpose | Heavy interrupted machining | Aluminium alloy and non-ferrous metal |

## Ramping (Slant Milling)

| Tool diameter | Max. ramping angle | |
|---|---|---|
| | WRX 2000 Typ | WRX 3000 Typ |
| Ø 20 | 4° | |
| Ø 25 | 2° | |
| Ø 32 | 1°30’ | |
| Ø 40 | 1° | 2° |
| Ø 50 | 0°30’ | 1° |
| Ø 63 | | 0°30’ |
| Ø 80 | | 0°30’ |
| Ø100 | | Not possible |



## Recommended Cutting Conditions

Tool: WRX 3050 RH53 F22, øD = 50mm, $d_{oc}$ = 50mm

| ISO | Work material | Property, condition | Hardness (HB) | Grades (optimum grade in bold letters) | | | Chip breaker | Recommended cutting speed and feed / tooth according to width of cut ( $w_{oc}$ /øD ) - must be adjusted to actual machine and workpiece conditions. | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | 10% | | 25% | | >50% | |
| | | | | | | | | $v_c$ | $f_t$ | $v_c$ | $f_t$ | $v_c$ | $f_t$ |
| | | | | | | | | min. **Optimum** max. | min. **Optimum** max. | min. **Optimum** max. | min. **Optimum** max. | min. **Optimum** max. | min. **Optimum** max. |
| P | **Steel, carbon steel** | < 0,15% C, annealed | 125 | ACP 100 | **ACP 200** | ACP 300 | L - **G** | 170 – **215** – 240 | 0,21 – **0,28** – 0,35 | 160 – **195** – 220 | 0,16 – **0,21** – 0,26 | 130 – **160** – 180 | 0,08 – **0,10** – 0,13 |
| | | < 0,45% C, annealed | 190 | ACP 100 | **ACP 200** | ACP 300 | L - **G** | 160 – **195** – 220 | 0,21 – **0,28** – 0,35 | 140 – **175** – 190 | 0,16 – **0,21** – 0,26 | 110 – **140** – 160 | 0,08 – **0,10** – 0,13 |
| | | < 0,45% C, tempered | 250 | ACP 100 | **ACP 200** | ACP 300 | L - **G** - H | 140 – **180** – 200 | 0,19 – **0,26** – 0,32 | 130 – **165** – 180 | 0,14 – **0,19** – 0,24 | 100 – **130** – 140 | 0,08 – **0,10** – 0,13 |
| | | < 0,75% C, annealed | 270 | ACP 100 | **ACP 200** | ACP 300 | L - **G** - H | 140 – **170** – 190 | 0,19 – **0,26** – 0,32 | 120 – **155** – 170 | 0,14 – **0,19** – 0,24 | 100 – **130** – 140 | 0,07 – **0,10** – 0,12 |
| | | < 0,75% C, tempered | 300 | ACP 100 | **ACP 200** | ACP 300 | L - **G** - H | 130 – **165** – 180 | 0,19 – **0,26** – 0,32 | 120 – **150** – 170 | 0,14 – **0,19** – 0,24 | 100 – **120** – 130 | 0,07 – **0,10** – 0,12 |
| | **Low alloyed steel** | annealed | 180 | ACP 100 | **ACP 200** | ACP 300 | **G** - H | 130 – **165** – 180 | 0,18 – **0,24** – 0,30 | 120 – **150** – 170 | 0,13 – **0,18** – 0,22 | 100 – **120** – 130 | 0,07 – **0,09** – 0,11 |
| | | tempered | 275 | ACP 100 | **ACP 200** | ACP 300 | **G** - H | 130 – **160** – 180 | 0,17 – **0,23** – 0,28 | 120 – **145** – 160 | 0,12 – **0,16** – 0,20 | 100 – **120** – 130 | 0,07 – **0,09** – 0,11 |
| | | tempered | 300 | ACP 100 | **ACP 200** | ACP 300 | **G** - H | 110 – **140** – 160 | 0,16 – **0,22** – 0,27 | 100 – **130** – 140 | 0,11 – **0,15** – 0,19 | 90 – **110** – 120 | 0,07 – **0,09** – 0,11 |
| | | tempered | 350 | ACP 100 | **ACP 200** | ACP 300 | **G** - H | 100 – **130** – 140 | 0,16 – **0,21** – 0,26 | 100 – **120** – 130 | 0,11 – **0,15** – 0,19 | 80 – **100** – 110 | 0,06 – **0,08** – 0,10 |
| | **High alloyed and tool steel** | annealed | 200 | **ACP 100** | ACP 200 | | G - **H** | 70 – **85** – 90 | 0,15 – **0,21** – 0,26 | 60 – **80** – 90 | 0,11 – **0,14** – 0,18 | 60 – **70** – 80 | 0,06 – **0,08** – 0,10 |
| | | tempered | 325 | **ACP 100** | ACP 200 | | G - **H** | 30 – **35** – 40 | 0,14 – **0,19** – 0,24 | 30 – **35** – 40 | 0,10 – **0,14** – 0,17 | 20 – **30** – 30 | 0,06 – **0,08** – 0,10 |
| M | **Stainless steel, ferritic/martensitic** | annealed | 200 | | ACP 200 | **ACP 300** | L - **G** - H | 120 – **150** – 170 | 0,15 – **0,20** – 0,25 | 110 – **135** – 150 | 0,11 – **0,14** – 0,18 | 90 – **110** – 120 | 0,07 – **0,09** – 0,11 |
| | **Stainless, martensitic** | tempered | 240 | | ACP 200 | **ACP 300** | L - **G** - H | 100 – **125** – 140 | 0,16 – **0,22** – 0,27 | 90 – **115** – 130 | 0,12 – **0,16** – 0,20 | 80 – **100** – 110 | 0,07 – **0,10** – 0,12 |
| | **Stainless, austenitic** | plunged | 180 | | ACP 200 | **ACP 300** | L - **G** | 80 – **95** – 110 | 0,15 – **0,20** – 0,25 | 70 – **85** – 90 | 0,11 – **0,14** – 0,18 | 60 – **70** – 80 | 0,06 – **0,08** – 0,10 |
| K | **Gray cast iron** | GG | 180 | **ACK 200** | ACK 300 | | **G** - H | 190 – **240** – 270 | 0,19 – **0,26** – 0,32 | 180 – **220** – 240 | 0,14 – **0,19** – 0,24 | 140 – **170** – 190 | 0,09 – **0,12** – 0,15 |
| | **Nodular cast iron** | GGG | 250 | **ACK 200** | ACK 300 | | **G** - H | 140 – **170** – 190 | 0,16 – **0,21** – 0,26 | 120 – **155** – 170 | 0,12 – **0,16** – 0,20 | 100 – **130** – 140 | 0,07 – **0,10** – 0,12 |
| S | **Exotic alloys (Resistant alloys, Ti + Ni alloys)** | Fe based, annelaed | 200 | ACK 200 | **ACK 300** | | L - **G** | 40 – **45** – 50 | 0,12 – **0,16** – 0,21 | 30 – **40** – 45 | 0,08 – **0,11** – 0,14 | 30 – **35** – 40 | 0,07 – **0,09** – 0,11 |
| | | hardened | 280 | ACK 200 | **ACK 300** | | L - **G** | 15 – **20** – 25 | 0,10 – **0,14** – 0,17 | 10 – **15** – 20 | 0,07 – **0,10** – 0,12 | 10 – **15** – 20 | 0,05 – **0,07** – 0,09 |
| N | **Aluminum alloy** | Si < 13% | | | **DL 1000** | H1 | **S** | 510 – **635** – 710 | 0,23 – **0,31** – 0,38 | 460 – **580** – 640 | 0,17 – **0,22** – 0,28 | 390 – **485** – 540 | 0,08 – **0,12** – 0,14 |
| | | Si ≥ 13% | | | **DL 1000** | H1 | **S** | 150 – **190** – 210 | 0,19 – **0,25** – 0,32 | 140 – **175** – 190 | 0,14 – **0,18** – 0,23 | 130 – **165** – 180 | 0,08 – **0,10** – 0,13 |
| | **Copper alloy** | | | | **DL 1000** | H1 | **S** | 320 – **405** – 450 | 0,15 – **0,21** – 0,26 | 300 – **370** – 410 | 0,13 – **0,16** – 0,22 | 240 – **300** – 330 | 0,07 – **0,10** – 0,12 |

- Se recomienda corte en seco (aire) - para usar lubricante recomendamos grados revestidos CVD (ACP100 / ACK200) o grados PVD tenaces (ACP300 / ACK300).
- Geometrías de plaquitas: Tipo L para fuerzas de corte bajas; componentes de paredes delgadas, Tipo G para uso general, El tipo H ofrece mayor estabilidad del filo de corte para desbaste y corte pesado.

# WBMR Type



## Features

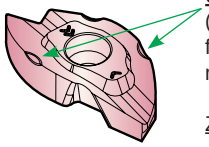
Particularly suitable for die mold machining the WBMR replaceable insert ball nose endmill efficiently roughs complex profiles.

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

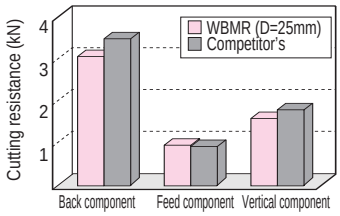


**Chipbreaker**
(Nick type)
for r = 25
radial insert

ZNMT 4310250-N

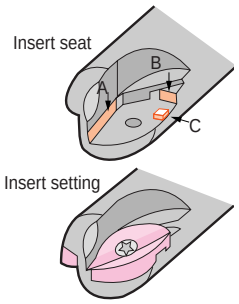
## Performance

● Cutting resistance



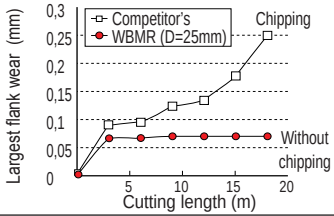

Cutting conditions (Shoulder milling, downcut)
$v_c$ =200m/min, $f_t$ =0.15mm/tooth
Axial $d_{oc}$ : 5mm, Radial $w_{oc}$ : 5mm
Work material : C50

● Anti-rotational mechanism




Circumferential movement of the insert caused by cutting forces is controlled by guide faces A, B & C, so as to allow stable cutting.

● Insert life

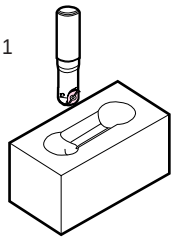



Cutting conditions (Shoulder milling, downcut)
$v_c$ =100m/min, $f_t$ =0.15mm/tooth
Axial $d_{oc}$ : 5mm, Radial $w_{oc}$ : 5mm
Work material : X 40 CrMoV 5-1(HRC45)

## Application Example

● Cold molding die

Work material :
X 155 CrVMo 12 1



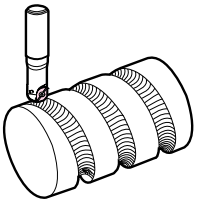
<Results>
Flank wear after continuous cutting for seven hours was less than other manufacturer's product.
Stable cutting was observed.

WBMR 2200S (ø20mm)
Insert grade : ACZ350

Cutting conditions :
n = 2200 rpm, $v_f$ = 500 mm/min
Depth of cut : 0,3~2 mm
Non-water soluble cutting oil

● Injection molded part

(Cr-Mo steel + Stellite-overlay)



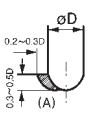
<Results>
Wave ball (ø30mm) could cut without chattering while other manufacturer's products could not cut at all due to chattering.

WBMR 2300M (ø30mm)
Insert grade : ACZ350

Cutting conditions :
n = 500 rpm, $v_f$ = 35 mm/min
Depth of cut : 5 mm
Dry cut

## Recommended cutting conditions (2 teeth)

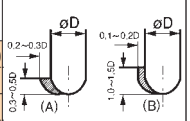
| Condition | Material | Carbon steel (Below HRC25) | Alloy steel (Below HRC45) | Stainless, Die steel etc. | Cast iron |
|---|---|---|---|---|---|
| (A) | $v_c$ | 200-**250**-300 | 100-**150**-200 | 50-**80**-100 | 100-**120**-150 |
| | $f_t$ | 0,1-**0,2**-0,3 | 0,1-**0,2**-0,3 | 0,1-**0,15**-0,2 |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




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

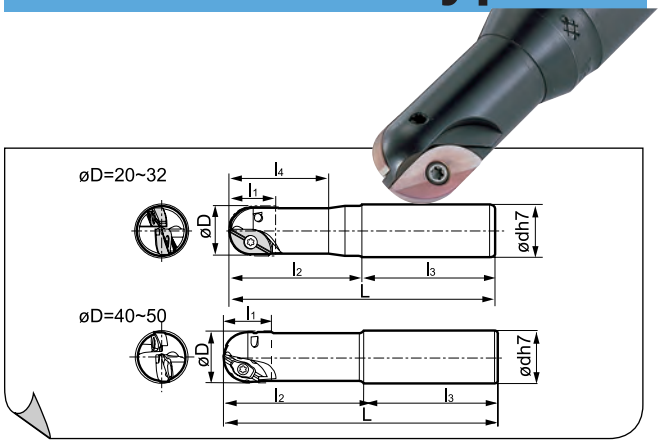
## Recommended cutting conditions (4 teeth)

| Condition | Material | Carbon steel (Below HRC25) | Alloy steel (Below HRC45) | Stainless, Die steel etc. | Cast iron |
|---|---|---|---|---|---|
| (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 |




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

# Wave Ball Mill" for Roughing
# WBMR 2000 Type

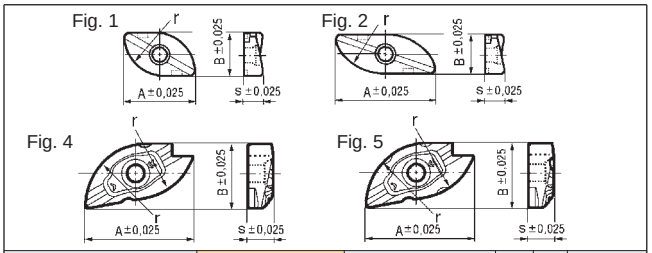



## Body ( Short and middle length type, 2 teeth)

| Cat. No. | Stock | Dimensions (mm) | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | øD | ød | $l_1$ | $l_2$ | $l_3$ | $l_4$ | L |
| WBMR 2200 S | ● | 20 | 25 | 20 | 60 | 80 | 40 | 140 |
| WBMR 2200 M | ● | | | | 60 | 140 | | 200 |
| WBMR 2200 MW | ● | | | | | | | |
| WBMR 2250 S | ● | 25 | 32 | 23 | 70 | 80 | 50 | 150 |
| WBMR 2250 M | ● | | | | 73 | 147 | | 220 |
| WBMR 2250 MW | ● | | | | | | | |
| WBMR 2320 S | ● | 32 | 32 | 31 | 80 | 80 | 60 | 160 |
| WBMR 2320 M | ● | | | | 85 | 155 | | 240 |
| WBMR 2320 MW | ● | | | | | | | |
| WBMR 2400 S | ❍ | 40 | 42 | 35 | 100 | 100 | - | 200 |
| WBMR 2400 M | ❍ | | | | 180 | 100 | | 280 |
| WBMR 2500 S | ❍ | 50 | 42 | 47 | 100 | 100 | - | 200 |
| WBMR 2500 M | ❍ | | | | 180 | 100 | | 280 |

S: **S**hort type with cylindrical shank
M: **M**iddle length type with cylindrical shank
MW: **M**iddle length type with Weldon shank

## Inserts



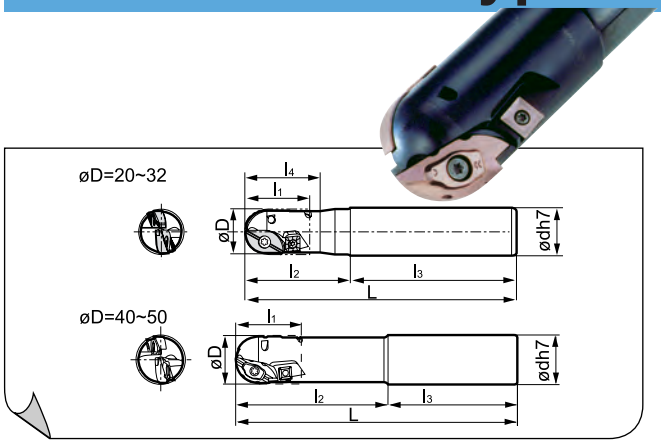

| Cat. No. | Coated | | | Dimensions (mm) | | | | Fig. | No. of teeth | Applicable endmill |
|---|---|---|---|---|---|---|---|---|---|---|
| | ACP 200 | ACP 300 | ACK 300 | A | B | S | r | | | |
| ZNMT 1804100-C | ● | ● | ● | 18,00 | 9,76 | 4,76 | 10 | 1 | 1 | WBMR2200 |
| ZNMT 2004100-S | ● | ● | ● | 20,00 | 7,50 | 4,37 | 10 | 2 | | |
| 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 | | |
| ZNMT 2907160-C | ● | ● | ● | 29,00 | 15,62 | 7,15 | 16 | 1 | 1 | WBMR2320 |
| ZNMT 3006160-S | ● | ● | ● | 30,00 | 12,00 | 6,70 | 16 | 2 | | |
| ZNMT 3608200 | ❍ | ❍ | ❍ | 36,00 | 19,50 | 6,70 | 20 | 4 | 2 | WBMR2400 |
| ZNMT 4310250 | ❍ | ❍ | ❍ | 43,00 | 25,70 | 10,15 | 25 | 4 | 2 | WBMR2500 |
| ZNMT 4310250-N | ❍ | ❍ | ❍ | 43,00 | 25,70 | 10,15 | 25 | 5 | | |

● = 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<br>WBMR 2500 |

# Wave Ball Mill" for Roughing
# WBMR 2000L Type

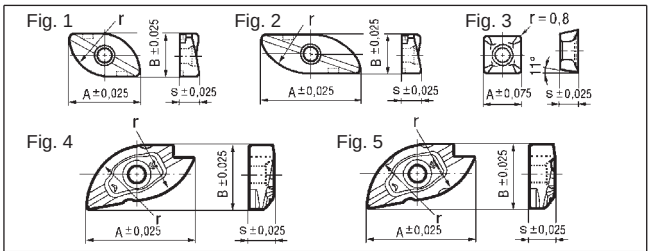



## Body ( Extra long type, 4 teeth)

| Cat. No. | Stock | Dimensions (mm) | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | øD | ød | $l_1$ | $l_2$ | $l_3$ | $l_4$ | L |
| WBMR 2200 LL | ● | 20 | 25 | 30 | 80 | 170 | 40 | 250 |
| WBMR 2200 LLW | ● | | | | | | | |
| WBMR 2250 LL | ● | 25 | 32 | 38 | 100 | 200 | 50 | 300 |
| WBMR 2250 LLW | ● | | | | | | | |
| WBMR 2320 LL | ● | 32 | 32 | 44 | 120 | 230 | 60 | 350 |
| WBMR 2320 LLW | ● | | | | | | | |
| WBMR 2400 LL | ❍ | 40 | 42 | 50 | 250 | 100 | - | 350 |
| WBMR 2400 LLW | | | | | | | | |
| WBMR 2500 LL | ❍ | 50 | 42 | 69 | 250 | 100 | - | 350 |
| WBMR 2500 LLW | | | | | | | | |

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 |
|---|---|---|---|---|---|---|---|---|---|---|
| | ACP 200 | ACP 300 | ACK 300 | A | B | S | r | | | |
| ZNMT 1804100-C | ● | ● | ● | 18,00 | 9,76 | 4,76 | 10 | 1 | 1 | WBMR2200 |
| ZNMT 2004100-S | ● | ● | ● | 20,00 | 7,50 | 4,37 | 10 | 2 | | |
| SPMT 070308 | ● | ● | ● | 7,94 | – | 3,18 | – | 3 | 2 | |
| ZNMT 2205125-C | ● | ● | ● | 22,50 | 12,20 | 5,70 | 12,5 | 1 | 1 | WBMR2250 |
| ZNMT 2305125-S | ● | ● | ● | 23,00 | 9,38 | 5,56 | 12,5 | 2 | | |
| SPMT 09T308 | ● | ● | ● | 9,53 | – | 3,97 | – | 3 | 2 | |
| ZNMT 2907160-C | ● | ● | ● | 29,00 | 15,62 | 7,15 | 16 | 1 | 1 | WBMR2320 |
| ZNMT 3006160-S | ● | ● | ● | 30,00 | 12,00 | 6,70 | 16 | 2 | | |
| SPMT 09T308 | ● | ● | ● | 9,53 | – | 3,97 | – | 3 | 2 | |
| ZNMT 3608200 | ❍ | ❍ | ❍ | 36,00 | 19,50 | 6,70 | 20 | 4 | 2 | WBMR2400 |
| SPMT 09T308 | ● | ● | ● | 9,53 | – | 3,97 | – | 3 | | |
| ZNMT 4310250 | ❍ | ❍ | ❍ | 43,00 | 25,70 | 10,15 | 25 | 4 | 2 | WBMR2500 |
| ZNMT 4310250-N | ❍ | ❍ | ❍ | 43,00 | 25,70 | 10,15 | 25 | 5 | | |
| SPMT 120408 | ❍ | ❍ | ❍ | 12,7 | – | 4,76 | – | 3 | | |

● = 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 |
| BFTX0407N | – | TRD15 | |
| BFTX0619N | – | TRD25 | WBMR 2400 LL |
| BFTX0409N | – | TRD15 | WBMR 2500 LL |

# Wave Ball Mill for Finishing
# WBMF Type



## Features

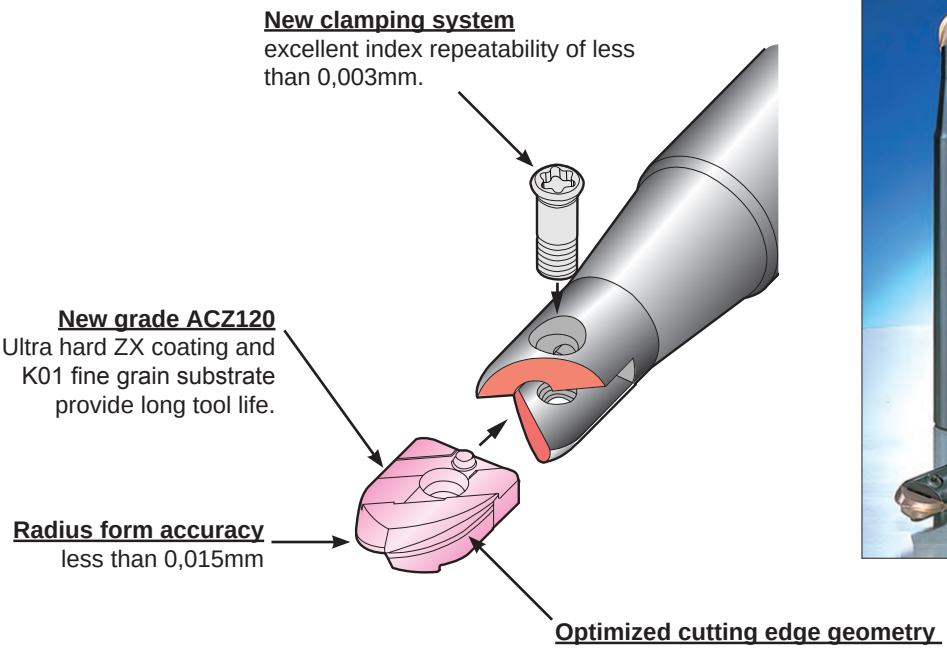
The outstanding results obtained from this finishing cutter are due to the combination of its large sigmoid blade and precise clamping system making it extremely rigid !

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

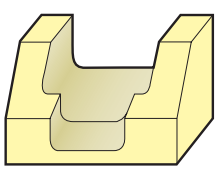





## Application Example

● Bumper moulding die

Work material :
C55

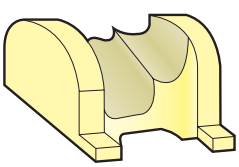


<Results>
Surface roughness after continuous cutting for twelve hours was better than other manufacturer's product.
Less width of flank wear was observed.

| | |
|---|---|
| WBMF1200M (ø20mm)<br>Insert : ZPGU2471100<br>Grade : ACZ120 | Cutting conditions<br>$v_c$ = 88 m/min<br>$v_f$ = 700 mm/min ( $f_t$ = 0,25 mm/tooth)<br>Width of cut : 0,5 mm<br>Depth of cut : 0,5 mm<br>Dry |

● Bumper moulding die

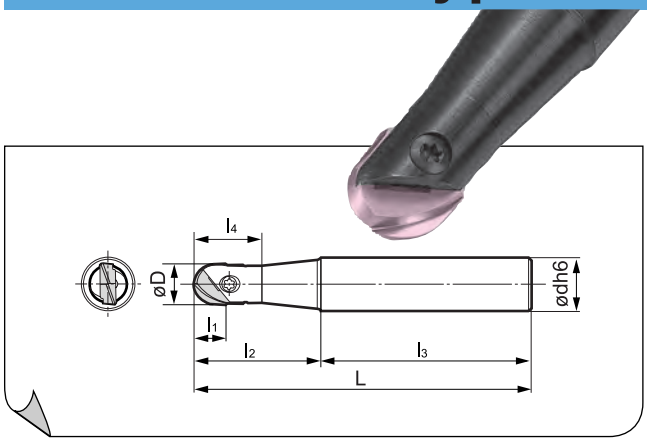
Work material :
C50



<Results>
Smooth cutting and good surface finish after continuous cutting for eight hours

| | |
|---|---|
| WBMF1200M (ø20mm)<br>Insert : ZPGU2471100<br>Grade : ACZ120 | Cutting conditions<br>$v_c$ = 190 m/min<br>$v_f$ = 1200 mm/min ( $f_t$ = 0,21 mm/tooth)<br>Width of cut : 0,2 mm<br>Depth of cut : 0,2 mm<br>Dry |

# Wave Ball Mill for Finishing
# WBMF 1000 Type

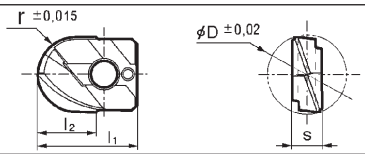



## Body

| Cat. No. | Stock | Dimensions (mm) | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | øD | ød | $l_1$ | $l_2$ | $l_3$ | $l_4$ | L |
| WBMF 1100 S | ❍ | 10 | 16 | 9 | 30 | 70 | 17 | 100 |
| WBMF 1100 M | ● | | | | 35 | 95 | | 130 |
| WBMF 1100 L | ❍ | | | | 50 | 130 | | 180 |
| WBMF 1120 S | ❍ | 12 | 16 | 10,5 | 40 | 70 | 19,5 | 110 |
| WBMF 1120 M | ● | | | | 40 | 110 | | 150 |
| WBMF 1120 MM12N | | | 12 | | 40 | 110 | | 150 |
| WBMF 1120 L | ❍ | | 16 | | 60 | 140 | | 200 |
| WBMF 1160 S | ❍ | 16 | 20 | 12 | 50 | 80 | 25,5 | 130 |
| WBMF 1160 M | ● | | | | 50 | 130 | | 180 |
| WBMF 1160 MM16N | | | 16 | | 50 | 130 | | 180 |
| WBMF 1160 L | ❍ | | 20 | | 70 | 150 | | 220 |
| WBMF 1200 S | ❍ | 20 | 25 | 15 | 60 | 80 | 32 | 140 |
| WBMF 1200 M | ● | | | | 60 | 140 | | 200 |
| WBMF 1200 MM20N | | | 20 | | 60 | 140 | | 200 |
| WBMF 1200 L | ❍ | | 25 | | 80 | 170 | | 250 |
| WBMF 1250 S | | 25 | 32 | 18,5 | 70 | 80 | 36 | 150 |
| WBMF 1250 M | ● | | | | 73 | 147 | | 220 |
| WBMF 1250 L | ❍ | | | | 100 | 200 | | 300 |
| WBMF 1300 S | | 30 | 32 | 22,5 | 80 | 80 | 43 | 160 |
| WBMF 1300 M | ● | | | | 85 | 155 | | 240 |
| WBMF 1300 L | ❍ | | | | 120 | 230 | | 350 |

S : **S**hort type
M : **M**iddle length type
L : **L**ong type

## Inserts



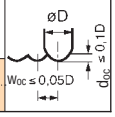

| Cat. No. | Coated | Dimensions (mm) | | | | | Applicable endmill |
|---|---|---|---|---|---|---|---|
| | ACZ120 | øD | $l_1$ | $l_2$ | s | r | |
| ZPGU 1551050 | ● | 10 | 15,6 | 9 | 5,1 | 5,0 | WBMF1100 |
| ZPGU 1856060 | ● | 12 | 18 | 10,5 | 5,6 | 6,0 | WBMF1120 |
| ZPGU 2061080 | ● | 16 | 20,5 | 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
❍ = Delivery on request

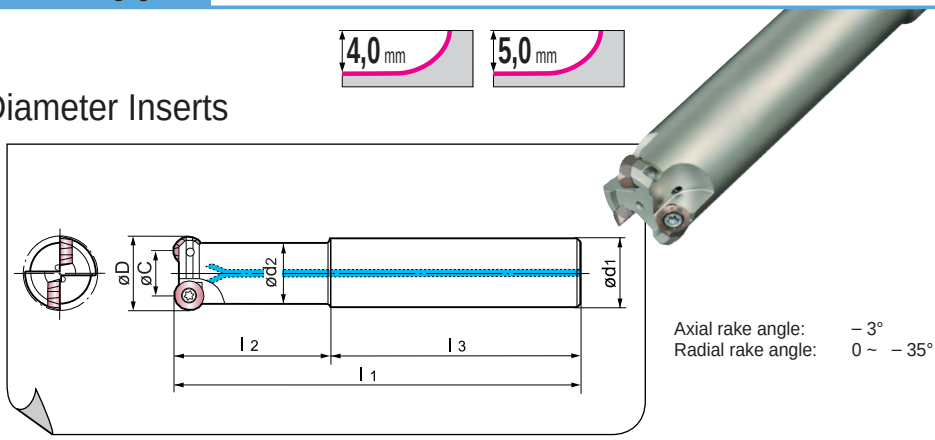
## Spare Parts

| 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

| Condition \ Material | | Carbon steel (Below HRC25) | Alloy steel (Below HRC45) | Stainless, Die steel etc. | Cast iron | |
|---|---|---|---|---|---|---|
| øD 10~30 | $v_c$ | 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 | |

## Shank Type with Small Diameter Inserts



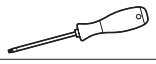

E_ : Cylindrical straight shank type

ES : **S**hort type with straight shank
EM : **M**iddle length type with straight shank
EL : **L**ong type with straight shank

Axial rake angle: – 3°
Radial rake angle: 0 ~ – 35°

## ■ Body

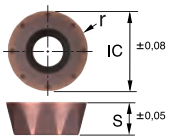
## ■ Spare Parts

| Insert IC (mm) | Cat. No. | Stock | Dimensions (mm) øD | øC | ød1 | ød2 | l1 | l2 | l3 | No. of teeth | Axial rake | Radial rake | Helical boring øB Standard | Plunging α max. |  |  |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 8 | **WRCX 08012 ES** | ● | 12 | - | 12 | 9,4 | 110 | 40 | 70 | 1 | -3° | -35° | – | 0°30´ | BFTX 02505 IP | TRDR 08 IP |
| | **WRCX 08012 EM** | ● | 12 | - | 12 | 9,4 | 150 | 70 | 80 | 1 | | | | | | |
| | **WRCX 08016 ES** | ● | 16 | - | 16 | 14 | 120 | 50 | 70 | 1 | -3° | -10° | $24^{+7}_{-4}$ | 5°30´ | BFTX 02506 IP | TRDR 08 IP |
| | **WRCX 08016 EM** | ● | 16 | - | 16 | 14 | 150 | 70 | 80 | 1 | | | | | | |
| | **WRCX 08020 ES** | ● | 20 | 12 | 20 | 18 | 130 | 50 | 80 | 2 | -3° | -3° | $32^{\pm 7}$ | 13° | | |
| | **WRCX 08020 EM** | ● | 20 | 12 | 20 | 18 | 180 | 100 | 80 | 2 | | | | | | |
| | **WRCX 08020 EL** | ● | 20 | 12 | 20 | 18 | 250 | 130 | 120 | 2 | | | | | | |
| | **WRCX 08025 ES** | ● | 25 | 17 | 25 | 21 | 130 | 50 | 80 | 3 | -3° | 0° | $42^{\pm 7}$ | 8°20´ | | |
| | **WRCX 08025 EM** | ● | 25 | 17 | 25 | 21 | 180 | 100 | 80 | 3 | | | | | | |
| | **WRCX 08025 EL** | ● | 25 | 17 | 25 | 21 | 250 | 130 | 120 | 3 | | | | | | |
| 10 | **WRCX 10025 ES** | ● | 25 | 15 | 25 | 21 | 130 | 50 | 80 | 2 | -3° | 0° | $40^{\pm 8}$ | 13°10´ | BFTX 03584 IP | TRDR 15 IP |
| | **WRCX 10025 EM** | ● | 25 | 15 | 25 | 21 | 180 | 100 | 80 | 2 | | | | | | |
| | **WRCX 10025 EL** | ● | 25 | 15 | 25 | 21 | 250 | 130 | 120 | 2 | | | | | | |
| | **WRCX 10032 ES** | ● | 32 | 22 | 32 | 28 | 130 | 50 | 80 | 3 | -3° | 0° | $54^{\pm 8}$ | 8° | | |
| | **WRCX 10032 EM** | ● | 32 | 22 | 32 | 28 | 200 | 120 | 80 | 3 | | | | | | |
| | **WRCX 10032 EL** | ● | 32 | 22 | 32 | 28 | 300 | 180 | 120 | 3 | | | | | | |

## ■ Insert

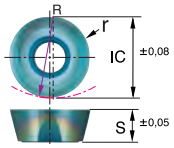
● QPMT... : Standard 16 cornered polygon type
QPMT...-H : Stronger cutting edge type

Fig. 1




● QPET...-S : Polished round insert for non-ferrous material

Fig. 2




Rake angle: 25°
4 corners use
R : wiper radius

| Cat. No. | Coated carbide ACP100 | ACP200 | ACP300 | ACK200 | ACK300 | Diamond coated DL1000 | Uncoated carbide H1 | IC (mm) | r (mm) | s (mm) | Max. $d_{oc}$ 4 corners application | 8 corners application | Fig. | Applicable endmill |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **QPMT 080330 PPEN** | ● | ● | ● | ● | ● | | | 8 | 3,0 | 3,18 | 3,8 | 1,0 | ❶ | WRCX 08000 E |
| **QPMT 080330 PPEN-H** | ● | ● | ● | ● | ● | | | | | | | | | |
| **QPMT 10T335 PPEN** | ● | ● | ● | ● | ● | | | 10 | 3,5 | 3,97 | 4,7 | 1,2 | ❶ | WRCX 10000 E |
| **QPMT 10T335 PPEN-H** | ● | ● | ● | ● | ● | | | | | | | | | |
| **QPET 10T350 PPFR-S** | | | | | | ● | ● | | 5,0 | | | – | ❷ | |

● = Euro stock

## ■ Recommended cutting conditions

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

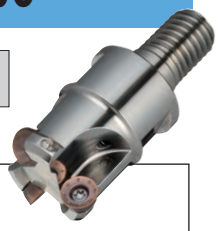
| Material / Grade | | Carbon steel (ex. C40 ~ C50) | Alloy steel (Below HRC40) | Stainless steel (ex. X10CrNiS18-9) | Cast iron (ex. GG20) | Non-ferrous material |
|---|---|---|---|---|---|---|
| øD (mm) | | ACP100, ACP200 | ACP100, ACP200 | ACP200, ACP300 | ACK200, ACK300 | DL1000, H1 |
| 12 ~ 32 | $v_c$ | 80-**120**-160 | 60-**100**-140 | 60-**100**-120 | 60-**80**-120 | 200-**500**-1000 |
| | $f_t$ | 0,1-**0,3**-0,4 | 0,1-**0,2**-0,3 | 0,1-**0,15**-0,2 | 0,1-**0,2**-0,3 | 0,1-**0,2**-0,3 |

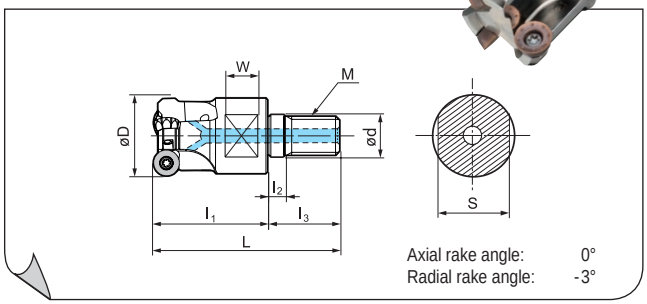
# Exchangeable Head Endmills
# WRCX 08000 M Type

## Modular Tools

4,0 mm

High efficiency multi purpose endmills






### Heads

For insert type : QPMT 0803

| Cat. No. | Stock | Dimensions (mm) | | | | | | | | | No. of teeth |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | øD | ød | M | L | $l_1$ | $l_2$ | $l_3$ | W | S | |
| WRCX08020M10Z2 | ● | 20 | 10,5 | M10 | 49 | 30 | 5 | 19 | 8 | 15 | 2 |
| WRCX08025M12Z3 | ● | 25 | 12,5 | M12 | 56 | 35 | 5 | 21 | 10 | 19 | 3 |

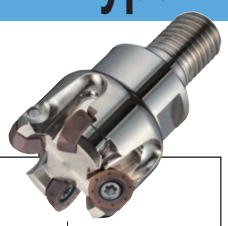
Inserts are not included.

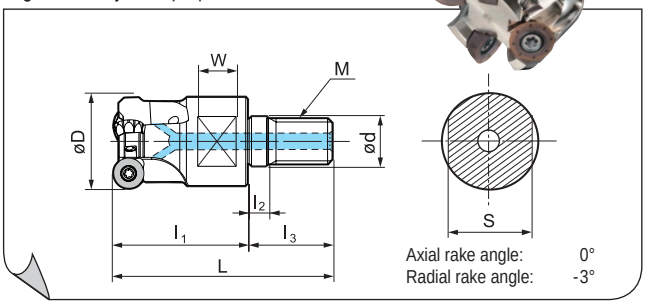
# Exchangeable Head Endmills
# WRCX 10000/12000 M Type

5,0 mm (WRCX 10000M)

6,0 mm (WRCX 12000M)

High efficiency multi purpose endmills






### Heads

For insert type : QP○T 10T3

| Cat. No. | Stock | Dimensions (mm) | | | | | | | | | No. of teeth |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | øD | ød | M | L | $l_1$ | $l_2$ | $l_3$ | W | S | |
| WRCX10025M12Z2 | ● | 25 | 12,5 | M12 | 56 | 35 | 5 | 21 | 10 | 19 | 2 |
| WRCX10028M12Z2 | ❍ | 28 | 12,5 | M12 | 56 | 35 | 5 | 21 | 10 | 19 | 2 |
| WRCX10030M16Z3 | ❍ | 30 | 17,0 | M16 | 63 | 40 | 5 | 23 | 10 | 24 | 3 |
| WRCX10032M16Z3 | ● | 32 | 17,0 | M16 | 63 | 40 | 5 | 23 | 10 | 24 | 3 |

Inserts are not included.

### Heads

For insert type : QP○T 1204

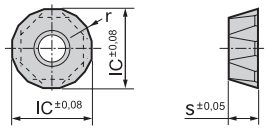
| Cat. No. | Stock | Dimensions (mm) | | | | | | | | | No. of teeth |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | øD | ød | M | L | $l_1$ | $l_2$ | $l_3$ | W | S | |
| WRCX12040M16Z4 | ❍ | 40 | 17,0 | M16 | 63 | 40 | 5 | 23 | 10 | 24 | 4 |

Inserts are not included.

### Inserts

● QPMT – 16 corner insert for General Purpose Application
QPMT ... H 16 corner insert with Strong cutting edge

Fig. 1

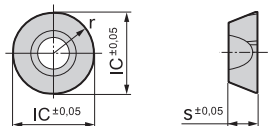



● QPET ... S Round insert with Sharp cutting edge for Aluminium

Rake angle: 25°

4 corners use

Fig. 2




| Cat. No. | Coated Carbide | | | | | DLC Coated | Uncoated Carbide | IC (mm) | r (mm) | s (mm) | Max. $d_{oc}$ | | Fig. | Applicable endmill |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ACP 100 | ACP 200 | ACP 300 | ACK 200 | ACK 300 | DL1000 | H1 | | | | 4 corners application | 8 corners application | | |
| QPMT 080330 PPEN | ● | ● | ● | ● | ● | | | 8 | 3,0 | 3,18 | 3,8 | 1,0 | ❶ | WRCX 08000M |
| QPMT 080330 PPEN-H | ● | ● | ● | ● | ● | | | | | | | | | |
| QPMT 10T335 PPEN | ● | ● | ● | ● | ● | | | 10 | 3,5 | 3,97 | 4,7 | 1,2 | ❶ | WRCX 10000M |
| QPMT 10T335 PPEN-H | ● | ● | ● | ● | ● | | | | | | | | | |
| QPET 10T350 PPFR-S | | | | | | ● | ● | | 5,0 | | | – | ❷ | |
| QPMT 120440 PPEN | ● | ● | ● | ● | ● | | | 12 | 4,0 | 4,76 | 5,6 | 1,5 | ❶ | WRCX 12000M |
| QPMT 120440 PPEN-H | ● | ● | ● | ● | ● | | | | | | | | | |
| QPET 120460 PPFR-S | | | | | | ● | ● | | 6,0 | | | – | ❷ | |

● = Euro stock
❍ = Delivery on request

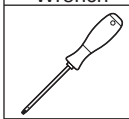
● Identification of Catalogue No.

**WRCX 08 020 M10 Z2**

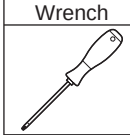
- WRCX: Cutter type
- 08: insert size
- 020: Diameter
- M10: Mounting screw
- Z2: No. of teeth



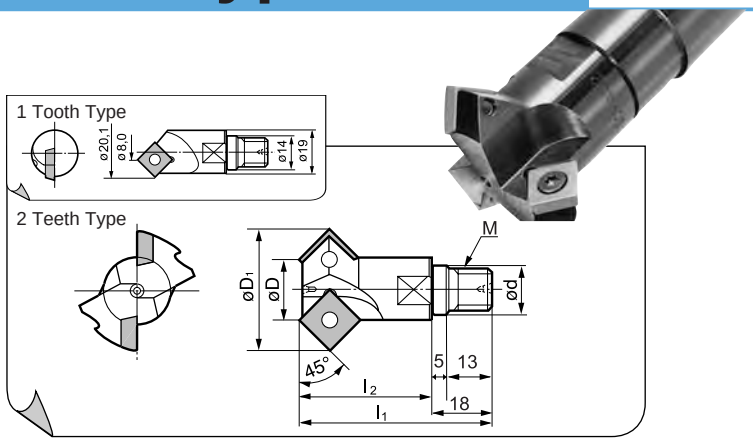

### Spare Parts

| Wrench | Screw | Required torque (N·m) | Applicable endmill |
|---|---|---|---|
|  |  | | |
| TRDR 08 IP | BFTX 02506 IP | 1,5 | WRCX 08020M ~ WRCX 08025M |

### Spare Parts

| Wrench | Screw | Required torque (N·m) | Applicable endmill |
|---|---|---|---|
|  |  | | |
| TRDR 15 IP | BFTX 03584 IP | 3,0 | WRCX 10025M ~ WRCX 10032M |
| | BFTX 0409 IP | 3,0 | WRCX 12040M |

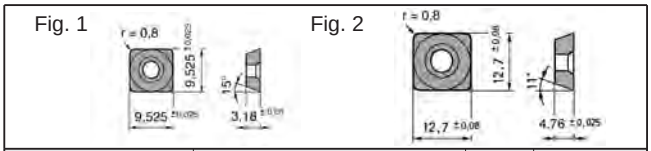
# SCP Type




## Body

| Cat. No. | Stock | Dimensions (mm) | | | | | | No. of teeth |
|---|---|---|---|---|---|---|---|---|
| | | ø D | ø $D_1$ | ød | $l_1$ | $l_2$ | 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 |

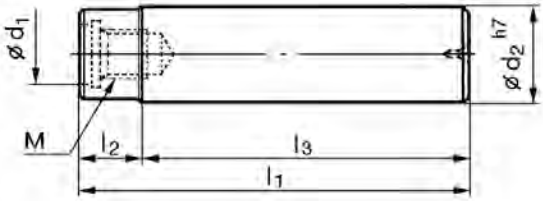
## Inserts




| Cat. No. | Carbide | | | | Fig. | Applicable endmill |
|---|---|---|---|---|---|---|
| | A30N | G10E | | | | |
| **SDMA 090308** | | ● | | | 1. | SCP 308 |
| **SDMA 090308 T** | ● | | | | | |
| **SPMA 120408** | | ● | | | 2. | SCP 419<br>SCP 432 |
| **SPMA 120408 T** | ● | | | | | |

● = Euro stock

## Holder for SCP



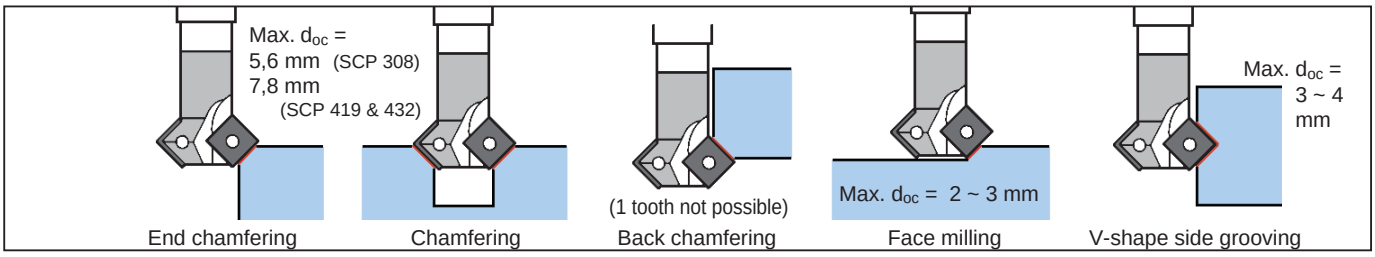

| Cat. No. | Stock | Dimensions (mm) | | | | | | Applicable endmill |
|---|---|---|---|---|---|---|---|---|
| | | ø$d_1$ | ø$d_2$ | M | $l_1$ | $l_2$ | $l_3$ | |
| **SCA 20** | ● | 14 | 20 | M12 | 105 | 20 | 85 | SCP 308<br>SCP 419 |
| **SCA 32** | ● | 20 | 32 | M16 | 130 | 20 | 110 | SCP 432 |

● = 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** | ø D (mm) | Tooling | Cutting conditions | General steel | | | Cast iron |
|---|---|---|---|---|---|---|---|
| | | | | Less than HRC25 | HRC25 ~ 35 | HRC35 ~ 45 | (GG20) |
| SCP 308 | 8,5 ~ 19,5 | Chamfering | $v_c$ (m/min) | 80 - **100** - 140 | 50 - **60** - 80 | 20 - **40** - 60 | 90 - **110** - 130 |
| SCP 419 | 19,5 ~ 35,1 | | $f_t$ (mm/tooth) | 0,15 - 0,4 | 0,1 - 0,25 | 0,05 - 0,15 | 0,2 - 0,5 |
| SCP 432 | 32,5 ~ 48,1 | Face milling | $v_c$ (m/min) | 80 - **100** - 140 | 50 - **60** - 80 | 20 - **40** - 60 | 90 - **110** - 130 |
| | | | $f_t$ (mm/tooth) | 0,1 - 0,2 | 0,05 - 0,1 | 0,04 - 0,08 | 0,1 - 0,3 |

# J

# Coated & Solid Endmills

**J1 ~ J50**






| | | |
|---|---|---|
| Selection Guide | According to Work Materials | J 2 - 3 |
| | New Global Standard Endmills | J 4 - 6 |

**Coated Endmills**

| | | |
|---|---|---|
| GSX MILL Series | **GSX** 20000 New | J 7 -11 |
| | **GSX** 30000 New | J12-13 |
| Slotted Type | **GSXSLT** 30000 New | J14 |
| | **GSX** 40000 New | J15-19 |
| Anti-Vibration Type | **GSXVL** 40000 New | J20-21 |
| SSEH MILL Series for Exotic Alloys | **SSEHVL** 4000**W-R** / **SSEH** 4000**W-R** New | J22-24 |
| GS MILL Series | **GLM** 4000**SF/SF-R** | J25 |
| Hard Type | **GSH** 4000/6000/8000**SF** | J26 |
| Roughing Type | **GSRE** 4000**SF** | J27 |
| UP MILL Series | **SSUP** 4000**ZX/ZX-R** | J28-29 |
| AURORA COAT MILL Series | **ASM** 2000/4000**DL** / **DL-R** | J30-31 |
| Standard Type | **SSM** 2000/4000**ZX** | J32 |
| Long Type | **LSM** 2000/4000**ZX** | J33 |
| Hard Type | **LHHM** 4000/6000/8000**ZX** | J34 |
| | **EHHM** 4000/6000/8000**ZX** | J34 |
| Fast Helix Type | **HSM** 2000/3000/4000**ZX** | J35 |
| GSX Mills Ball Type | **GSXB** 20000 New | J36 |
| GS Mills Ball Type | **GLB** 2000**SF** | J37 |
| Ball Mills "Neo" | **SNB** 2000**ZX** | J38-39 |
| Standard Ball Type | **SSB** 2000**ZX** | J39 |
| AURORA COAT Ball Type | **SNB** 2000**DL** | J40 |

**Uncoated Endmills**

| | | |
|---|---|---|
| SSEH MILL Series for Exotic Alloys | **SSEHVL** 4000-**R** / **SSEH** 4000-**R** New | J41 |
| Standard Type | **SSM** 2000/4000 | J42-43 |
| Long Type | **LSM** 2000/4000 | J44 |
| Extra LongType | **ELSM** 2000/4000 | J45 |
| Fast Helix Type | **HSM** 2000/3000/4000 | J46 |
| For Aluminium Cutting | **ASM** 4000 | J47 |
| Straight Flute Ball Type | **BSM** 2000 | J47 |
| SUMIBORON "Helical Master" for Hardened Steel | **BNES** 1000 | J48 |
| SUMIBORON "Mould Finish Master" for Hardened Steel | **BNBP** 2R…4/6 | J49 |

## ● According to Work Materials

### Square Type

Legend: Grade | Edge Type | Usage

#### General Steel (Common Use)

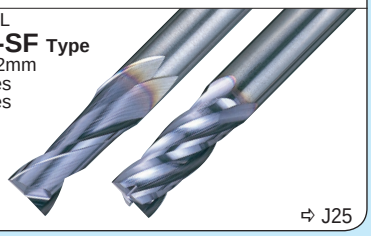
Coated | Sharp | General

Global Endmills
Standard
**GSX Type**
ø1~25mm
•2 Flutes
•3 Flutes
•4 Flutes
New

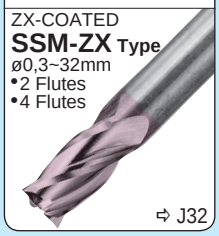
⇨ J7~19

New
Anti-Vibration
Radius Corner
Endmills
**GSXVL Type**
ø2~25mm
•4 Flutes
⇨ J20~21

Coated | Sharp | General

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

⇨ J25

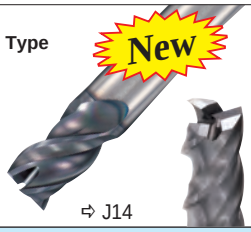
Coated | Sharp | General

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

⇨ J32

#### General Steel (Special Use)

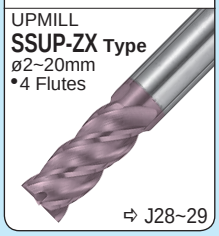
Plunge Cut
Multi-Purpose

Coated | Sharp | General

GSX MILL
**GSXSLT Type**
ø1~16mm
•3 Flutes
New

⇨ J14

High Efficiency

Coated | Strong | High Efficiency

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

⇨ J28~29

High Efficiency

Coated | Strong | High Efficiency

ROUGHING ENDMILL
**GSRE-SFType**
ø6~20mm
•4 Flutes

⇨ J27

#### Hardened Steel

High performance Type

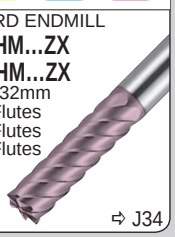
Coated | Strong | High Efficiency

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

⇨ J26

High Rigidity Type

Coated | Strong | High Efficiency

HARD ENDMILL
**LHHM...ZX**
**EHHM...ZX**
ø3~32mm
•4 Flutes
•6 Flutes
•8 Flutes

⇨ J34

SumiBoron Endmill

CBN

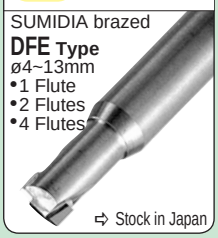
"Helical Master"
**BNES Type**
ø6~16mm
•1 Flute

⇨ J48, M34

#### 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

⇨ J30~31

#### Exotic Metals

For Heat Resistive Steel

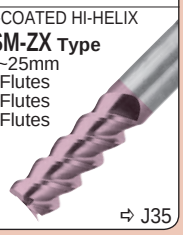
Coated | Sharp | General

Radius Endmills
Standard
**SSEH Type**
ø4,5~25mm
•4 Flutes
New

Anti-Vibration
Radius Endmills
**SSEHVL Type**
ø4,5~25mm
•4 Flut
⇨ J22, J24, J41
⇨ J22~23, J41

For Heat Resistive Steel

Coated | Strong | High Efficiency

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

⇨ J35

## ● According to Work Materials

### Ballnose Type

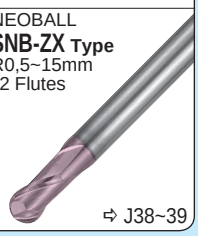
#### General Steel (Common Use)

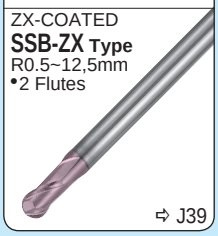
Coated | General
GSX MILL BALL
**GSXB Type**
R0,2~12,5mm
•2 Flutes
New

⇨ J36

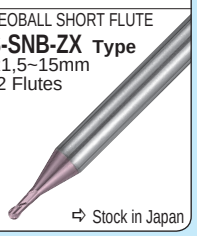
Coated | General
GS MILL BALL
**GLB-SF Type**
R0,5~6mm
•2 Flutes

⇨ J37

Coated | General
NEOBALL
**SNB-ZX Type**
R0,5~15mm
•2 Flutes

⇨ J38~39

Coated | General
ZX-COATED
**SSB-ZX Type**
R0.5~12,5mm
•2 Flutes

⇨ J39

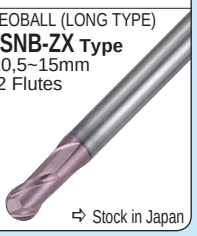
#### General Steel (Short Series)

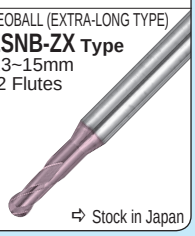
Coated | Short | General
NEOBALL SHORT FLUTE
**S-SNB-ZX Type**
R1,5~15mm
•2 Flutes

⇨ Stock in Japan

Coated | Short | General
ZX-COATED SHORT FLUTE
**S-SSB-ZX Type**
R1,5~4mm
•2 Flutes

⇨ Stock in Japan

#### General Steel (Long Series)

Coated | Long | General
NEOBALL (LONG TYPE)
**LSNB-ZX Type**
R0,5~15mm
•2 Flutes

⇨ Stock in Japan

Coated | Long | General
NEOBALL (EXTRA-LONG TYPE)
**ESNB-ZX Type**
R3~15mm
•2 Flutes

⇨ Stock in Japan

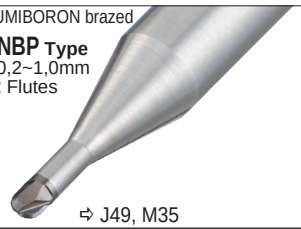
#### Hardened Steel

High Rigidity Type

Coated | Strong | High Efficiency
HARDBALL
**SHB-ZX Type**
R0,5~10mm
•2 Flutes

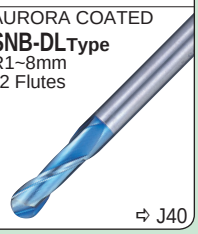
⇨ Stock in Japan

Hardened Steel

CBN | MOULD FINISH MASTER
SUMIBORON brazed
**BNBP Type**
R0,2~1,0mm
•2 Flutes

⇨ J49, M35

#### Non-ferrous Metal

DLC-Coated Endmill

Coated | General
AURORA COATED
**SNB-DL Type**
R1~8mm
•2 Flutes

⇨ J40

# GSX MILL Series

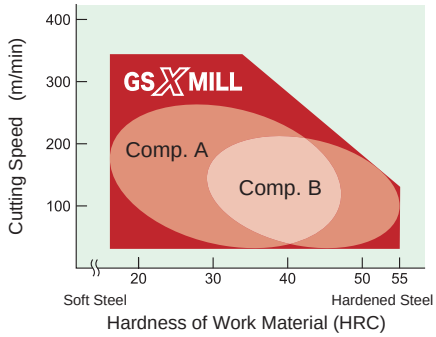
New



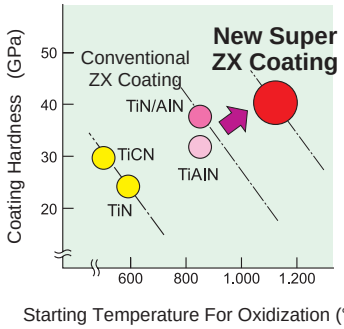
## ■ Characteristics and Applications

- Wide variation of three flute types and four flute lengths enable use in a wide variety of applications.
- Fine carbide substrate provides high transverse rupture strength and excellent thermal shock resistance improving reliability in wet cutting applications.
- GSX Coating provides improved reliability and longer tool life.
- Large rake angle and unique flute design improve sharpness and chip evacuation.
- Cutting teeth with gash land improves corner flute strength.
- Sharper edge S type and fracture resistant C type added to the 2D size series.

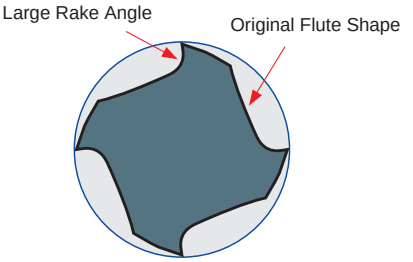
### ● Wear Resistance




### ● Thermal Resistance




### ● Improved Chip Evacuation

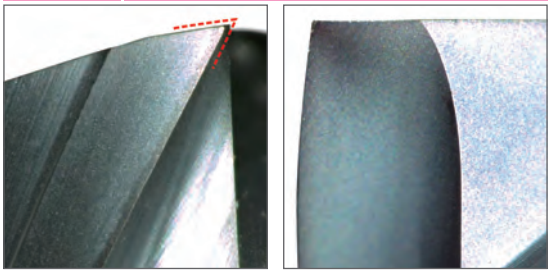



Large rake angle combined with our unique flute design improves sharpness and chip evacuation.

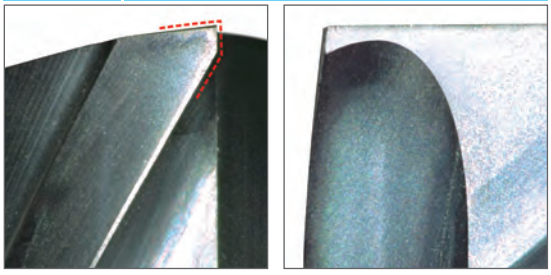
## ■ 2 cutting edge designs expand machining applications

Sharper edge S type and fracture resistant C type added to the 2D size series.

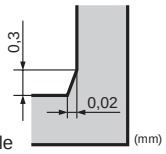
**S Type** Sharp Corner: Sharper Edge Design



**C Type** Gash Land: Fracture Resistant Design



Note: In gash land drilling, some material remains as shown on the right. If you need sharp corners, use the S Type.




Ex.: Corner on a ø10mm hole

## ■ Application Range

| P | | | | | H | | | M | S | | K | N | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| General Structure Rolled Steel | Carbon Steel | Alloy Steel | Pre-hardened Steel | Tempered Die Steel | Hardened Steel 45 ~ 55 HRC | Hardened Steel 55 ~ 60 HRC | Hardened Steel 60 ~ 65 HRC | Stainless Steel | Ti Alloy | Heat Resistant Alloy | Cast Iron | Al Alloy | Cu Alloy | Graphite |
| ○ | ◎ | ◎ | ◎ | ◎ | ◎ *1 | | | ◎ | ○ | ○ | ○ | | | |

◎ : Best
○ : Good

Blank : Not recommended
*1: GSXSLT30000C is recommended for 50 HRC or less

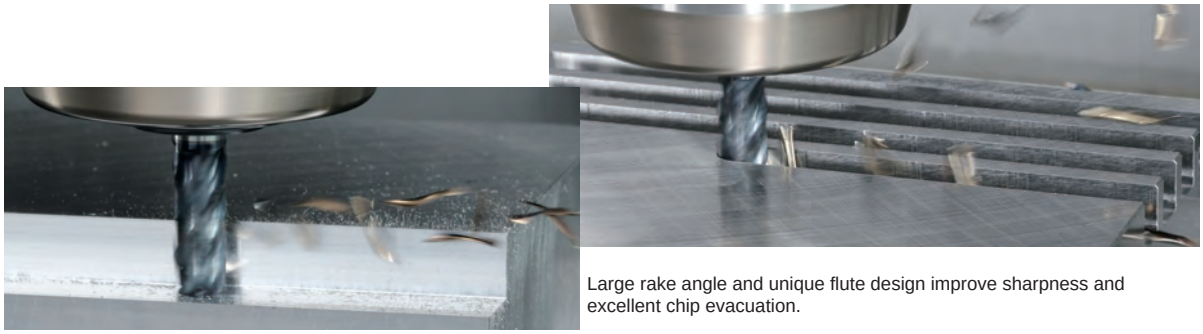
## ■ Recommended Milling Examples

| Application | Surface Milling | | Grooving | | Groove Finishing | |
|---|---|---|---|---|---|---|
| Form | | | | | | |
| | Rough | Finishing | Rough | Finishing | Rough | Finishing |
| S Type | | ◎ | | ○ *2 | | ◎ |
| C Type | ◎ | ○ | ◎ | ◎ | ◎ | ○ |

S Type is best for removing inside corners.

*2: Use with small depth of cut.

# GSX MILL Series



Large rake angle and unique flute design improve sharpness and excellent chip evacuation.

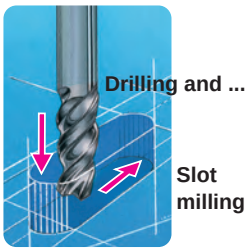
## ■ Product Range

| Application | No. of Teeth | Flute Length | | | | |
|---|---|---|---|---|---|---|
| | | 1,5 D | 2 D | | 3 D | 4 D |
| | | C Type | S Type | C Type | C Type | C Type |
| General Purpose | 2 Flutes | GSX20000C-1.5D  ⇨ J 7 | GSX20000S-2D  ⇨ J 8 | GSX20000C-2D  ⇨ J 9 | GSX20000C-3D  ⇨ J 10 | GSX20000C-4D  ⇨ J 11 |
| | 3 Flutes | GSX30000C-1.5D  ⇨ J 12 | | GSX30000C-2D  ⇨ J 13 | | |
| | 4 Flutes | GSX40000C-1.5D  ⇨ J 15 | GSX40000S-2D  ⇨ J 16 | GSX40000C-2D  ⇨ J 17 | GSX40000C-3D  ⇨ J 18 | GSX40000C-4D  ⇨ J 19 |
| Compound Endmilling | 3 Flutes | GSXSLT30000C-1.5D  ⇨ J 14 | | | | |

## ■ Multi-Purpose "GSX-SLT" Slot Type

● Optimized flute design of slotted 3 flute (1.5D) short type reduces cutting resistance.

① Allows drilling and slot milling and other continuous (compound) applications.
② Perfect for use with thin sheets and small machining centres



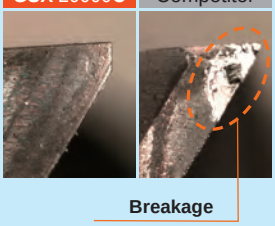




## ■ Application Examples

### ● Carbon Steel Grooving with GSX20000C

GSX 20000C | Competitor




Gash land for stronger cutting edge.

| | |
|---|---|
| Tool dimension | ø6 (2 Flutes) |
| Work material | C50 |
| Cutting speed | $v_c$ = 87 m/min |
| | n = 4615 rpm |
| Feed rate | $f_t$ = 0,06 mm/teeth |
| | $v_f$ = 553 mm/min |
| Depth of cut | $d_{oc}$ = 3 mm |
| Wide of cut | $w_{oc}$ = 6 mm |
| Cooland | Dry |
| Vertical machining centre (BT50) | |

### ● Cast Iron Grooving with GSX20000C

GSX 20000C | Competitor

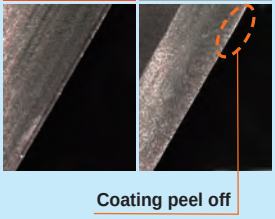



GSX coating for improved wear resistance.

| | |
|---|---|
| Tool dimension | ø10 (2 Flutes) |
| Work material | GGG60 |
| Cutting speed | $v_c$ = 66 m/min |
| | n = 2100 rpm |
| Feed rate | $f_t$ = 0,072 mm/teeth |
| | $v_f$ = 302 mm/min |
| Depth of cut | $d_{oc}$ = 5 mm, 5 passes |
| Wide of cut | $w_{oc}$ = 10 mm |
| Cooland | Dry |
| Vertical machining centre (BT40) | |

### ● Stainless Steel Machining with GSX20000C

GSX 20000C | Competitor

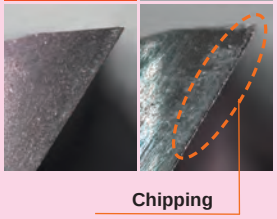



Improved reliability even under wet machining.

| | |
|---|---|
| Tool dimension | ø10 (2 Flutes) |
| Work material | X5 CrNi 1812 |
| Cutting speed | $v_c$ = 50 m/min |
| | n = 1591 rpm |
| Feed rate | $f_t$ = 0,04 mm/teeth |
| | $v_f$ = 27 mm/min |
| Depth of cut | $d_{oc}$ = 10 mm |
| Wide of cut | $w_{oc}$ = 0,5 mm |
| Cooland | Wet |
| Vertical machining centre (BT50) | |

### ● Surface Milling C50 with GSX20000S

GSX 20000S | Competitor




S type delivers optimum cutting performance.

| | |
|---|---|
| Tool dimension | ø6 (2 Flutes) |
| Work material | C50 |
| Cutting speed | $v_c$ = 87 m/min |
| | n = 4615 rpm |
| Feed rate | $f_t$ = 0,06 mm/teeth |
| | $v_f$ = 553 mm/min |
| Depth of cut | $d_{oc}$ = 10 mm |
| Wide of cut | $w_{oc}$ = 0,3 mm |
| Cooland | Dry |
| Vertical machining centre (BT50) | |

# GSX MILL Series

New



☞ J 20, J 21

## GSX MILL Anti-vibration Type (Square/Radius)

### ■ Characteristics and Applications

- Optimized irregular pitch and lead affords:
  - Drastically improved chattering and fracture resistance !
  - Less cutting force  Allows high-speed, high-feed cutting.
- Rounded lands greatly improve machined surface quality (from ø4 and up).
- New fine-grained carbide substrate and special coating for better rigidity and thermal and wear resistance.

### ■ Product Range

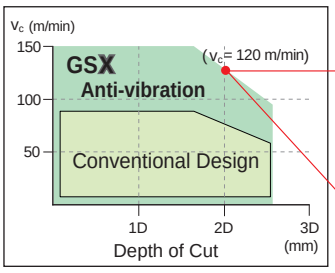
**GSX MILL Anti-vibration Square Type**

| Series | No. of Teeth | Serie | øD (mm) |
|---|---|---|---|
| **GSXVL4000-2.5D** | 4 Flutes |  ⇨ J 20 | ø2 ~ ø20 |

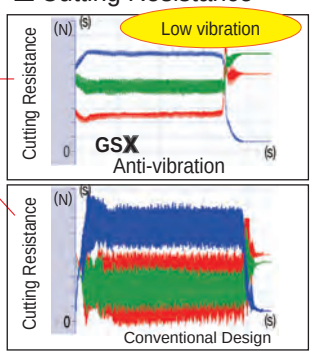
**GSX MILL Anti-vibration Corner Radius Type**

| Series | No. of Teeth | Serie | øD (mm) |
|---|---|---|---|
| **GSXVL4000-R-2.5D** | 4 Flutes |  ⇨ J 21 | ø3 ~ ø20 |

### ■ Cutting Range



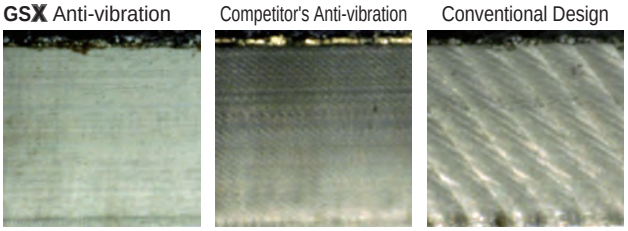

### ■ Cutting Resistance




### ■ Application Range

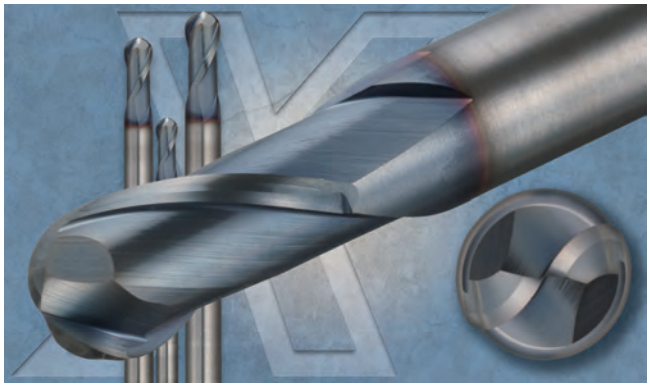
● Surface Finish Quality

GSX Anti-vibration | Competitor's Anti-vibration | Conventional Design



No Chattering Clean Surface | Minute Chattering Poor Surface | Heavy Chattering Poor Surface

| | | | |
|---|---|---|---|
| Work material: | C50 | Cutting Conditions: | n = 4.800 rpm<br>$v_f$ = 800 mm/min |
| Grooving: | | Depth of cut | $d_{oc}$ = 10 mm |
| Tool dimension: | ø10 | Equipment: | BT50 |



☞ J 36

## GSX MILL Ball

### ■ Characteristics and Applications

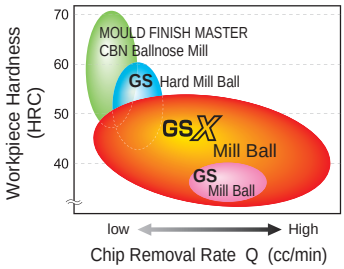
- New coating combined with a fine-grained carbide substrate affords better thermal and wear resistance.
- Large helix angle on cutting edge reduces cutting resistance.
- Unique pocket design and expanded pocket area promotes better chip evacuation.

☞ Expands the range of machineable material from soft to hardened steels, and offers reliability and longer tool life.

### ■ Product Range

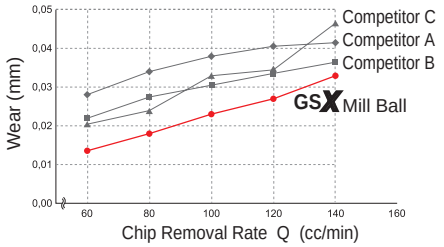
| Series | No. of Teeth | Serie | øD (mm) |
|---|---|---|---|
| **GSX-B 20000** | 2 Flutes |  ⇨ J 36 | Rø0,2 ~ ø15 (øD=0,2 ~ 30) |

### ■ Application Range

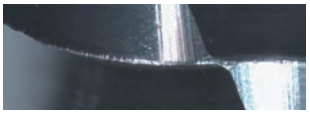



### ■ Application Examples

● Flank Wear




**GSX Ball (Cutting Length 140 m)**



Able to continue



Conventional Tool (Cutting Length 80 m)



Unable to continue



| | |
|---|---|
| Work Material : | X40CrVMo5-1 (50HRC) |
| Tool Dimensions : | R3 (2 Flutes) |
| Cutting Conditions : | $v_c$= 179 m/min (n = 9.500 rpm) |
| | $v_f$= 2.250 mm/min ($f_t$ = 0,12 mm/t) |
| $d_{oc}$ = 0,2 ~ 1,0 mm, | $w_{oc}$ =0,3 mm, Wet |
| Equipment Vertical Machining Centre BT40 | |

Chipping in centre
Heavy wear on flank face

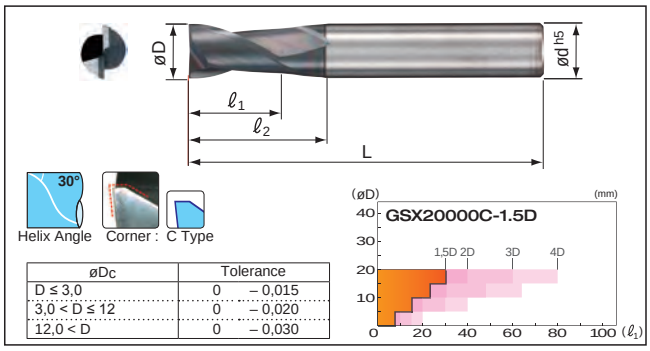
# GSX MILL Endmills

New

# GSX 20000C-1.5D Type

Coated Carbide Grades | GSX Coating

| Structural Steel | Carbon Steel | Alloy Steel | Pre-hardened Steel | Tempered Die Steel | Hardened Steel 45~55 HRC | Hardened Steel 55~60 HRC | Hardened Steel 60~65 HRC | Stainless Steel | Ti Alloy / Heat Resistant Alloy | Cast iron | Al Alloy | Cu Alloy | Graphite |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ○ | ◎ | ◎ | ◎ | ◎ | ◎ | ○ | | ◎ | ○ | ○ | | | |




| øDc | Tolerance |
|---|---|
| D ≤ 3,0 | 0 – 0,015 |
| 3,0 < D ≤ 12 | 0 – 0,020 |
| 12,0 < D | 0 – 0,030 |

Grade: ACF20

## ■ Endmills

(mm)

| Cat. No. | Stock | øD | $\ell_1$ | $\ell_2$ | L | ød |
|---|---|---|---|---|---|---|
| **GSX 20100C-1.5D** | ● | 1,0 | 1,5 | 2,5 | 40 | 4 |
| **GSX 20150C-1.5D** | ● | 1,5 | 2,3 | 3,3 | 40 | 4 |
| **GSX 20200C-1.5D** | ● | 2,0 | 3,0 | 4,0 | 40 | 4 |
| **GSX 20250C-1.5D** | ● | 2,5 | 3,8 | 4,8 | 40 | 4 |
| **GSX 20300C-1.5D** | ● | 3,0 | 4,5 | 6,0 | 45 | 6 |
| **GSX 20350C-1.5D** | ● | 3,5 | 5,3 | 6,8 | 45 | 6 |
| **GSX 20400C-1.5D** | ● | 4,0 | 6,0 | 7,5 | 45 | 6 |
| **GSX 20450C-1.5D** | ● | 4,5 | 6,8 | 8,3 | 50 | 6 |
| **GSX 20500C-1.5D** | ● | 5,0 | 7,5 | 9,5 | 50 | 6 |
| **GSX 20550C-1.5D** | ● | 5,5 | 8,3 | 10,3 | 50 | 6 |
| **GSX 20600C-1.5D** | ● | 6,0 | 9,0 | – | 50 | 6 |
| **GSX 20700C-1.5D** | ● | 7,0 | 11,0 | 13,0 | 60 | 8 |
| **GSX 20800C-1.5D** | ● | 8,0 | 12,0 | – | 60 | 8 |
| **GSX 20900C-1.5D** | ● | 9,0 | 14,0 | 16,0 | 70 | 10 |
| **GSX 21000C-1.5D** | ● | 10,0 | 15,0 | – | 70 | 10 |
| **GSX 21200C-1.5D** | ● | 12,0 | 18,0 | – | 75 | 12 |
| **GSX 21400C-1.5D** | | 14,0 | 21,0 | 24,5 | 90 | 16 |
| **GSX 21500C-1.5D** | | 15,0 | 23,0 | 26,5 | 90 | 16 |
| **GSX 21600C-1.5D** | | 16,0 | 24,0 | – | 90 | 16 |
| **GSX 22000C-1.5D** | | 20,0 | 30,0 | – | 100 | 20 |

● = Euro stock

## ■ Endmill Identification (GSX MILL Series)

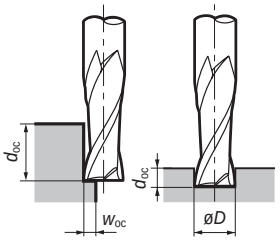
**GSX 2 0100 C - 1.5D**

| ① | ② | ③ | ④ | ⑤ |
|---|---|---|---|---|
| Series Code | No. of Teeth | Diameter | Cutting Edge | Cutting Edge Length |

④ Cutting Edge: S: Sharp Edge, C: Gash Land Drilling

## ■ Recommended cutting conditions

1. For stable machining performance use rigid, high-precision machines and holders.
2. Use air blowing when dry machining.
3. Use wet machining for stainless steel, heat resistant alloy, and titanium alloy applications.
4. If the machine cannot achieve the recommended spindle speed, please use the max. spindle speed available.




### ● Shoulder Milling

| Work Material / Cond. / øD (mm) | Structural Steel | | Carbon Steel (150 to 250HB) | | Cast Iron | | Alloy Steel (25 to 35HRC) | | Tempered Steel, Hardened Steel (35 to 45HRC) | | Hardened Steel (45 to 55HRC) | | Stainless Steel | | Heat Resistive Steel, Titanium Alloy | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) |
| 1,0 | 19.600 | 250 | 19.600 | 250 | 19.600 | 250 | 18.300 | 180 | 12.700 | 100 | 9.000 | 60 | 11.000 | 70 | 9.000 | 50 |
| 2,0 | 11.200 | 340 | 11.200 | 340 | 11.200 | 340 | 10.500 | 240 | 7.300 | 130 | 5.300 | 80 | 6.400 | 90 | 5.300 | 70 |
| 4,0 | 6.400 | 460 | 6.400 | 460 | 6.400 | 460 | 6.000 | 320 | 4.200 | 180 | 3.000 | 110 | 3.600 | 120 | 3.000 | 90 |
| 6,0 | 4.600 | 560 | 4.600 | 560 | 4.600 | 560 | 4.300 | 400 | 3.000 | 210 | 2.200 | 130 | 2.700 | 140 | 2.200 | 100 |
| 8,0 | 3.400 | 560 | 3.400 | 560 | 3.400 | 560 | 3.200 | 400 | 2.200 | 210 | 1.600 | 130 | 2.000 | 140 | 1.600 | 100 |
| 10,0 | 2.800 | 560 | 2.800 | 560 | 2.800 | 560 | 2.600 | 400 | 1.800 | 210 | 1.300 | 130 | 1.600 | 140 | 1.300 | 100 |
| 12,0 | 2.300 | 560 | 2.300 | 560 | 2.300 | 560 | 2.200 | 400 | 1.500 | 210 | 1.100 | 130 | 1.300 | 140 | 1.100 | 100 |
| 16,0 | 1.700 | 450 | 1.700 | 450 | 1.700 | 450 | 1.600 | 320 | 1.100 | 180 | 800 | 100 | 1.000 | 110 | 800 | 85 |
| 20,0 | 1.350 | 380 | 1.350 | 380 | 1.350 | 380 | 1.300 | 280 | 900 | 160 | 650 | 90 | 800 | 100 | 650 | 75 |
| Shoulder cutting $d_{oc}$ | 1,5 *D* | | | | | | | | | | 1,0 *D* | | | | | |
| Shoulder cutting $w_{oc}$ | 0,05 *D* | | | | | | | | | | 0,02 *D* | | | | | |

### ● Grooving

| Work Material / Cond. / øD (mm) | Structural Steel | | Carbon Steel (150 to 250HB) | | Cast Iron | | Alloy Steel (25 to 35HRC) | | Tempered Steel, Hardened Steel (35 to 45HRC) | | Hardened Steel (45 to 55HRC) | | Stainless Steel | | Heat Resistive Steel, Titanium Alloy | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) |
| 1,0 | 19.600 | 200 | 19.600 | 250 | 19.600 | 250 | 18.300 | 180 | 12.700 | 100 | 9.000 | 60 | 11.000 | 50 | 4.500 | 20 |
| 2,0 | 11.200 | 270 | 11.200 | 340 | 11.200 | 340 | 10.500 | 240 | 7.300 | 130 | 5.300 | 80 | 6.400 | 65 | 2.650 | 25 |
| 4,0 | 6.400 | 370 | 6.400 | 460 | 6.400 | 460 | 6.000 | 320 | 4.200 | 180 | 3.000 | 110 | 3.600 | 80 | 1.500 | 35 |
| 6,0 | 4.600 | 450 | 4.600 | 560 | 4.600 | 560 | 4.300 | 400 | 3.000 | 210 | 2.200 | 130 | 2.700 | 100 | 1.100 | 40 |
| 8,0 | 3.400 | 450 | 3.400 | 560 | 3.400 | 560 | 3.200 | 400 | 2.200 | 210 | 1.600 | 130 | 2.000 | 100 | 800 | 40 |
| 10,0 | 2.800 | 450 | 2.800 | 560 | 2.800 | 560 | 2.600 | 400 | 1.800 | 210 | 1.300 | 130 | 1.600 | 100 | 650 | 40 |
| 12,0 | 2.300 | 450 | 2.300 | 560 | 2.300 | 560 | 2.200 | 400 | 1.500 | 210 | 1.100 | 130 | 1.300 | 100 | 500 | 40 |
| 16,0 | 1.700 | 360 | 1.700 | 450 | 1.700 | 450 | 1.600 | 320 | 1.100 | 180 | 800 | 100 | 1.000 | 80 | 400 | 35 |
| 20,0 | 1.350 | 300 | 1.350 | 380 | 1.350 | 380 | 1.300 | 280 | 900 | 160 | 650 | 90 | 800 | 70 | 320 | 30 |
| Grooving $d_{oc}$ | 0,2 *D* | | 0,5 *D* | | | | | | 0,2 *D* | | 0,05 *D* | | 0,2 *D* | | | |

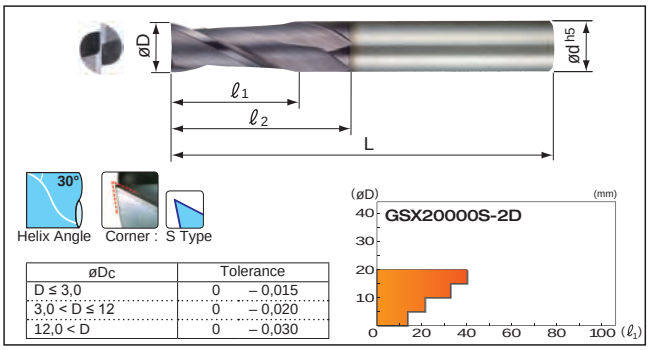
New

# GSX 20000S-2D Type



Coated Carbide — Grades
GSX — Coating

| Structural Steel | Carbon Steel | Alloy Steel | Pre-hardened Steel | Tempered Die Steel | Hardened Steel 45~55 HRC | Hardened Steel 55~60 HRC | Hardened Steel 60~65 HRC | Stainless Steel | Ti Alloy / Heat Resistant Alloy | Cast iron | Al Alloy | Cu Alloy | Graphite |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ○ | ◎ | ◎ | ◎ | ◎ | ◎ | ○ | | ◎ | ○ | ○ | | | |




| øDc | Tolerance |
|---|---|
| D ≤ 3,0 | 0 – 0,015 |
| 3,0 < D ≤ 12 | 0 – 0,020 |
| 12,0 < D | 0 – 0,030 |

Grade: ACF20

## ■ Endmills

(mm)

| Cat. No. | Stock | øD | $\ell_1$ | $\ell_2$ | L | ød |
|---|---|---|---|---|---|---|
| **GSX 20050S-2D** | ● | 0,5 | 1,3 | 1,7 | 40 | 4 |
| **GSX 20100S-2D** | ● | 1,0 | 2,5 | 3,5 | 40 | 4 |
| **GSX 20150S-2D** | ● | 1,5 | 3,8 | 4,8 | 40 | 4 |
| **GSX 20200S-2D** | ● | 2,0 | 5,0 | 6,0 | 40 | 4 |
| **GSX 20250S-2D** | ● | 2,5 | 6,3 | 7,3 | 40 | 4 |
| **GSX 20300S-2D** | ● | 3,0 | 7,5 | 9,0 | 45 | 6 |
| **GSX 20350S-2D** | ● | 3,5 | 8,8 | 10,3 | 45 | 6 |
| **GSX 20400S-2D** | ● | 4,0 | 11,0 | 14,0 | 45 | 6 |
| **GSX 20450S-2D** | ● | 4,5 | 11,3 | 12,8 | 50 | 6 |
| **GSX 20500S-2D** | ● | 5,0 | 13,0 | 19,6 | 50 | 6 |
| **GSX 20550S-2D** | ● | 5,5 | 13,0 | 19,6 | 50 | 6 |
| **GSX 20600S-2D** | ● | 6,0 | 13,0 | – | 50 | 6 |
| **GSX 20700S-2D** | ● | 7,0 | 16,0 | 21,1 | 60 | 8 |
| **GSX 20800S-2D** | ● | 8,0 | 19,0 | – | 60 | 8 |
| **GSX 20900S-2D** | ● | 9,0 | 19,0 | 24,1 | 70 | 10 |
| **GSX 21000S-2D** | ● | 10,0 | 22,0 | – | 70 | 10 |
| **GSX 21200S-2D** | ● | 12,0 | 26,0 | – | 75 | 12 |
| **GSX 21600S-2D** | ● | 16,0 | 32,0 | – | 90 | 16 |
| **GSX 22000S-2D** | ● | 20,0 | 40,0 | – | 100 | 20 |

● = Euro stock

## ■ Endmill Identification (GSX MILL Series)

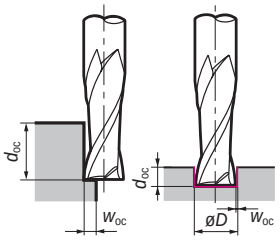
**GSX 2 0050 S - 2D**

| ① | ② | ③ | ④ | ⑤ |
|---|---|---|---|---|
| Series Code | No. of Teeth | Diameter | Cutting Edge | Cutting Edge Length |

④ (S: Sharp Edge, C: Gash Land Drilling)

## ■ Recommended cutting conditions

1. For stable machining performance use rigid, high-precision machines and holders.
2. Use air blowing when dry machining.
3. Use wet machining for stainless steel, heat resistant alloy, and titanium alloy applications.
4. If chattering is a problem, reduce the spindle speed and feed rate indicated in the table below by the same ratio, or reduce the depth of cut.
5. This series is not recommended for grooving.
6. If the machine cannot achieve the recommended spindle speed, please use the max. spindle speed available.




### ●Shoulder Milling

| Work Material / Cond. / øD (mm) | Structural Steel | | Carbon Steel (150 to 250HB) | | Cast Iron | | Alloy Steel (25 to 35HRC) | | Tempered Steel, Hardened Steel (35 to 45HRC) | | Hardened Steel (45 to 55HRC) | | Stainless Steel | | Heat Resistive Steel, Titanium Alloy | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) |
| 1,0 | 16.600 | 180 | 16.600 | 180 | 16.600 | 180 | 15.500 | 130 | 10.500 | 70 | 7.500 | 45 | 9.400 | 50 | 7.500 | 35 |
| 2,0 | 9.500 | 250 | 9.500 | 250 | 9.500 | 250 | 9.000 | 200 | 6.200 | 100 | 4.500 | 60 | 5.400 | 70 | 4.500 | 50 |
| 4,0 | 5.400 | 330 | 5.400 | 330 | 5.400 | 330 | 5.000 | 250 | 3.400 | 120 | 2.500 | 75 | 3.000 | 90 | 2.500 | 65 |
| 6,0 | 4.000 | 400 | 4.000 | 400 | 4.000 | 400 | 3.700 | 300 | 2.550 | 150 | 1.900 | 100 | 2.300 | 110 | 1.900 | 80 |
| 8,0 | 3.000 | 400 | 3.000 | 400 | 3.000 | 400 | 2.800 | 300 | 1.900 | 150 | 1.400 | 100 | 1.700 | 110 | 1.400 | 80 |
| 10,0 | 2.400 | 400 | 2.400 | 400 | 2.400 | 400 | 2.200 | 300 | 1.500 | 150 | 1.100 | 100 | 1.300 | 110 | 1.100 | 80 |
| 12,0 | 2.000 | 400 | 2.000 | 400 | 2.000 | 400 | 1.850 | 300 | 1.300 | 150 | 950 | 100 | 1.100 | 110 | 950 | 80 |
| 16,0 | 1.500 | 330 | 1.500 | 330 | 1.500 | 330 | 1.400 | 250 | 950 | 120 | 700 | 75 | 850 | 85 | 700 | 60 |
| 20,0 | 1.200 | 280 | 1.200 | 280 | 1.200 | 280 | 1.100 | 220 | 750 | 110 | 550 | 65 | 650 | 75 | 550 | 55 |
| Shoulder cutting $d_{oc}$ | 1,5 *D* | | | | | | | | | | 1,0 *D* | | | | | |
| Shoulder cutting $w_{oc}$ | 0,05 *D* | | | | | | | | | | 0,02 *D* | | | | | |

### ●Groove Finishing

| Work Material / Cond. / øD (mm) | Structural Steel | | Carbon Steel (150 to 250HB) | | Cast Iron | | Alloy Steel (25 to 35HRC) | | Tempered Steel, Hardened Steel (35 to 45HRC) | | Hardened Steel (45 to 55HRC) | | Stainless Steel | | Heat Resistive Steel, Titanium Alloy | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) |
| 1,0 | 16.600 | 180 | 16.600 | 180 | 16.600 | 180 | 15.500 | 130 | 10.500 | 70 | 7.500 | 45 | 9.400 | 50 | 7.500 | 35 |
| 2,0 | 9.500 | 250 | 9.500 | 250 | 9.500 | 250 | 9.000 | 200 | 6.200 | 100 | 4.500 | 60 | 5.400 | 70 | 4.500 | 50 |
| 4,0 | 5.400 | 330 | 5.400 | 330 | 5.400 | 330 | 5.000 | 250 | 3.400 | 120 | 2.500 | 75 | 3.000 | 90 | 2.500 | 65 |
| 6,0 | 4.000 | 400 | 4.000 | 400 | 4.000 | 400 | 3.700 | 300 | 2.550 | 150 | 1.900 | 100 | 2.300 | 110 | 1.900 | 80 |
| 8,0 | 3.000 | 400 | 3.000 | 400 | 3.000 | 400 | 2.800 | 300 | 1.900 | 150 | 1.400 | 100 | 1.700 | 110 | 1.400 | 80 |
| 10,0 | 2.400 | 400 | 2.400 | 400 | 2.400 | 400 | 2.200 | 300 | 1.500 | 150 | 1.100 | 100 | 1.300 | 110 | 1.100 | 80 |
| 12,0 | 2.000 | 400 | 2.000 | 400 | 2.000 | 400 | 1.850 | 300 | 1.300 | 150 | 950 | 100 | 1.100 | 110 | 950 | 80 |
| 16,0 | 1.500 | 330 | 1.500 | 330 | 1.500 | 330 | 1.400 | 250 | 950 | 120 | 700 | 75 | 850 | 85 | 700 | 60 |
| 20,0 | 1.200 | 280 | 1.200 | 280 | 1.200 | 280 | 1.100 | 220 | 750 | 110 | 550 | 65 | 650 | 75 | 550 | 55 |
| Groove finishing $d_{oc}$ | 1,5 *D* | | | | | | | | | | | | | | | |
| Groove finishing $w_{oc}$ | ~ 0,02 *D* | | | | | | | | | | | | | | | |

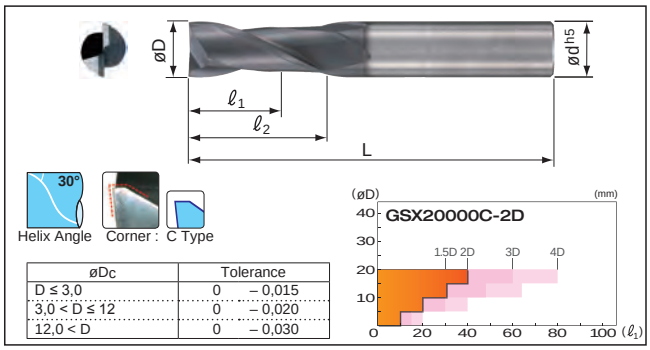
# GSX MILL Endmills

New

# GSX 20000C-2D Type

Coated Carbide Grades | GSX Coating

| Structural Steel | Carbon Steel | Alloy Steel | Pre-hardened Steel | Tempered Die Steel | Hardened Steel 45~55 HRC | Hardened Steel 55~60 HRC | Hardened Steel 60~65 HRC | Stainless Steel | Ti Alloy / Heat Resistant Alloy | Cast iron | Al Alloy | Cu Alloy | Graphite |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ○ | ◎ | ◎ | ◎ | ◎ | ◎ | ○ | | ◎ | ○ | ○ | | | |




| øDc | Tolerance |
|---|---|
| D ≤ 3,0 | 0 – 0,015 |
| 3,0 < D ≤ 12 | 0 – 0,020 |
| 12,0 < D | 0 – 0,030 |

Grade: ACF20

## ■ Endmills

(mm)

| Cat. No. | Stock | øD | ℓ1 | ℓ2 | L | ød |
|---|---|---|---|---|---|---|
| GSX 20050C-2D | ● | 0,5 | 1,0 | 1,4 | 40 | 4 |
| GSX 20100C-2D | ● | 1,0 | 2,0 | 3,0 | 40 | 4 |
| GSX 20150C-2D | ● | 1,5 | 3,0 | 4,0 | 40 | 4 |
| GSX 20200C-2D | ● | 2,0 | 4,0 | 5,0 | 40 | 4 |
| GSX 20250C-2D | ● | 2,5 | 5,0 | 6,0 | 40 | 4 |
| GSX 20300C-2D | ● | 3,0 | 6,0 | 7,5 | 45 | 6 |
| GSX 20350C-2D | ● | 3,5 | 7,0 | 8,5 | 45 | 6 |
| GSX 20400C-2D | ● | 4,0 | 8,0 | 9,5 | 45 | 6 |
| GSX 20450C-2D | ● | 4,5 | 9,0 | 10,5 | 50 | 6 |
| GSX 20500C-2D | ● | 5,0 | 10,0 | 12,0 | 50 | 6 |
| GSX 20550C-2D | ● | 5,5 | 11,0 | 13,0 | 50 | 6 |
| GSX 20600C-2D | ● | 6,0 | 12,0 | — | 50 | 6 |
| GSX 20700C-2D | ● | 7,0 | 14,0 | 16,0 | 60 | 8 |
| GSX 20800C-2D | ● | 8,0 | 16,0 | — | 60 | 8 |
| GSX 20900C-2D | ● | 9,0 | 18,0 | 20,0 | 70 | 10 |
| GSX 21000C-2D | ● | 10,0 | 20,0 | — | 70 | 10 |
| GSX 21200C-2D | ● | 12,0 | 24,0 | — | 75 | 12 |
| GSX 21400C-2D | | 14,0 | 28,0 | 31,5 | 90 | 16 |
| GSX 21500C-2D | | 15,0 | 30,0 | 33,5 | 90 | 16 |
| GSX 21600C-2D | ● | 16,0 | 32,0 | — | 90 | 16 |
| GSX 22000C-2D | ● | 20,0 | 40,0 | — | 100 | 20 |

● = Euro stock

## ■ Endmill Identification (GSX MILL Series)

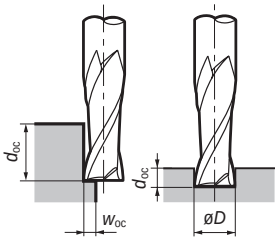
**GSX 2 0050 C - 2D**

| ① | ② | ③ | ④ | ⑤ |
|---|---|---|---|---|
| Series Code | No. of Teeth | Diameter | Cutting Edge | Cutting Edge Length |

④ Cutting Edge: S: Sharp Edge, C: Gash Land Drilling

## ■ Recommended cutting conditions

1. For stable machining performance use rigid, high-precision machines and holders.
2. Use air blowing when dry machining.
3. Use wet machining for stainless steel, heat resistant alloy, and titanium alloy applications.
4. If chattering is a problem, reduce the spindle speed and feed rate indicated in the table below by the same ratio, or reduce the depth of cut.
5. If the machine cannot achieve the recommended spindle speed, please use the max. spindle speed available.




### ●Shoulder Milling

| Work Material / Cond. | | Structural Steel | | Carbon Steel (150 to 250HB) | | Cast Iron | | Alloy Steel (25 to 35HRC) | | Tempered Steel, Hardened Steel (35 to 45HRC) | | Hardened Steel (45 to 55HRC) | | Stainless Steel | | Heat Resistive Steel, Titanium Alloy | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| øD (mm) | | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) |
| 1,0 | | 19.600 | 250 | 19.600 | 250 | 19.600 | 250 | 18.300 | 180 | 12.700 | 100 | 9.000 | 60 | 11.000 | 70 | 9.000 | 50 |
| 2,0 | | 11.200 | 340 | 11.200 | 340 | 11.200 | 340 | 10.500 | 240 | 7.300 | 130 | 5.300 | 80 | 6.400 | 90 | 5.300 | 70 |
| 4,0 | | 6.400 | 460 | 6.400 | 460 | 6.400 | 460 | 6.000 | 320 | 4.200 | 180 | 3.000 | 110 | 3.600 | 120 | 3.000 | 90 |
| 6,0 | | 4.600 | 560 | 4.600 | 560 | 4.600 | 560 | 4.300 | 400 | 3.000 | 210 | 2.200 | 130 | 2.700 | 140 | 2.200 | 100 |
| 8,0 | | 3.400 | 560 | 3.400 | 560 | 3.400 | 560 | 3.200 | 400 | 2.200 | 210 | 1.600 | 130 | 2.000 | 140 | 1.600 | 100 |
| 10,0 | | 2.800 | 560 | 2.800 | 560 | 2.800 | 560 | 2.600 | 400 | 1.800 | 210 | 1.300 | 130 | 1.600 | 140 | 1.300 | 100 |
| 12,0 | | 2.300 | 560 | 2.300 | 560 | 2.300 | 560 | 2.200 | 400 | 1.500 | 210 | 1.100 | 130 | 1.300 | 140 | 1.100 | 100 |
| 16,0 | | 1.700 | 450 | 1.700 | 450 | 1.700 | 450 | 1.600 | 320 | 1.100 | 180 | 800 | 100 | 1.000 | 110 | 800 | 85 |
| 20,0 | | 1.350 | 380 | 1.350 | 380 | 1.350 | 380 | 1.300 | 280 | 900 | 160 | 650 | 90 | 800 | 100 | 650 | 75 |
| Shoulder cutting | $d_{oc}$ | 1,5 *D* | | | | | | | | | | 1,0 *D* | | | | | |
| | $w_{oc}$ | 0,05 *D* | | | | | | | | | | 0,02 *D* | | | | | |

### ●Grooving

| Work Material / Cond. | | Structural Steel | | Carbon Steel (150 to 250HB) | | Cast Iron | | Alloy Steel (25 to 35HRC) | | Tempered Steel, Hardened Steel (35 to 45HRC) | | Hardened Steel (45 to 55HRC) | | Stainless Steel | | Heat Resistive Steel, Titanium Alloy | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| øD (mm) | | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) |
| 1,0 | | 19.600 | 200 | 19.600 | 250 | 19.600 | 250 | 18.300 | 180 | 12.700 | 100 | 9.000 | 60 | 11.000 | 50 | 4.500 | 20 |
| 2,0 | | 11.200 | 270 | 11.200 | 340 | 11.200 | 340 | 10.500 | 240 | 7.300 | 130 | 5.300 | 80 | 6.400 | 65 | 2.650 | 25 |
| 4,0 | | 6.400 | 370 | 6.400 | 460 | 6.400 | 460 | 6.000 | 320 | 4.200 | 180 | 3.000 | 110 | 3.600 | 80 | 1.500 | 35 |
| 6,0 | | 4.600 | 450 | 4.600 | 560 | 4.600 | 560 | 4.300 | 400 | 3.000 | 210 | 2.200 | 130 | 2.700 | 100 | 1.100 | 40 |
| 8,0 | | 3.400 | 450 | 3.400 | 560 | 3.400 | 560 | 3.200 | 400 | 2.200 | 210 | 1.600 | 130 | 2.000 | 100 | 800 | 40 |
| 10,0 | | 2.800 | 450 | 2.800 | 560 | 2.800 | 560 | 2.600 | 400 | 1.800 | 210 | 1.300 | 130 | 1.600 | 100 | 650 | 40 |
| 12,0 | | 2.300 | 450 | 2.300 | 560 | 2.300 | 560 | 2.200 | 400 | 1.500 | 210 | 1.100 | 130 | 1.300 | 100 | 500 | 40 |
| 16,0 | | 1.700 | 360 | 1.700 | 450 | 1.700 | 450 | 1.600 | 320 | 1.100 | 180 | 800 | 100 | 1.000 | 80 | 400 | 35 |
| 20,0 | | 1.350 | 300 | 1.350 | 380 | 1.350 | 380 | 1.300 | 280 | 900 | 160 | 650 | 90 | 800 | 70 | 320 | 30 |
| Grooving | $d_{oc}$ | 0,2 *D* | | 0,5 *D* | | | | | | 0,2 *D* | | 0,05 *D* | | 0,2 *D* | | | |

New

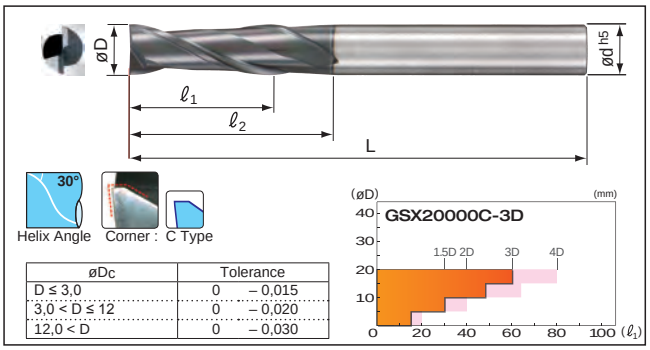
# GSX 20000C-3D Type



Coated Carbide — Grades

GSX — Coating

| Structural Steel | Carbon Steel | Alloy Steel | Pre-hardened Steel | Tempered Die Steel | Hardened Steel 45~55 HRC | Hardened Steel 55~60 HRC | Hardened Steel 60~65 HRC | Stainless Steel | Ti Alloy / Heat Resistant Alloy | Cast iron | Al Alloy | Cu Alloy | Graphite |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ○ | ◎ | ◎ | ◎ | ◎ | ◎ | ○ | | ◎ | ○ | ○ | | | |




| øDc | Tolerance |
|---|---|
| D ≤ 3,0 | 0 – 0,015 |
| 3,0 < D ≤ 12 | 0 – 0,020 |
| 12,0 < D | 0 – 0,030 |

Grade: ACF20

## ■ Endmills

(mm)

| Cat. No. | Stock | øD | $\ell_1$ | $\ell_2$ | L | ød |
|---|---|---|---|---|---|---|
| **GSX 20100C-3D** | ● | 1,0 | 3,0 | 4,0 | 40 | 4 |
| **GSX 20150C-3D** | ● | 1,5 | 4,5 | 5,5 | 40 | 4 |
| **GSX 20200C-3D** | ● | 2,0 | 6,0 | 7,0 | 40 | 4 |
| **GSX 20250C-3D** | ● | 2,5 | 7,5 | 8,5 | 40 | 4 |
| **GSX 20300C-3D** | ● | 3,0 | 9,0 | 10,5 | 50 | 6 |
| **GSX 20400C-3D** | ● | 4,0 | 12,0 | 13,5 | 50 | 6 |
| **GSX 20500C-3D** | ● | 5,0 | 15,0 | 17,0 | 50 | 6 |
| **GSX 20600C-3D** | ● | 6,0 | 18,0 | — | 50 | 6 |
| **GSX 20800C-3D** | ● | 8,0 | 24,0 | — | 70 | 8 |
| **GSX 21000C-3D** | ● | 10,0 | 30,0 | — | 90 | 10 |
| **GSX 21200C-3D** | ● | 12,0 | 36,0 | — | 90 | 12 |
| **GSX 21600C-3D** | ● | 16,0 | 48,0 | — | 110 | 16 |
| **GSX 22000C-3D** | | 20,0 | 60,0 | — | 120 | 20 |

● = Euro stock

## ■ Endmill Identification (GSX MILL Series)

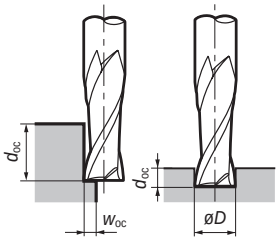
**GSX 2 0100 C - 3D**

| ① | ② | ③ | ④ | ⑤ |
|---|---|---|---|---|
| Series Code | No. of Teeth | Diameter | Cutting Edge | Cutting Edge Length |

④ Cutting Edge: S: Sharp Edge; C: Gash Land Drilling

## ■ Recommended cutting conditions

1. For stable machining performance use rigid, high-precision machines and holders.
2. Use air blowing when dry machining.
3. Use wet machining for stainless steel, heat resistant alloy, and titanium alloy applications.
4. In rare cases, chattering may occur in early milling stages, dissipating after 2m of cutting.
5. If chattering is a problem, reduce the spindle speed and feed rate indicated in the table below by the same ratio, or reduce the depth of cut.
6. If the machine cannot achieve the recommended spindle speed, please use the max. spindle speed available.




### ●Shoulder Milling

| Work Material / Cond. / øD (mm) | Structural Steel | | Carbon Steel (150 to 250HB) | | Cast Iron | | Alloy Steel (25 to 35HRC) | | Tempered Steel, Hardened Steel (35 to 45HRC) | | Hardened Steel (45 to 55HRC) | | Stainless Steel | | Heat Resistive Steel, Titanium Alloy | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) |
| 1,0 | 16.600 | 190 | 16.600 | 190 | 16.600 | 190 | 15.500 | 140 | 10.500 | 70 | 7.500 | 45 | 9.400 | 50 | 7.500 | 35 |
| 2,0 | 9.500 | 250 | 9.500 | 250 | 9.500 | 250 | 9.000 | 200 | 6.200 | 120 | 4.500 | 60 | 5.200 | 70 | 4.500 | 50 |
| 4,0 | 5.200 | 330 | 5.200 | 330 | 5.200 | 330 | 4.800 | 200 | 3.400 | 150 | 2.250 | 75 | 2.600 | 90 | 2.250 | 65 |
| 6,0 | 3.500 | 360 | 3.500 | 360 | 3.500 | 360 | 3.200 | 250 | 2.550 | 170 | 1.500 | 90 | 1.700 | 100 | 1.500 | 80 |
| 8,0 | 2.600 | 320 | 2.600 | 320 | 2.600 | 320 | 2.400 | 240 | 1.900 | 170 | 1.100 | 90 | 1.300 | 105 | 1.100 | 80 |
| 10,0 | 2.100 | 300 | 2.100 | 300 | 2.100 | 300 | 1.900 | 230 | 1.500 | 170 | 900 | 90 | 1.000 | 100 | 900 | 80 |
| 12,0 | 1.750 | 280 | 1.750 | 280 | 1.750 | 280 | 1.600 | 230 | 1.250 | 170 | 750 | 90 | 850 | 100 | 750 | 80 |
| 16,0 | 1.300 | 240 | 1.300 | 240 | 1.300 | 240 | 1.200 | 200 | 950 | 150 | 550 | 75 | 650 | 85 | 550 | 65 |
| 20,0 | 1.050 | 220 | 1.050 | 220 | 1.050 | 220 | 950 | 180 | 750 | 140 | 450 | 70 | 500 | 75 | 450 | 60 |
| Shoulder cutting $d_{oc}$ | 2,5 *D* | | | | | | | | 2,0 *D* | | | | | | | |
| Shoulder cutting $w_{oc}$ | øD< 3: 0,05 *D* , 3 ≤ øD: 0,1 *D* | | | | | | | | 0,02 *D* | | | | | | | |

### ●Grooving

| Work Material / Cond. / øD (mm) | Structural Steel | | Carbon Steel (150 to 250HB) | | Cast Iron | | Alloy Steel (25 to 35HRC) | | Tempered Steel, Hardened Steel (35 to 45HRC) | | Hardened Steel (45 to 55HRC) | | Stainless Steel | | Heat Resistive Steel, Titanium Alloy | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) |
| 1,0 | 16.600 | 70 | 16.600 | 80 | 16.600 | 80 | 15.500 | 50 | 10.500 | 50 | 7.500 | 35 | 9.400 | 30 | 3.750 | 10 |
| 2,0 | 9.500 | 80 | 9.500 | 100 | 9.500 | 100 | 9.000 | 90 | 6.200 | 60 | 4.500 | 45 | 5.200 | 40 | 2.250 | 15 |
| 4,0 | 5.200 | 120 | 5.200 | 150 | 5.200 | 150 | 4.800 | 120 | 3.400 | 80 | 2.200 | 50 | 2.600 | 50 | 1.250 | 20 |
| 6,0 | 3.500 | 140 | 3.500 | 170 | 3.500 | 170 | 3.200 | 130 | 2.550 | 100 | 1.500 | 50 | 1.700 | 60 | 950 | 25 |
| 8,0 | 2.600 | 140 | 2.600 | 160 | 2.600 | 160 | 2.400 | 130 | 1.900 | 100 | 1.100 | 50 | 1.300 | 60 | 700 | 25 |
| 10,0 | 2.100 | 130 | 2.100 | 150 | 2.100 | 150 | 1.900 | 120 | 1.500 | 90 | 900 | 50 | 1.000 | 60 | 550 | 25 |
| 12,0 | 1.750 | 130 | 1.750 | 150 | 1.750 | 150 | 1.600 | 120 | 1.250 | 90 | 750 | 50 | 850 | 60 | 450 | 25 |
| 16,0 | 1.300 | 110 | 1.300 | 130 | 1.300 | 130 | 1.200 | 110 | 950 | 80 | 550 | 45 | 650 | 50 | 350 | 20 |
| 20,0 | 1.050 | 100 | 1.050 | 120 | 1.050 | 120 | 950 | 100 | 750 | 70 | 450 | 40 | 500 | 40 | 280 | 15 |
| Grooving $d_{oc}$ / $w_{oc}$ | 0,1 *D* | | 0,2 *D* | | | | | | | | 0,05 *D* | | 0,1 *D* | | | |

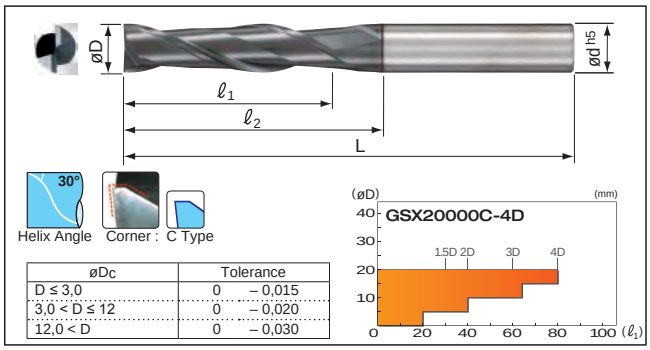
# GSX MILL Endmills

New

# GSX 20000C-4D Type

Coated Carbide Grades | GSX Coating

| Structural Steel | Carbon Steel | Alloy Steel | Pre-hardened Steel | Tempered Die Steel | Hardened Steel 45~55 HRC | Hardened Steel 55~60 HRC | Hardened Steel 60~65 HRC | Stainless Steel | Ti Alloy / Heat Resistant Alloy | Cast iron | Al Alloy | Cu Alloy | Graphite |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ○ | ◎ | ◎ | ◎ | ◎ | ◎ | ○ | | ◎ | ○ | ○ | | | |




| øDc | Tolerance |
|---|---|
| D ≤ 3,0 | 0 – 0,015 |
| 3,0 < D ≤ 12 | 0 – 0,020 |
| 12,0 < D | 0 – 0,030 |

Grade: ACF20

## ■ Endmills

(mm)

| Cat. No. | Stock | øD | $\ell_1$ | $\ell_2$ | L | ød |
|---|---|---|---|---|---|---|
| GSX 20100C-4D | ● | 1,0 | 4,0 | 5,0 | 40 | 4 |
| GSX 20150C-4D | ● | 1,5 | 6,0 | 7,0 | 40 | 4 |
| GSX 20200C-4D | ● | 2,0 | 8,0 | 9,0 | 40 | 4 |
| GSX 20250C-4D | ● | 2,5 | 10,0 | 11,0 | 50 | 4 |
| GSX 20300C-4D | ● | 3,0 | 12,0 | 13,5 | 50 | 6 |
| GSX 20400C-4D | ● | 4,0 | 16,0 | 17,5 | 50 | 6 |
| GSX 20500C-4D | ● | 5,0 | 20,0 | 22,0 | 60 | 6 |
| GSX 20600C-4D | ● | 6,0 | 24,0 | – | 60 | 6 |
| GSX 20800C-4D | ● | 8,0 | 32,0 | – | 80 | 8 |
| GSX 21000C-4D | ● | 10,0 | 40,0 | – | 90 | 10 |
| GSX 21200C-4D | ● | 12,0 | 48,0 | – | 100 | 12 |
| GSX 21600C-4D | | 16,0 | 64,0 | – | 120 | 16 |
| GSX 22000C-4D | | 20,0 | 80,0 | – | 140 | 20 |

● = Euro stock

## ■ Endmill Identification (GSX MILL Series)

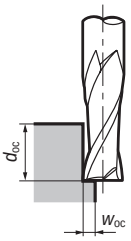
**GSX 2 0100 C - 4D**

| ① | ② | ③ | ④ | ⑤ |
|---|---|---|---|---|
| Series Code | No. of Teeth | Diameter | Cutting Edge | Cutting Edge Length |

④ S: Sharp Edge
C: Gash Land Drilling

## ■ Recommended cutting conditions

1. For stable machining performance use rigid, high-precision machines and holders.
2. Use air blowing when dry machining.
3. Use wet machining for stainless steel, heat resistant alloy, and titanium alloy applications.
4. In rear cases, chattering may occur in early milling stages, dissipating after 2m of cutting.
5. If chattering is a problem, reduce the spindle speed and feed rate indicated in the table below by the same ratio, or reduce the depth of cut.
6. This series is not recommended for grooving.
7. If the machine cannot achieve the recommended spindle speed, please use the max. spindle speed available.




### ● Shoulder Milling

| Work Material / Cond. / øD (mm) | Structural Steel | | Carbon Steel (150 to 250HB) | | Cast Iron | | Alloy Steel (25 to 35HRC) | | Tempered Steel, Hardened Steel (35 to 45HRC) | | Hardened Steel (45 to 55HRC) | | Stainless Steel | | Heat Resistive Steel, Titanium Alloy | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) |
| 1,0 | 9.000 | 130 | 9.000 | 130 | 9.000 | 130 | 7.000 | 95 | 6.500 | 50 | 4.500 | 30 | 5.400 | 40 | 4.500 | 25 |
| 2,0 | 4.500 | 180 | 4.500 | 180 | 4.500 | 180 | 3.500 | 120 | 3.200 | 70 | 2.300 | 40 | 2.700 | 50 | 2.300 | 35 |
| 4,0 | 2.250 | 240 | 2.250 | 240 | 2.250 | 240 | 1.750 | 160 | 1.600 | 95 | 1.200 | 60 | 1.350 | 65 | 1.200 | 40 |
| 6,0 | 1.500 | 300 | 1.500 | 300 | 1.500 | 300 | 1.150 | 170 | 1.050 | 110 | 800 | 70 | 900 | 70 | 800 | 50 |
| 8,0 | 1.100 | 260 | 1.100 | 260 | 1.100 | 260 | 850 | 170 | 800 | 110 | 600 | 70 | 660 | 70 | 600 | 50 |
| 10,0 | 900 | 250 | 900 | 250 | 900 | 250 | 700 | 160 | 650 | 110 | 460 | 70 | 540 | 70 | 460 | 50 |
| 12,0 | 750 | 240 | 750 | 240 | 750 | 240 | 580 | 160 | 520 | 110 | 400 | 70 | 450 | 70 | 400 | 50 |
| 16,0 | 550 | 200 | 550 | 200 | 550 | 200 | 440 | 140 | 400 | 95 | 300 | 55 | 330 | 60 | 300 | 45 |
| 20,0 | 450 | 180 | 450 | 180 | 450 | 180 | 350 | 120 | 320 | 85 | 240 | 45 | 270 | 50 | 240 | 40 |
| Shoulder cutting $d_{oc}$ | 3,5 *D* | | | | | | | | | | 3,0 *D* | | | | | |
| Shoulder cutting $w_{oc}$ | 0,08 *D* | | | | | | 0,04 *D* | | | | | | | | | |

New

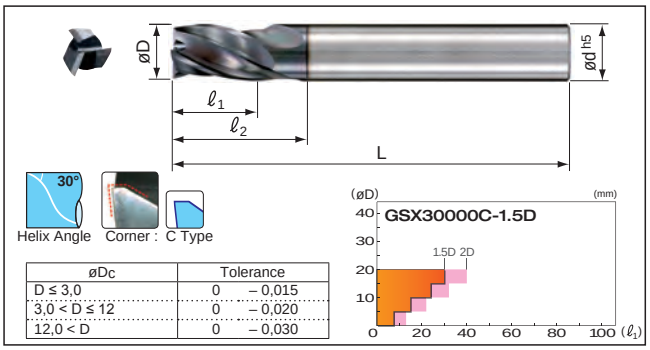
# GSX 30000C-1.5D Type



Coated Carbide — Grades

GSX — Coating

| Structural Steel | Carbon Steel | Alloy Steel | Pre-hardened Steel | Tempered Die Steel | Hardened Steel 45~55 HRC | Hardened Steel 55~60 HRC | Hardened Steel 60~65 HRC | Stainless Steel | Ti Alloy / Heat Resistant Alloy | Cast iron | Al Alloy | Cu Alloy | Graphite |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ○ | ◎ | ◎ | ◎ | ◎ | ◎ | | | ◎ | ○ | ○ | | | |




| øDc | Tolerance |
|---|---|
| D ≤ 3,0 | 0 – 0,015 |
| 3,0 < D ≤ 12 | 0 – 0,020 |
| 12,0 < D | 0 – 0,030 |

Grade: ACF20

## ■ Endmills

(mm)

| Cat. No. | Stock | øD | $\ell_1$ | $\ell_2$ | L | ød |
|---|---|---|---|---|---|---|
| **GSX 30100C-1.5D** | ● | 1,0 | 1,5 | 2,5 | 40 | 4 |
| **GSX 30150C-1.5D** | ● | 1,5 | 2,3 | 3,3 | 40 | 4 |
| **GSX 30200C-1.5D** | ● | 2,0 | 3,0 | 4,0 | 40 | 4 |
| **GSX 30250C-1.5D** | ● | 2,5 | 3,8 | 4,8 | 40 | 4 |
| **GSX 30300C-1.5D** | ● | 3,0 | 4,5 | 6,0 | 45 | 6 |
| **GSX 30400C-1.5D** | ● | 4,0 | 6,0 | 7,5 | 45 | 6 |
| **GSX 30500C-1.5D** | ● | 5,0 | 7,5 | 9,5 | 50 | 6 |
| **GSX 30600C-1.5D** | ● | 6,0 | 9,0 | – | 50 | 6 |
| **GSX 30700C-1.5D** | ● | 7,0 | 11,0 | 13,0 | 60 | 8 |
| **GSX 30800C-1.5D** | ● | 8,0 | 12,0 | – | 60 | 8 |
| **GSX 30900C-1.5D** | ● | 9,0 | 14,0 | 16,0 | 70 | 10 |
| **GSX 31000C-1.5D** | ● | 10,0 | 15,0 | – | 70 | 10 |
| **GSX 31200C-1.5D** | ● | 12,0 | 18,0 | – | 75 | 12 |
| **GSX 31600C-1.5D** | | 16,0 | 24,0 | – | 90 | 16 |
| **GSX 32000C-1.5D** | | 20,0 | 30,0 | – | 100 | 20 |

● = Euro stock

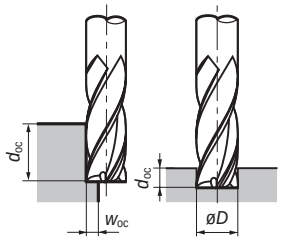
## ■ Endmill Identification (GSX MILL Series)

**GSX 3 0100 C - 1.5D**

① Series Code — GSX
② No. of Teeth — 3
③ Diameter — 0100
④ Cutting Edge — C (S: Sharp Edge, C: Gash Land Drilling)
⑤ Cutting Edge Length — 1.5D

## ■ Recommended cutting conditions

1. For stable machining performance use rigid, high-precision machines and holders.
2. Use air blowing when dry machining.
3. Use wet machining for stainless steel, heat resistant alloy, and titanium alloy applications.
4. If the machine cannot achieve the recommended spindle speed, please use the max. spindle speed available.




### ● Shoulder Milling

| Work Material / Cond. / øD (mm) | Structural Steel | | Carbon Steel (150 to 250HB) | | Cast Iron | | Alloy Steel (25 to 35HRC) | | Tempered Steel, Hardened Steel (35 to 45HRC) | | Hardened Steel (45 to 55HRC) | | Stainless Steel | | Heat Resistive Steel, Titanium Alloy | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) |
| 1,0 | 19.600 | 300 | 19.600 | 300 | 19.600 | 300 | 18.300 | 210 | 12.700 | 130 | 9.000 | 80 | 11.000 | 90 | 9.000 | 65 |
| 2,0 | 11.200 | 410 | 11.200 | 410 | 11.200 | 410 | 10.500 | 280 | 7.300 | 170 | 5.300 | 100 | 6.400 | 120 | 5.300 | 90 |
| 4,0 | 6.400 | 550 | 6.400 | 550 | 6.400 | 550 | 6.000 | 370 | 4.200 | 230 | 3.000 | 140 | 3.600 | 150 | 3.000 | 120 |
| 6,0 | 4.600 | 670 | 4.600 | 670 | 4.600 | 670 | 4.300 | 460 | 3.000 | 270 | 2.200 | 170 | 2.700 | 180 | 2.200 | 130 |
| 8,0 | 3.400 | 670 | 3.400 | 670 | 3.400 | 670 | 3.200 | 460 | 2.200 | 270 | 1.600 | 170 | 2.000 | 180 | 1.600 | 130 |
| 10,0 | 2.800 | 670 | 2.800 | 670 | 2.800 | 670 | 2.600 | 460 | 1.800 | 270 | 1.300 | 170 | 1.600 | 180 | 1.300 | 130 |
| 12,0 | 2.300 | 670 | 2.300 | 670 | 2.300 | 670 | 2.200 | 460 | 1.500 | 270 | 1.100 | 170 | 1.300 | 180 | 1.100 | 130 |
| 16,0 | 1.700 | 550 | 1.700 | 550 | 1.700 | 550 | 1.600 | 370 | 1.100 | 230 | 800 | 140 | 1.000 | 150 | 800 | 100 |
| 20,0 | 1.350 | 490 | 1.350 | 490 | 1.350 | 490 | 1.300 | 330 | 900 | 210 | 650 | 120 | 800 | 130 | 650 | 90 |
| Shoulder cutting $d_{oc}$ | 1,5 *D* | | | | | | | | 1,0 *D* | | | | | | | |
| Shoulder cutting $w_{oc}$ | 0,05 *D* | | | | | | | | 0,02 *D* | | | | | | | |

### ● Grooving

| Work Material / Cond. / øD (mm) | Structural Steel | | Carbon Steel (150 to 250HB) | | Cast Iron | | Alloy Steel (25 to 35HRC) | | Tempered Steel, Hardened Steel (35 to 45HRC) | | Hardened Steel (45 to 55HRC) | | Stainless Steel | | Heat Resistive Steel, Titanium Alloy | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) |
| 1,0 | 19.600 | 240 | 19.600 | 300 | 19.600 | 300 | 18.300 | 210 | 12.700 | 130 | 9.000 | 80 | 11.000 | 65 | 4.500 | 25 |
| 2,0 | 11.200 | 320 | 11.200 | 410 | 11.200 | 410 | 10.500 | 280 | 7.300 | 170 | 5.300 | 100 | 6.400 | 85 | 2.650 | 35 |
| 4,0 | 6.400 | 450 | 6.400 | 550 | 6.400 | 550 | 6.000 | 370 | 4.200 | 230 | 3.000 | 140 | 3.600 | 100 | 1.500 | 50 |
| 6,0 | 4.600 | 540 | 4.600 | 670 | 4.600 | 670 | 4.300 | 460 | 3.000 | 270 | 2.200 | 170 | 2.650 | 130 | 1.150 | 55 |
| 8,0 | 3.400 | 540 | 3.400 | 670 | 3.400 | 670 | 3.200 | 460 | 2.200 | 270 | 1.600 | 170 | 2.000 | 130 | 800 | 55 |
| 10,0 | 2.800 | 540 | 2.800 | 670 | 2.800 | 670 | 2.600 | 460 | 1.800 | 270 | 1.300 | 170 | 1.600 | 130 | 650 | 55 |
| 12,0 | 2.300 | 540 | 2.300 | 670 | 2.300 | 670 | 2.200 | 460 | 1.500 | 270 | 1.100 | 170 | 1.300 | 130 | 500 | 55 |
| 16,0 | 1.700 | 440 | 1.700 | 550 | 1.700 | 550 | 1.600 | 370 | 1.100 | 230 | 800 | 140 | 1.000 | 110 | 400 | 45 |
| 20,0 | 1.350 | 390 | 1.350 | 490 | 1.350 | 490 | 1.300 | 330 | 900 | 210 | 650 | 120 | 800 | 90 | 320 | 40 |
| Grooving $d_{oc}$ / $w_{oc}$ | 0,2 *D* | | 0,5 *D* | | | | | | | | 0,05 *D* | | 0,2 *D* | | | |

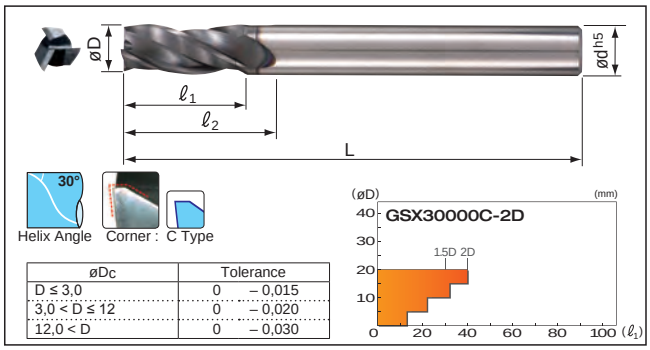
# GSX MILL Endmills

New

# GSX 30000C-2D Type

Coated Carbide Grades | GSX Coating

| Structural Steel | Carbon Steel | Alloy Steel | Pre-hardened Steel | Tempered Die Steel | Hardened Steel 45~55 HRC | Hardened Steel 55~60 HRC | Hardened Steel 60~65 HRC | Stainless Steel | Ti Alloy / Heat Resistant Alloy | Cast iron | Al Alloy | Cu Alloy | Graphite |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ○ | ◎ | ◎ | ◎ | ◎ | ◎ | | | ◎ | ○ | ○ | | | |




| øDc | Tolerance |
|---|---|
| D ≤ 3,0 | 0 – 0,015 |
| 3,0 < D ≤ 12 | 0 – 0,020 |
| 12,0 < D | 0 – 0,030 |

Grade: ACF20

## ■ Endmills

(mm)

| Cat. No. | Stock | øD | $\ell_1$ | $\ell_2$ | L | ød |
|---|---|---|---|---|---|---|
| GSX 30100C-2D | ● | 1,0 | 2,5 | 3,5 | 40 | 4 |
| GSX 30150C-2D | ● | 1,5 | 3,8 | 4,8 | 40 | 4 |
| GSX 30200C-2D | ● | 2,0 | 5,0 | 6,0 | 40 | 4 |
| GSX 30250C-2D | ● | 2,5 | 6,3 | 7,3 | 40 | 4 |
| GSX 30300C-2D | ● | 3,0 | 7,5 | 9,0 | 45 | 6 |
| GSX 30400C-2D | ● | 4,0 | 11,0 | 12,5 | 45 | 6 |
| GSX 30500C-2D | ● | 5,0 | 13,0 | 15,0 | 50 | 6 |
| GSX 30600C-2D | ● | 6,0 | 13,0 | – | 50 | 6 |
| GSX 30700C-2D | ● | 7,0 | 16,0 | 18,0 | 60 | 8 |
| GSX 30800C-2D | ● | 8,0 | 19,0 | – | 60 | 8 |
| GSX 30900C-2D | ● | 9,0 | 19,0 | 21,0 | 70 | 10 |
| GSX 31000C-2D | ● | 10,0 | 22,0 | – | 70 | 10 |
| GSX 31200C-2D | ● | 12,0 | 26,0 | – | 75 | 12 |
| GSX 31600C-2D | | 16,0 | 32,0 | – | 90 | 16 |
| GSX 32000C-2D | | 20,0 | 40,0 | – | 100 | 20 |

● = Euro stock

## ■ Endmill Identification (GSX MILL Series)

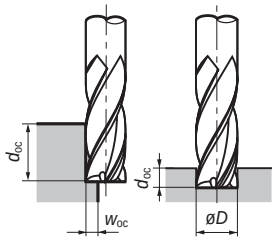
**GSX 3 0100 C - 2D**

| ① | ② | ③ | ④ | ⑤ |
|---|---|---|---|---|
| Series Code | No. of Teeth | Diameter | Cutting Edge | Cutting Edge Length |

④ ( S: Sharp Edge
C: Gash Land Drilling

## ■ Recommended cutting conditions

1. For stable machining performance use rigid, high-precision machines and holders.
2. Use air blowing when dry machining.
3. Use wet machining for stainless steel, heat resistant alloy, and titanium alloy applications.
4. If the machine cannot achieve the recommended spindle speed, please use the max. spindle speed available.




### ● Shoulder Milling

| Work Material / Cond. / øD (mm) | Structural Steel | | Carbon Steel (150 to 250HB) | | Cast Iron | | Alloy Steel (25 to 35HRC) | | Tempered Steel, Hardened Steel (35 to 45HRC) | | Hardened Steel (45 to 55HRC) | | Stainless Steel | | Heat Resistive Steel, Titanium Alloy | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) |
| 1,0 | 19.600 | 300 | 19.600 | 300 | 19.600 | 300 | 18.300 | 210 | 12.700 | 130 | 9.000 | 80 | 11.000 | 90 | 9.000 | 65 |
| 2,0 | 11.200 | 410 | 11.200 | 410 | 11.200 | 410 | 10.500 | 280 | 7.300 | 170 | 5.300 | 100 | 6.400 | 120 | 5.300 | 90 |
| 4,0 | 6.400 | 550 | 6.400 | 550 | 6.400 | 550 | 6.000 | 370 | 4.200 | 230 | 3.000 | 140 | 3.600 | 150 | 3.000 | 120 |
| 6,0 | 4.600 | 670 | 4.600 | 670 | 4.600 | 670 | 4.300 | 460 | 3.000 | 270 | 2.200 | 170 | 2.700 | 180 | 2.200 | 130 |
| 8,0 | 3.400 | 670 | 3.400 | 670 | 3.400 | 670 | 3.200 | 460 | 2.200 | 270 | 1.600 | 170 | 2.000 | 180 | 1.600 | 130 |
| 10,0 | 2.800 | 670 | 2.800 | 670 | 2.800 | 670 | 2.600 | 460 | 1.800 | 270 | 1.300 | 170 | 1.600 | 180 | 1.300 | 130 |
| 12,0 | 2.300 | 670 | 2.300 | 670 | 2.300 | 670 | 2.200 | 460 | 1.500 | 270 | 1.100 | 170 | 1.300 | 180 | 1.100 | 130 |
| 16,0 | 1.700 | 550 | 1.700 | 550 | 1.700 | 550 | 1.600 | 370 | 1.100 | 230 | 800 | 140 | 1.000 | 150 | 800 | 100 |
| 20,0 | 1.350 | 490 | 1.350 | 490 | 1.350 | 490 | 1.300 | 330 | 900 | 210 | 650 | 120 | 800 | 130 | 650 | 90 |
| Shoulder cutting $d_{oc}$ | 1,5 *D* | | | | | | | | | | 1,0 *D* | | | | | |
| Shoulder cutting $w_{oc}$ | 0,05 *D* | | | | | | | | | | 0,02 *D* | | | | | |

### ● Grooving

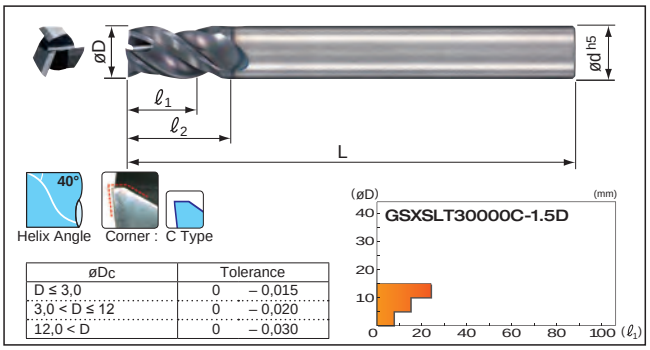
| Work Material / Cond. / øD (mm) | Structural Steel | | Carbon Steel (150 to 250HB) | | Cast Iron | | Alloy Steel (25 to 35HRC) | | Tempered Steel, Hardened Steel (35 to 45HRC) | | Hardened Steel (45 to 55HRC) | | Stainless Steel | | Heat Resistive Steel, Titanium Alloy | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) |
| 1,0 | 19.600 | 240 | 19.600 | 300 | 19.600 | 300 | 18.300 | 210 | 12.700 | 130 | 9.000 | 80 | 11.000 | 65 | 4.500 | 25 |
| 2,0 | 11.200 | 320 | 11.200 | 410 | 11.200 | 410 | 10.500 | 280 | 7.300 | 170 | 5.300 | 100 | 6.400 | 85 | 2.650 | 35 |
| 4,0 | 6.400 | 450 | 6.400 | 550 | 6.400 | 550 | 6.000 | 370 | 4.200 | 230 | 3.000 | 140 | 3.600 | 100 | 1.500 | 50 |
| 6,0 | 4.600 | 540 | 4.600 | 670 | 4.600 | 670 | 4.300 | 460 | 3.000 | 270 | 2.200 | 170 | 2.650 | 130 | 1.150 | 55 |
| 8,0 | 3.400 | 540 | 3.400 | 670 | 3.400 | 670 | 3.200 | 460 | 2.200 | 270 | 1.600 | 170 | 2.000 | 130 | 800 | 55 |
| 10,0 | 2.800 | 540 | 2.800 | 670 | 2.800 | 670 | 2.600 | 460 | 1.800 | 270 | 1.300 | 170 | 1.600 | 130 | 650 | 55 |
| 12,0 | 2.300 | 540 | 2.300 | 670 | 2.300 | 670 | 2.200 | 460 | 1.500 | 270 | 1.100 | 170 | 1.300 | 130 | 500 | 55 |
| 16,0 | 1.700 | 440 | 1.700 | 550 | 1.700 | 550 | 1.600 | 370 | 1.100 | 230 | 800 | 140 | 1.000 | 110 | 400 | 45 |
| 20,0 | 1.350 | 390 | 1.350 | 490 | 1.350 | 490 | 1.300 | 330 | 900 | 210 | 650 | 120 | 800 | 90 | 320 | 40 |
| Grooving $d_{oc}$ | 0,2 *D* | | 0,5 *D* | | | | | | 0,2 *D* | | 0,05 *D* | | 0,2 *D* | | | |

# GSXSLT 30000C-1.5D Type

For Compound Endmilling

Coated Carbide Grades | GSX Coating

| Structural Steel | Carbon Steel | Alloy Steel | Pre-hardened Steel | Tempered Die Steel | Hardened Steel 45~55 HRC | Hardened Steel 55~60 HRC | Hardened Steel 60~65 HRC | Stainless Steel | Ti Alloy / Heat Resistant Alloy | Cast iron | Al Alloy | Cu Alloy | Graphite |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ○ | ◎ | ◎ | ◎ | ◎ | ◎ | | | ◎ | ○ | ○ | | | |




| øDc | Tolerance |
|---|---|
| D ≤ 3,0 | 0 – 0,015 |
| 3,0 < D ≤ 12 | 0 – 0,020 |
| 12,0 < D | 0 – 0,030 |

Grade: ACF20

## ■ Endmills

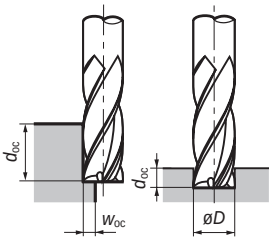
(mm)

| Cat. No. | Stock | øD | $\ell_1$ | $\ell_2$ | L | ød |
|---|---|---|---|---|---|---|
| GSXSLT 30100C-1.5D | ● | 1,0 | 1,5 | 2,5 | 40 | 4 |
| GSXSLT 30150C-1.5D | ● | 1,5 | 2,3 | 3,3 | 40 | 4 |
| GSXSLT 30200C-1.5D | ● | 2,0 | 3,0 | 4,0 | 40 | 4 |
| GSXSLT 30250C-1.5D | ● | 2,5 | 3,8 | 4,8 | 40 | 4 |
| GSXSLT 30300C-1.5D | ● | 3,0 | 4,5 | 6,0 | 45 | 6 |
| GSXSLT 30400C-1.5D | ● | 4,0 | 6,0 | 7,5 | 45 | 6 |
| GSXSLT 30500C-1.5D | ● | 5,0 | 7,5 | 9,5 | 50 | 6 |
| GSXSLT 30600C-1.5D | ● | 6,0 | 9,0 | – | 50 | 6 |
| GSXSLT 30700C-1.5D | ● | 7,0 | 11,0 | 13,0 | 60 | 8 |
| GSXSLT 30800C-1.5D | ● | 8,0 | 12,0 | – | 60 | 8 |
| GSXSLT 30900C-1.5D | ● | 9,0 | 14,0 | 16,0 | 70 | 10 |
| GSXSLT 31000C-1.5D | ● | 10,0 | 15,0 | – | 70 | 10 |
| GSXSLT 31200C-1.5D | ● | 12,0 | 18,0 | – | 75 | 12 |
| GSXSLT 31600C-1.5D | | 16,0 | 24,0 | – | 90 | 16 |

● = Euro stock

## ■ Recommended cutting conditions

1. For stable machining performance use rigid, high-precision machines and holders.
2. Use air blowing when dry machining.
3. Use wet machining for stainless steel, heat resistant alloy, and titanium alloy applications.
4. Use step machining of 0.1Dc when drilling stainless steel, heat resistant alloy, and titanium alloy.
5. If the machine cannot achieve the recommended spindle speed, please use the max. spindle speed available.




### ●Shoulder Milling

| Work Material / Cond. | | Structural Steel | | Carbon Steel (150 to 250HB) | | Cast Iron | | Alloy Steel (25 to 35HRC) | | Tempered Steel, Hardened Steel (35 to 45HRC) | | Hardened Steel (45 to 55HRC) | | Stainless Steel | | Heat Resistive Steel, Titanium Alloy | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| øD (mm) | | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) |
| 1,0 | | 19.600 | 300 | 19.600 | 300 | 19.600 | 300 | 18.300 | 210 | 12.700 | 130 | 9.000 | 80 | 11.000 | 90 | 9.000 | 65 |
| 2,0 | | 11.200 | 410 | 11.200 | 410 | 11.200 | 410 | 10.500 | 280 | 7.300 | 170 | 5.300 | 100 | 6.400 | 120 | 5.300 | 90 |
| 4,0 | | 6.400 | 550 | 6.400 | 550 | 6.400 | 550 | 6.000 | 370 | 4.200 | 230 | 3.000 | 140 | 3.600 | 150 | 3.000 | 120 |
| 6,0 | | 4.600 | 670 | 4.600 | 670 | 4.600 | 670 | 4.300 | 460 | 3.000 | 270 | 2.200 | 170 | 2.700 | 180 | 2.200 | 130 |
| 8,0 | | 3.400 | 670 | 3.400 | 670 | 3.400 | 670 | 3.200 | 460 | 2.200 | 270 | 1.600 | 170 | 2.000 | 180 | 1.600 | 130 |
| 10,0 | | 2.800 | 670 | 2.800 | 670 | 2.800 | 670 | 2.600 | 460 | 1.800 | 270 | 1.300 | 170 | 1.600 | 180 | 1.300 | 130 |
| 12,0 | | 2.300 | 670 | 2.300 | 670 | 2.300 | 670 | 2.200 | 460 | 1.500 | 270 | 1.100 | 170 | 1.300 | 180 | 1.100 | 130 |
| 16,0 | | 1.700 | 550 | 1.700 | 550 | 1.700 | 550 | 1.600 | 370 | 1.100 | 230 | 800 | 140 | 1.000 | 150 | 800 | 100 |
| Shoulder cutting | $d_{oc}$ | 1.5 D | | | | | | | | | | 1.0 D | | | | | |
| | $w_{oc}$ | 0.05 D | | | | | | | | | | 0.02 D | | | | | |

### ●Grooving

| Work Material / Cond. | | Structural Steel | | Carbon Steel (150 to 250HB) | | Cast Iron | | Alloy Steel (25 to 35HRC) | | Tempered Steel, Hardened Steel (35 to 45HRC) | | Hardened Steel (45 to 55HRC) | | Stainless Steel | | Heat Resistive Steel, Titanium Alloy | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| øD (mm) | | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) |
| 1,0 | | 19.600 | 240 | 19.600 | 300 | 19.600 | 300 | 18.300 | 210 | 12.700 | 130 | 9.000 | 80 | 11.000 | 65 | 4.500 | 25 |
| 2,0 | | 11.200 | 320 | 11.200 | 410 | 11.200 | 410 | 10.500 | 280 | 7.300 | 170 | 5.300 | 100 | 6.400 | 85 | 2.650 | 35 |
| 4,0 | | 6.400 | 450 | 6.400 | 550 | 6.400 | 550 | 6.000 | 370 | 4.200 | 230 | 3.000 | 140 | 3.600 | 100 | 1.500 | 50 |
| 6,0 | | 4.600 | 540 | 4.600 | 670 | 4.600 | 670 | 4.300 | 460 | 3.000 | 270 | 2.200 | 170 | 2.650 | 130 | 1.150 | 55 |
| 8,0 | | 3.400 | 540 | 3.400 | 670 | 3.400 | 670 | 3.200 | 460 | 2.200 | 270 | 1.600 | 170 | 2.000 | 130 | 800 | 55 |
| 10,0 | | 2.800 | 540 | 2.800 | 670 | 2.800 | 670 | 2.600 | 460 | 1.800 | 270 | 1.300 | 170 | 1.600 | 130 | 650 | 55 |
| 12,0 | | 2.300 | 540 | 2.300 | 670 | 2.300 | 670 | 2.200 | 460 | 1.500 | 270 | 1.100 | 170 | 1.300 | 130 | 500 | 55 |
| 16,0 | | 1.700 | 440 | 1.700 | 550 | 1.700 | 550 | 1.600 | 370 | 1.100 | 230 | 800 | 140 | 1.000 | 110 | 400 | 45 |
| Grooving | $d_{oc}$ | 0,2 D | | 0,5 D | | | | | | 0,2 D | | 0,05 D | | 0,2 D | | | |

### ●Drilling

| Work Material / Cond. | Structural Steel | | Carbon Steel (150 to 250HB) | | Cast Iron | | Alloy Steel (25 to 35HRC) | | Tempered Steel, Hardened Steel (35 to 45HRC) | | Hardened Steel (45 to 55HRC) | | Stainless Steel | | Heat Resistive Steel, Titanium Alloy | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| øD (mm) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) |
| 1,0 | 19.600 | 70 | 19.600 | 90 | 19.600 | 90 | 18.300 | 60 | 12.700 | 40 | 9.000 | 25 | 11.000 | 20 | 4.500 | 10 |
| 2,0 | 11.200 | 90 | 11.200 | 120 | 11.200 | 120 | 10.500 | 80 | 7.300 | 50 | 5.300 | 30 | 6.400 | 25 | 2.650 | 15 |
| 4,0 | 6.400 | 130 | 6.400 | 160 | 6.400 | 160 | 6.000 | 110 | 4.200 | 70 | 3.000 | 40 | 3.600 | 30 | 1.500 | 20 |
| 6,0 | 4.600 | 160 | 4.600 | 200 | 4.600 | 200 | 4.300 | 130 | 3.000 | 80 | 2.200 | 50 | 2.650 | 40 | 1.150 | 20 |
| 8,0 | 3.400 | 160 | 3.400 | 200 | 3.400 | 200 | 3.200 | 130 | 2.200 | 80 | 1.600 | 50 | 2.000 | 40 | 800 | 20 |
| 10,0 | 2.800 | 160 | 2.800 | 200 | 2.800 | 200 | 2.600 | 130 | 1.800 | 80 | 1.300 | 50 | 1.600 | 40 | 650 | 20 |
| 12,0 | 2.300 | 160 | 2.300 | 200 | 2.300 | 200 | 2.200 | 130 | 1.500 | 80 | 1.100 | 50 | 1.300 | 40 | 500 | 20 |
| 16,0 | 1.700 | 130 | 1.700 | 160 | 1.700 | 160 | 1.600 | 110 | 1.100 | 70 | 800 | 40 | 1.000 | 35 | 400 | 15 |

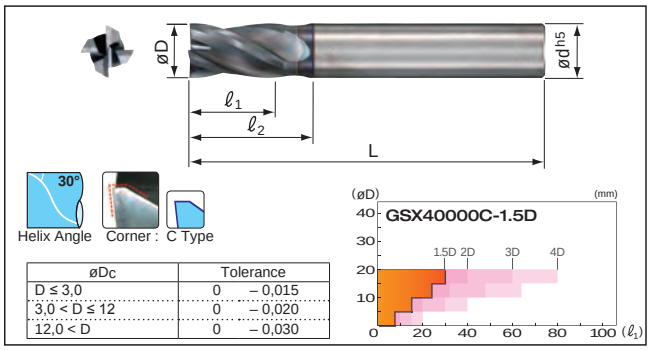
# GSX MILL Endmills

New

# GSX 40000C-1.5D Type

Coated Carbide Grades | GSX Coating

| Structural Steel | Carbon Steel | Alloy Steel | Pre-hardened Steel | Tempered Die Steel | Hardened Steel 45~55 HRC | Hardened Steel 55~60 HRC | Hardened Steel 60~65 HRC | Stainless Steel | Ti Alloy / Heat Resistant Alloy | Cast iron | Al Alloy | Cu Alloy | Graphite |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ○ | ◎ | ◎ | ◎ | ◎ | ◎ | ○ | | ◎ | ○ | ○ | | | |




| øDc | Tolerance |
|---|---|
| D ≤ 3,0 | 0 – 0,015 |
| 3,0 < D ≤ 12 | 0 – 0,020 |
| 12,0 < D | 0 – 0,030 |

Grade: ACF20

## ■ Endmills

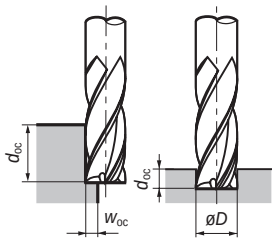
(mm)

| Cat. No. | Stock | øD | $\ell_1$ | $\ell_2$ | L | ød |
|---|---|---|---|---|---|---|
| GSX 40100C-1.5D | ● | 1,0 | 1,5 | 2,5 | 40 | 4 |
| GSX 40150C-1.5D | ● | 1,5 | 2,3 | 3,3 | 40 | 4 |
| GSX 40200C-1.5D | ● | 2,0 | 3,0 | 4,0 | 40 | 4 |
| GSX 40250C-1.5D | ● | 2,5 | 3,8 | 4,8 | 40 | 4 |
| GSX 40300C-1.5D | ● | 3,0 | 4,5 | 6,0 | 45 | 6 |
| GSX 40350C-1.5D | ● | 3,5 | 5,3 | 6,8 | 45 | 6 |
| GSX 40400C-1.5D | ● | 4,0 | 6,0 | 7,5 | 45 | 6 |
| GSX 40450C-1.5D | ● | 4,5 | 6,8 | 8,3 | 50 | 6 |
| GSX 40500C-1.5D | ● | 5,0 | 7,5 | 9,5 | 50 | 6 |
| GSX 40550C-1.5D | ● | 5,5 | 8,3 | 10,3 | 50 | 6 |
| GSX 40600C-1.5D | ● | 6,0 | 9,0 | – | 50 | 6 |
| GSX 40700C-1.5D | ● | 7,0 | 11,0 | 13,0 | 60 | 8 |
| GSX 40800C-1.5D | ● | 8,0 | 12,0 | – | 60 | 8 |
| GSX 40900C-1.5D | ● | 9,0 | 14,0 | 16,0 | 70 | 10 |
| GSX 41000C-1.5D | ● | 10,0 | 15,0 | – | 70 | 10 |
| GSX 41200C-1.5D | ● | 12,0 | 18,0 | – | 75 | 12 |
| GSX 41400C-1.5D | | 14,0 | 21,0 | 24,5 | 90 | 16 |
| GSX 41500C-1.5D | | 15,0 | 23,0 | 26,5 | 90 | 16 |
| GSX 41600C-1.5D | | 16,0 | 24,0 | – | 90 | 16 |
| GSX 42000C-1.5D | | 20,0 | 30,0 | – | 100 | 20 |

● = Euro stock

## ■ Recommended Cutting Conditions

1. For stable machining performance use rigid, high-precision machines and holders.
2. Use air blowing when dry machining.
3. Use wet machining for stainless steel, heat resistant alloy, and titanium alloy applications.
4. If the machine cannot achieve the recommended spindle speed, please use the max. spindle speed available.




## ● Shoulder Milling

| Work Material / Cond. / øD (mm) | Structural Steel | | Carbon Steel (150 to 250HB) | | Cast Iron | | Alloy Steel (25 to 35HRC) | | Tempered Steel, Hardened Steel (35 to 45HRC) | | Hardened Steel (45 to 55HRC) | | Stainless Steel | | Heat Resistive Steel, Titanium Alloy | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) |
| 1,0 | 24.000 | 470 | 24.000 | 470 | 24.000 | 470 | 21.000 | 290 | 14.500 | 180 | 10.500 | 120 | 12.600 | 120 | 10.500 | 85 |
| 2,0 | 12.800 | 570 | 12.800 | 570 | 12.800 | 570 | 12.000 | 380 | 8.300 | 230 | 6.000 | 150 | 7.200 | 160 | 6.000 | 110 |
| 4,0 | 6.800 | 730 | 6.800 | 730 | 6.800 | 730 | 6.400 | 490 | 4.400 | 300 | 3.200 | 200 | 3.800 | 210 | 3.200 | 130 |
| 6,0 | 4.600 | 780 | 4.600 | 780 | 4.600 | 780 | 4.300 | 520 | 3.000 | 320 | 2.200 | 210 | 2.650 | 220 | 2.200 | 150 |
| 8,0 | 3.400 | 780 | 3.400 | 780 | 3.400 | 780 | 3.200 | 520 | 2.200 | 320 | 1.600 | 210 | 2.000 | 220 | 1.600 | 150 |
| 10,0 | 2.800 | 780 | 2.800 | 780 | 2.800 | 780 | 2.600 | 520 | 1.800 | 320 | 1.300 | 210 | 1.500 | 220 | 1.300 | 150 |
| 12,0 | 2.300 | 780 | 2.300 | 780 | 2.300 | 780 | 2.200 | 520 | 1.500 | 320 | 1.100 | 210 | 1.300 | 220 | 1.100 | 150 |
| 16,0 | 1.700 | 650 | 1.700 | 650 | 1.700 | 650 | 1.600 | 420 | 1.100 | 280 | 800 | 170 | 1.000 | 180 | 800 | 120 |
| 20,0 | 1.350 | 600 | 1.350 | 600 | 1.350 | 600 | 1.300 | 380 | 900 | 260 | 650 | 150 | 800 | 160 | 650 | 100 |
| Shoulder cutting $d_{oc}$ | 1,5 *D* | | | | | | | | | | 1,0 *D* | | | | | |
| Shoulder cutting $w_{oc}$ | 0,05 *D* | | | | | | | | | | 0,02 *D* | | | | | |

## ● Shoulder Milling (High Speed Machining Centre)

| Work Material / Cond. / øD (mm) | Structural Steel | | Carbon Steel (150 to 250HB) | | Cast Iron | | Alloy Steel (25 to 35HRC) | | Tempered Steel, Hardened Steel (35 to 45HRC) | | Hardened Steel (45 to 55HRC) | | Stainless Steel | | Heat Resistive Steel, Titanium Alloy | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) |
| 1,0 | 60.000 | 1.200 | 60.000 | 1.200 | 60.000 | 1.200 | 60.000 | 850 | 60.000 | 720 | 48.000 | 500 | 32.000 | 300 | – | – |
| 2,0 | 47.800 | 2.200 | 47.800 | 2.200 | 47.800 | 2.200 | 47.800 | 1.600 | 39.800 | 1.200 | 31.800 | 900 | 15.900 | 400 | – | – |
| 4,0 | 23.900 | 2.600 | 23.900 | 2.600 | 23.900 | 2.600 | 23.900 | 1.900 | 19.900 | 1.400 | 15.900 | 1.100 | 8.000 | 490 | – | – |
| 6,0 | 16.000 | 2.700 | 16.000 | 2.700 | 16.000 | 2.700 | 16.000 | 2.000 | 13.300 | 1.500 | 10.600 | 1.200 | 5.300 | 520 | – | – |
| 8,0 | 12.000 | 2.700 | 12.000 | 2.700 | 12.000 | 2.700 | 12.000 | 2.000 | 10.000 | 1.500 | 8.000 | 1.200 | 4.000 | 520 | – | – |
| 10,0 | 9.600 | 2.700 | 9.600 | 2.700 | 9.600 | 2.700 | 9.600 | 2.000 | 8.000 | 1.500 | 6.400 | 1.200 | 3.200 | 520 | – | – |
| 12,0 | 8.000 | 2.700 | 8.000 | 2.700 | 8.000 | 2.700 | 8.000 | 2.000 | 6.700 | 1.500 | 5.300 | 1.200 | 2.700 | 520 | – | – |
| 16,0 | 6.000 | 2.200 | 6.000 | 2.200 | 6.000 | 2.200 | 6.000 | 1.600 | 5.000 | 1.200 | 4.000 | 900 | 2.000 | 450 | – | – |
| 20,0 | 4.800 | 2.000 | 4.800 | 2.000 | 4.800 | 2.000 | 4.800 | 1.400 | 4.000 | 1.100 | 3.200 | 750 | 1.600 | 380 | – | – |
| Shoulder cutting $d_{oc}$ | 1,5 *D* | | | | | | | | | | 1,0 *D* | | | | | |
| Shoulder cutting $w_{oc}$ | 0,05 *D* | | | | | | | | | | 0,02 *D* | | | | | |

## ● Grooving

| Work Material / Cond. / øD (mm) | Structural Steel | | Carbon Steel (150 to 250HB) | | Cast Iron | | Alloy Steel (25 to 35HRC) | | Tempered Steel, Hardened Steel (35 to 45HRC) | | Hardened Steel (45 to 55HRC) | | Stainless Steel | | Heat Resistive Steel, Titanium Alloy | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) |
| 1,0 | 24.000 | 380 | 24.000 | 470 | 24.000 | 470 | 21.000 | 290 | 14.500 | 180 | 10.500 | 120 | 12.600 | 85 | 5.200 | 30 |
| 2,0 | 12.800 | 460 | 12.800 | 570 | 12.800 | 570 | 12.000 | 380 | 8.300 | 230 | 6.000 | 150 | 7.200 | 110 | 3.000 | 40 |
| 4,0 | 6.800 | 580 | 6.800 | 730 | 6.800 | 730 | 5.400 | 490 | 4.400 | 300 | 3.200 | 200 | 3.800 | 130 | 1.600 | 55 |
| 6,0 | 4.600 | 620 | 4.600 | 780 | 4.600 | 780 | 4.300 | 520 | 3.000 | 320 | 2.200 | 210 | 2.650 | 160 | 1.100 | 65 |
| 8,0 | 3.400 | 620 | 3.400 | 780 | 3.400 | 780 | 3.200 | 520 | 2.200 | 320 | 1.600 | 210 | 2.000 | 160 | 800 | 65 |
| 10,0 | 2.800 | 620 | 2.800 | 780 | 2.800 | 780 | 2.600 | 520 | 1.800 | 320 | 1.300 | 210 | 1.600 | 160 | 650 | 65 |
| 12,0 | 2.300 | 620 | 2.300 | 780 | 2.300 | 780 | 2.200 | 520 | 1.500 | 320 | 1.100 | 210 | 1.300 | 160 | 550 | 65 |
| 16,0 | 1.700 | 520 | 1.700 | 560 | 1.700 | 560 | 1.600 | 420 | 1.100 | 280 | 800 | 170 | 1.000 | 130 | 400 | 55 |
| 20,0 | 1.350 | 480 | 1.350 | 600 | 1.350 | 600 | 1.300 | 380 | 900 | 260 | 650 | 150 | 800 | 110 | 320 | 50 |
| Grooving $d_{oc}$ | 0,2 *D* | | 0,5 *D* | | | | | | 0,2 *D* | | 0,05 *D* | | 0,2 *D* | | | |

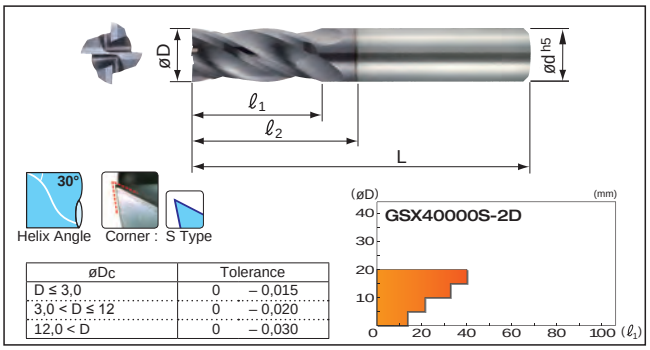
New

# GSX 40000S-2D Type



Coated Carbide — Grades
GSX — Coating

| Structural Steel | Carbon Steel | Alloy Steel | Pre-hardened Steel | Tempered Die Steel | Hardened Steel 45~55 HRC | Hardened Steel 55~60 HRC | Hardened Steel 60~65 HRC | Stainless Steel | Ti Alloy / Heat Resistant Alloy | Cast iron | Al Alloy | Cu Alloy | Graphite |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ○ | ◎ | ◎ | ◎ | ◎ | ◎ | ○ | | ◎ | ○ | ○ | | | |




| øDc | Tolerance |
|---|---|
| D ≤ 3,0 | 0 – 0,015 |
| 3,0 < D ≤ 12 | 0 – 0,020 |
| 12,0 < D | 0 – 0,030 |

Grade: ACF20

## ■ Endmills

(mm)

| Cat. No. | Stock | øD | ℓ1 | ℓ2 | L | ød |
|---|---|---|---|---|---|---|
| **GSX 40100S-2D** | ● | 1,0 | 2,5 | 3,5 | 40 | 4 |
| **GSX 40150S-2D** | ● | 1,5 | 3,8 | 4,8 | 40 | 4 |
| **GSX 40200S-2D** | ● | 2,0 | 5,0 | 6,0 | 40 | 4 |
| **GSX 40250S-2D** | ● | 2,5 | 6,3 | 7,3 | 40 | 4 |
| **GSX 40300S-2D** | ● | 3,0 | 7,5 | 9,0 | 45 | 6 |
| **GSX 40350S-2D** | ● | 3,5 | 8,8 | 10,0 | 45 | 6 |
| **GSX 40400S-2D** | ● | 4,0 | 11,0 | 14,0 | 45 | 6 |
| **GSX 40450S-2D** | ● | 4,5 | 11,3 | 12,8 | 50 | 6 |
| **GSX 40500S-2D** | ● | 5,0 | 13,0 | 19,6 | 50 | 6 |
| **GSX 40550S-2D** | ● | 5,5 | 13,0 | 19,6 | 50 | 6 |
| **GSX 40600S-2D** | ● | 6,0 | 13,0 | – | 50 | 6 |
| **GSX 40700S-2D** | ● | 7,0 | 16,0 | 21,1 | 60 | 8 |
| **GSX 40800S-2D** | ● | 8,0 | 19,0 | – | 60 | 8 |
| **GSX 40900S-2D** | ● | 9,0 | 19,0 | 24,1 | 70 | 10 |
| **GSX 41000S-2D** | ● | 10,0 | 22,0 | – | 70 | 10 |
| **GSX 41200S-2D** | ● | 12,0 | 26,0 | – | 75 | 12 |
| **GSX 41600S-2D** | ● | 16,0 | 32,0 | – | 90 | 16 |
| **GSX 42000S-2D** | ● | 20,0 | 40,0 | – | 100 | 20 |

● = Euro stock

## ■ Endmill Identification (GSX MILL Series)

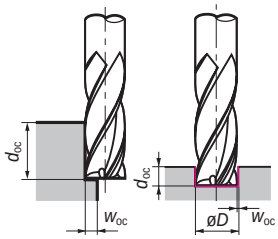
**GSX 4 1000 S - 2D**

| ① | ② | ③ | ④ | ⑤ |
|---|---|---|---|---|
| Series Code | No. of Teeth | Diameter | Cutting Edge | Cutting Edge Length |

④ (S: Sharp Edge, C: Gash Land Drilling)

## ■ Recommended cutting conditions

1. For stable machining performance use rigid, high-precision machines and holders.
2. Use air blowing when dry machining.
3. Use wet machining for stainless steel, heat resistant alloy, and titanium alloy applications.
4. If chattering is a problem, reduce the spindle speed and feed rate indicated in the table below by the same ratio, or reduce the depth of cut.
5. This series is not recommended for grooving.
6. If the machine cannot achieve the recommended spindle speed, please use the max. spindle speed available.




### ● Shoulder Milling

| Work Material / Cond. / øD (mm) | Structural Steel | | Carbon Steel (150 to 250HB) | | Cast Iron | | Alloy Steel (25 to 35HRC) | | Tempered Steel, Hardened Steel (35 to 45HRC) | | Hardened Steel (45 to 55HRC) | | Stainless Steel | | Heat Resistive Steel, Titanium Alloy | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) |
| 1,0 | 22.000 | 360 | 22.000 | 360 | 22.000 | 360 | 19.000 | 220 | 13.000 | 140 | 9.500 | 90 | 11.300 | 90 | 9.500 | 65 |
| 2,0 | 11.500 | 440 | 11.500 | 440 | 11.500 | 440 | 11.000 | 290 | 7.500 | 180 | 5.400 | 110 | 6.500 | 120 | 5.400 | 85 |
| 4,0 | 6.000 | 560 | 6.000 | 560 | 6.000 | 560 | 5.800 | 370 | 4.000 | 230 | 2.900 | 150 | 3.400 | 160 | 2.900 | 100 |
| 6,0 | 4.200 | 600 | 4.200 | 600 | 4.200 | 600 | 4.000 | 400 | 2.700 | 240 | 2.000 | 160 | 2.400 | 170 | 2.000 | 120 |
| 8,0 | 3.000 | 600 | 3.000 | 600 | 3.000 | 600 | 2.800 | 400 | 2.000 | 240 | 1.450 | 160 | 1.800 | 170 | 1.450 | 120 |
| 10,0 | 2.500 | 600 | 2.500 | 600 | 2.500 | 600 | 2.350 | 400 | 1.600 | 240 | 1.200 | 160 | 1.450 | 170 | 1.200 | 120 |
| 12,0 | 2.100 | 600 | 2.100 | 600 | 2.100 | 600 | 2.000 | 400 | 1.350 | 240 | 1.000 | 160 | 1.200 | 170 | 1.000 | 120 |
| 16,0 | 1.500 | 500 | 1.500 | 500 | 1.500 | 500 | 1.450 | 320 | 1.000 | 210 | 750 | 130 | 900 | 140 | 750 | 90 |
| 20,0 | 1.200 | 460 | 1.200 | 460 | 1.200 | 460 | 1.150 | 290 | 800 | 200 | 600 | 110 | 700 | 120 | 600 | 75 |
| Shoulder cutting $d_{oc}$ | 2,0 D | | | | | | | | | | | | | | | |
| Shoulder cutting $w_{oc}$ | 0,03 D | | | | | | | | | | 0,01 D | | | | | |

### ● Groove Finishing

| Work Material / Cond. / øD (mm) | Structural Steel | | Carbon Steel (150 to 250HB) | | Cast Iron | | Alloy Steel (25 to 35HRC) | | Tempered Steel, Hardened Steel (35 to 45HRC) | | Hardened Steel (45 to 55HRC) | | Stainless Steel | | Heat Resistive Steel, Titanium Alloy | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) |
| 1,0 | 22.000 | 360 | 22.000 | 360 | 22.000 | 360 | 19.000 | 220 | 13.000 | 140 | 9.500 | 90 | 11.300 | 90 | 9.500 | 65 |
| 2,0 | 11.500 | 440 | 11.500 | 440 | 11.500 | 440 | 11.000 | 290 | 7.500 | 180 | 5.400 | 110 | 6.500 | 120 | 5.400 | 85 |
| 4,0 | 6.000 | 560 | 6.000 | 560 | 6.000 | 560 | 5.800 | 370 | 4.000 | 230 | 2.900 | 150 | 3.400 | 160 | 2.900 | 100 |
| 6,0 | 4.200 | 600 | 4.200 | 600 | 4.200 | 600 | 4.000 | 400 | 2.700 | 240 | 2.000 | 160 | 2.400 | 170 | 2.000 | 120 |
| 8,0 | 3.000 | 600 | 3.000 | 600 | 3.000 | 600 | 2.800 | 400 | 2.000 | 240 | 1.450 | 160 | 1.800 | 170 | 1.450 | 120 |
| 10,0 | 2.500 | 600 | 2.500 | 600 | 2.500 | 600 | 2.350 | 400 | 1.600 | 240 | 1.200 | 160 | 1.450 | 170 | 1.200 | 120 |
| 12,0 | 2.100 | 600 | 2.100 | 600 | 2.100 | 600 | 2.000 | 400 | 1.350 | 240 | 1.000 | 160 | 1.200 | 170 | 1.000 | 120 |
| 16,0 | 1.500 | 500 | 1.500 | 500 | 1.500 | 500 | 1.450 | 320 | 1.000 | 210 | 750 | 130 | 900 | 140 | 750 | 90 |
| 20,0 | 1.200 | 460 | 1.200 | 460 | 1.200 | 460 | 1.150 | 290 | 800 | 200 | 600 | 110 | 700 | 120 | 600 | 75 |
| Groove finishing $d_{oc}$ | 1,5 D | | | | | | | | | | | | | | | |
| Groove finishing $w_{oc}$ | ~ 0,02 D | | | | | | | | | | | | | | | |

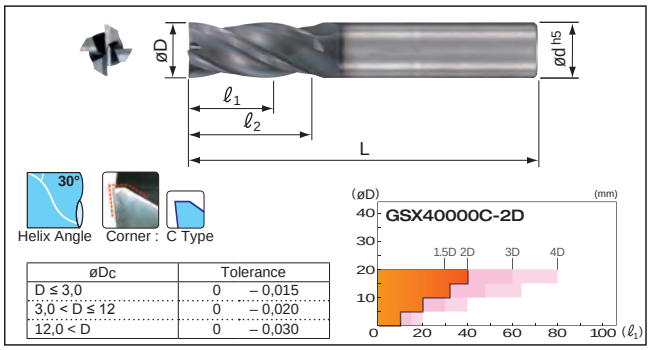
# GSX MILL Endmills

New

# GSX 40000C-2D Type

Coated Carbide Grades | GSX Coating

| Structural Steel | Carbon Steel | Alloy Steel | Pre-hardened Steel | Tempered Die Steel | Hardened Steel 45~55 HRC | Hardened Steel 55~60 HRC | Hardened Steel 60~65 HRC | Stainless Steel | Ti Alloy / Heat Resistant Alloy | Cast iron | Al Alloy | Cu Alloy | Graphite |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ○ | ◎ | ◎ | ◎ | ◎ | ◎ | ○ | | ◎ | ○ | ○ | | | |




| øDc | Tolerance |
|---|---|
| D ≤ 3,0 | 0 – 0,015 |
| 3,0 < D ≤ 12 | 0 – 0,020 |
| 12,0 < D | 0 – 0,030 |

Grade: ACF20

## ■ Endmills

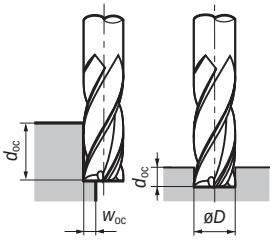
(mm)

| Cat. No. | Stock | øD | $\ell_1$ | $\ell_2$ | L | ød |
|---|---|---|---|---|---|---|
| GSX 40100C-2D | ● | 1,0 | 2,0 | 3,0 | 40 | 4 |
| GSX 40150C-2D | ● | 1,5 | 3,0 | 4,0 | 40 | 4 |
| GSX 40200C-2D | ● | 2,0 | 4,0 | 5,0 | 40 | 4 |
| GSX 40250C-2D | ● | 2,5 | 5,0 | 6,0 | 40 | 4 |
| GSX 40300C-2D | ● | 3,0 | 6,0 | 7,5 | 45 | 6 |
| GSX 40350C-2D | ● | 3,5 | 7,0 | 8,5 | 45 | 6 |
| GSX 40400C-2D | ● | 4,0 | 8,0 | 9,5 | 45 | 6 |
| GSX 40450C-2D | ● | 4,5 | 9,0 | 10,5 | 50 | 6 |
| GSX 40500C-2D | ● | 5,0 | 10,0 | 12,0 | 50 | 6 |
| GSX 40550C-2D | ● | 5,5 | 11,0 | 13,0 | 50 | 6 |
| GSX 40600C-2D | ● | 6,0 | 12,0 | – | 50 | 6 |
| GSX 40700C-2D | ● | 7,0 | 14,0 | 16,0 | 60 | 8 |
| GSX 40800C-2D | ● | 8,0 | 16,0 | – | 60 | 8 |
| GSX 40900C-2D | ● | 9,0 | 18,0 | 20,0 | 70 | 10 |
| GSX 41000C-2D | ● | 10,0 | 20,0 | – | 70 | 10 |
| GSX 41200C-2D | ● | 12,0 | 24,0 | – | 75 | 12 |
| GSX 41400C-2D | | 14,0 | 28,0 | 31,5 | 90 | 16 |
| GSX 41500C-2D | | 15,0 | 30,0 | 33,5 | 90 | 16 |
| GSX 41600C-2D | ● | 16,0 | 32,0 | – | 90 | 16 |
| GSX 42000C-2D | ● | 20,0 | 40,0 | – | 100 | 20 |

● = Euro stock

## ■ Recommended Cutting Conditions

1. For stable machining performance use rigid, high-precision machines and holders.
2. Use air blowing when dry machining.
3. Use wet machining for stainless steel, heat resistant alloy, and titanium alloy applications.
4. If chattering is a problem, reduce the spindle speed and feed rate indicated in the table below by the same ratio, or reduce the depth of cut.
5. If the machine cannot achieve the recommended spindle speed, please use the max. spindle speed available.




## ● Shoulder Milling

| Work Material / Cond. / øD (mm) | Structural Steel | | Carbon Steel (150 to 250HB) | | Cast Iron | | Alloy Steel (25 to 35HRC) | | Tempered Steel, Hardened Steel (35 to 45HRC) | | Hardened Steel (45 to 55HRC) | | Stainless Steel | | Heat Resistive Steel, Titanium Alloy | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) |
| 1,0 | 24.000 | 470 | 24.000 | 470 | 24.000 | 470 | 21.000 | 290 | 14.500 | 180 | 10.500 | 120 | 12.600 | 120 | 10.500 | 85 |
| 2,0 | 12.800 | 570 | 12.800 | 570 | 12.800 | 570 | 12.000 | 380 | 8.300 | 230 | 6.000 | 150 | 7.200 | 160 | 6.000 | 110 |
| 4,0 | 6.800 | 730 | 6.800 | 730 | 6.800 | 730 | 6.400 | 490 | 4.400 | 300 | 3.200 | 200 | 3.800 | 210 | 3.200 | 130 |
| 6,0 | 4.600 | 780 | 4.600 | 780 | 4.600 | 780 | 4.300 | 520 | 3.000 | 320 | 2.200 | 210 | 2.650 | 220 | 2.200 | 150 |
| 8,0 | 3.400 | 780 | 3.400 | 780 | 3.400 | 780 | 3.200 | 520 | 2.200 | 320 | 1.600 | 210 | 2.000 | 220 | 1.600 | 150 |
| 10,0 | 2.800 | 780 | 2.800 | 780 | 2.800 | 780 | 2.600 | 520 | 1.800 | 320 | 1.300 | 210 | 1.500 | 220 | 1.300 | 150 |
| 12,0 | 2.300 | 780 | 2.300 | 780 | 2.300 | 780 | 2.200 | 520 | 1.500 | 320 | 1.100 | 210 | 1.300 | 220 | 1.100 | 150 |
| 16,0 | 1.700 | 650 | 1.700 | 650 | 1.700 | 650 | 1.600 | 420 | 1.100 | 280 | 800 | 170 | 1.000 | 180 | 800 | 120 |
| 20,0 | 1.350 | 600 | 1.350 | 600 | 1.350 | 600 | 1.300 | 380 | 900 | 260 | 650 | 150 | 800 | 160 | 650 | 100 |
| Shoulder cutting $d_{oc}$ | 1,5 *D* | | | | | | | | | | 1,0 *D* | | | | | |
| Shoulder cutting $w_{oc}$ | 0,05 *D* | | | | | | | | | | 0,02 *D* | | | | | |

## ● Shoulder Milling (High Speed Machining Centre)

| Work Material / Cond. / øD (mm) | Structural Steel | | Carbon Steel (150 to 250HB) | | Cast Iron | | Alloy Steel (25 to 35HRC) | | Tempered Steel, Hardened Steel (35 to 45HRC) | | Hardened Steel (45 to 55HRC) | | Stainless Steel | | Heat Resistive Steel, Titanium Alloy | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) |
| 1,0 | 60.000 | 1.200 | 60.000 | 1.200 | 60.000 | 1.200 | 60.000 | 850 | 60.000 | 720 | 48.000 | 500 | 32.000 | 300 | – | – |
| 2,0 | 47.800 | 2.200 | 47.800 | 2.200 | 47.800 | 2.200 | 47.800 | 1.600 | 39.800 | 1.200 | 31.800 | 900 | 15.900 | 400 | – | – |
| 4,0 | 23.900 | 2.600 | 23.900 | 2.600 | 23.900 | 2.600 | 23.900 | 1.900 | 19.900 | 1.400 | 15.900 | 1.100 | 8.000 | 490 | – | – |
| 6,0 | 16.000 | 2.700 | 16.000 | 2.700 | 16.000 | 2.700 | 16.000 | 2.000 | 13.300 | 1.500 | 10.600 | 1.200 | 5.300 | 520 | – | – |
| 8,0 | 12.000 | 2.700 | 12.000 | 2.700 | 12.000 | 2.700 | 12.000 | 2.000 | 10.000 | 1.500 | 8.000 | 1.200 | 4.000 | 520 | – | – |
| 10,0 | 9.600 | 2.700 | 9.600 | 2.700 | 9.600 | 2.700 | 9.600 | 2.000 | 8.000 | 1.500 | 6.400 | 1.200 | 3.200 | 520 | – | – |
| 12,0 | 8.000 | 2.700 | 8.000 | 2.700 | 8.000 | 2.700 | 8.000 | 2.000 | 6.700 | 1.500 | 5.300 | 1.200 | 2.700 | 520 | – | – |
| 16,0 | 6.000 | 2.200 | 6.000 | 2.200 | 6.000 | 2.200 | 6.000 | 1.600 | 5.000 | 1.200 | 4.000 | 900 | 2.000 | 450 | – | – |
| 20,0 | 4.800 | 2.000 | 4.800 | 2.000 | 4.800 | 2.000 | 4.800 | 1.400 | 4.000 | 1.100 | 3.200 | 750 | 1.600 | 380 | – | – |
| Shoulder cutting $d_{oc}$ | 1,5 *D* | | | | | | | | | | 1,0 *D* | | | | | |
| Shoulder cutting $w_{oc}$ | 0,05 *D* | | | | | | | | | | 0,02 *D* | | | | | |

## ● Grooving

| Work Material / Cond. / øD (mm) | Structural Steel | | Carbon Steel (150 to 250HB) | | Cast Iron | | Alloy Steel (25 to 35HRC) | | Tempered Steel, Hardened Steel (35 to 45HRC) | | Hardened Steel (45 to 55HRC) | | Stainless Steel | | Heat Resistive Steel, Titanium Alloy | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) |
| 1,0 | 24.000 | 380 | 24.000 | 470 | 24.000 | 470 | 21.000 | 290 | 14.500 | 180 | 10.500 | 120 | 12.600 | 85 | 5.200 | 30 |
| 2,0 | 12.800 | 460 | 12.800 | 570 | 12.800 | 570 | 12.000 | 380 | 8.300 | 230 | 6.000 | 150 | 7.200 | 110 | 3.000 | 40 |
| 4,0 | 6.800 | 580 | 6.800 | 730 | 6.800 | 730 | 5.400 | 490 | 4.400 | 300 | 3.200 | 200 | 3.800 | 130 | 1.600 | 55 |
| 6,0 | 4.600 | 620 | 4.600 | 780 | 4.600 | 780 | 4.300 | 520 | 3.000 | 320 | 2.200 | 210 | 2.650 | 160 | 1.100 | 65 |
| 8,0 | 3.400 | 620 | 3.400 | 780 | 3.400 | 780 | 3.200 | 520 | 2.200 | 320 | 1.600 | 210 | 2.000 | 160 | 800 | 65 |
| 10,0 | 2.800 | 620 | 2.800 | 780 | 2.800 | 780 | 2.600 | 520 | 1.800 | 320 | 1.300 | 210 | 1.600 | 160 | 650 | 65 |
| 12,0 | 2.300 | 620 | 2.300 | 780 | 2.300 | 780 | 2.200 | 520 | 1.500 | 320 | 1.100 | 210 | 1.300 | 160 | 550 | 65 |
| 16,0 | 1.700 | 520 | 1.700 | 560 | 1.700 | 560 | 1.600 | 420 | 1.100 | 280 | 800 | 170 | 1.000 | 130 | 400 | 55 |
| 20,0 | 1.350 | 480 | 1.350 | 600 | 1.350 | 600 | 1.300 | 380 | 900 | 260 | 650 | 150 | 800 | 110 | 320 | 50 |
| Grooving $d_{oc}$ | 0,2 *D* | | 0,5 *D* | | | | | | 0,2 *D* | | 0,05 *D* | | 0,2 *D* | | | |

New

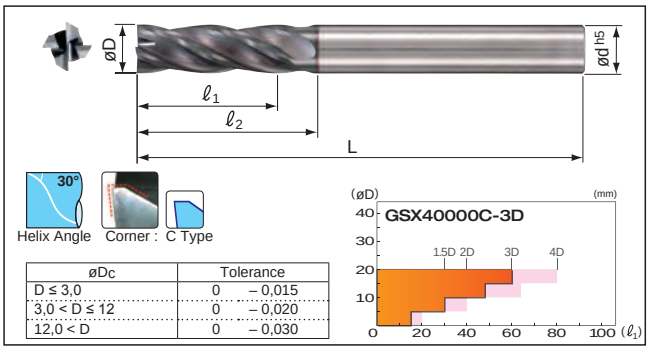


# GSX 40000C-3D Type

Coated Carbide — Grades

GSX — Coating

| Structural Steel | Carbon Steel | Alloy Steel | Pre-hardened Steel | Tempered Die Steel | Hardened Steel 45~55 HRC | Hardened Steel 55~60 HRC | Hardened Steel 60~65 HRC | Stainless Steel | Ti Alloy / Heat Resistant Alloy | Cast iron | Al Alloy | Cu Alloy | Graphite |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ○ | ◎ | ◎ | ◎ | ◎ | ◎ | ○ | | ◎ | ○ | ○ | | | |




| øDc | Tolerance |
|---|---|
| D ≤ 3,0 | 0 – 0,015 |
| 3,0 < D ≤ 12 | 0 – 0,020 |
| 12,0 < D | 0 – 0,030 |

Grade: ACF20

## ■ Endmills

(mm)

| Cat. No. | Stock | øD | $\ell_1$ | $\ell_2$ | L | ød |
|---|---|---|---|---|---|---|
| **GSX 40100C-3D** | ● | 1,0 | 3,0 | 4,0 | 40 | 4 |
| **GSX 40150C-3D** | ● | 1,5 | 4,5 | 5,5 | 40 | 4 |
| **GSX 40200C-3D** | ● | 2,0 | 6,0 | 7,0 | 40 | 4 |
| **GSX 40250C-3D** | ● | 2,5 | 7,5 | 8,5 | 40 | 4 |
| **GSX 40300C-3D** | ● | 3,0 | 9,0 | 10,5 | 50 | 6 |
| **GSX 40400C-3D** | ● | 4,0 | 12,0 | 13,5 | 50 | 6 |
| **GSX 40500C-3D** | ● | 5,0 | 15,0 | 17,0 | 50 | 6 |
| **GSX 40600C-3D** | ● | 6,0 | 18,0 | – | 50 | 6 |
| **GSX 40800C-3D** | ● | 8,0 | 24,0 | – | 70 | 8 |
| **GSX 41000C-3D** | ● | 10,0 | 30,0 | – | 90 | 10 |
| **GSX 41200C-3D** | ● | 12,0 | 36,0 | – | 90 | 12 |
| **GSX 41600C-3D** | ● | 16,0 | 48,0 | – | 110 | 16 |
| **GSX 42000C-3D** | | 20,0 | 60,0 | – | 120 | 20 |

● = Euro stock

## ■ Endmill Identification (GSX MILL Series)

**GSX 4 0100 C - 2D/3D**

① Series Code — GSX

② No. of Teeth — 4

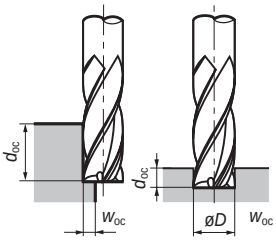
③ Diameter — 0100

④ Cutting Edge — C (S: Sharp Edge, C: Gash Land Drilling)

⑤ Cutting Edge Length — 2D/3D

## ■ Recommended cutting conditions

1. For stable machining performance use rigid, high-precision machines and holders.
2. Use air blowing when dry machining.
3. Use wet machining for stainless steel, heat resistant alloy, and titanium alloy applications.
4. In rear cases, chattering may occur in early milling stages, dissipating after 2m of cutting.
5. If chattering is a problem, reduce the spindle speed and feed rate indicated in the table below by the same ratio, or reduce the depth of cut.
6. If the machine cannot achieve the recommended spindle speed, please use the max. spindle speed available.




### ●Shoulder Milling

| Work Material / Cond. | Structural Steel | | Carbon Steel (150 to 250HB) | | Cast Iron | | Alloy Steel (25 to 35HRC) | | Tempered Steel, Hardened Steel (35 to 45HRC) | | Hardened Steel (45 to 55HRC) | | Stainless Steel | | Heat Resistive Steel, Titanium Alloy | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| øD (mm) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) |
| 1,0 | 21.000 | 360 | 21.000 | 360 | 21.000 | 360 | 19.000 | 220 | 13.000 | 140 | 9.000 | 90 | 10.500 | 90 | 9.000 | 65 |
| 2,0 | 10.500 | 360 | 10.500 | 360 | 10.500 | 360 | 9.600 | 290 | 7.500 | 180 | 4.500 | 110 | 5.200 | 120 | 4.500 | 85 |
| 4,0 | 5.200 | 500 | 5.200 | 500 | 5.200 | 500 | 4.800 | 370 | 4.000 | 280 | 2.250 | 150 | 2.600 | 160 | 2.250 | 100 |
| 6,0 | 3.500 | 560 | 3.500 | 560 | 3.500 | 560 | 3.200 | 400 | 2.700 | 300 | 1.500 | 160 | 1.700 | 170 | 1.500 | 120 |
| 8,0 | 2.600 | 520 | 2.600 | 520 | 2.600 | 520 | 2.400 | 400 | 2.000 | 300 | 1.100 | 160 | 1.300 | 170 | 1.100 | 120 |
| 10,0 | 2.100 | 500 | 2.100 | 500 | 2.100 | 500 | 1.900 | 400 | 1.600 | 300 | 900 | 160 | 1.000 | 160 | 900 | 120 |
| 12,0 | 1.750 | 500 | 1.750 | 500 | 1.750 | 500 | 1.600 | 400 | 1.350 | 300 | 750 | 150 | 850 | 160 | 750 | 120 |
| 16,0 | 1.300 | 420 | 1.300 | 420 | 1.300 | 420 | 1.200 | 330 | 1.000 | 260 | 550 | 120 | 650 | 140 | 550 | 100 |
| 20,0 | 1.050 | 380 | 1.050 | 380 | 1.050 | 380 | 950 | 290 | 800 | 230 | 450 | 110 | 500 | 120 | 450 | 90 |
| Shoulder cutting $d_{oc}$ | 2,5 *D* | | | | | | | | | | 2,0 *D* | | | | | |
| Shoulder cutting $w_{oc}$ | øD< 3: 0,05 *D* , 3 ≤ øD< 8: 0,1 *D* , 8 ≤ øD: 0,15 *D* | | | | | | | | 0,02 *D* | | | | | | | |

### ●Grooving

| Work Material / Cond. | Structural Steel | | Carbon Steel (150 to 250HB) | | Cast Iron | | Alloy Steel (25 to 35HRC) | | Tempered Steel, Hardened Steel (35 to 45HRC) | | Hardened Steel (45 to 55HRC) | | Stainless Steel | | Heat Resistive Steel, Titanium Alloy | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| øD (mm) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) |
| 1,0 | 16.600 | 140 | 16.600 | 140 | 16.600 | 140 | 15.500 | 100 | 10.500 | 100 | 7.500 | 70 | 9.400 | 60 | 3.750 | 20 |
| 2,0 | 9.500 | 160 | 9.500 | 160 | 9.500 | 160 | 9.000 | 180 | 6.200 | 120 | 4.500 | 90 | 5.200 | 80 | 2.250 | 30 |
| 4,0 | 5.200 | 160 | 5.200 | 180 | 5.200 | 180 | 4.800 | 160 | 3.400 | 110 | 2.200 | 65 | 2.600 | 70 | 1.250 | 25 |
| 6,0 | 3.500 | 160 | 3.500 | 200 | 3.500 | 200 | 3.200 | 160 | 2.550 | 120 | 1.500 | 65 | 1.700 | 70 | 950 | 25 |
| 8,0 | 2.600 | 160 | 2.600 | 200 | 2.600 | 200 | 2.400 | 160 | 1.900 | 120 | 1.100 | 65 | 1.300 | 70 | 700 | 25 |
| 10,0 | 2.100 | 160 | 2.100 | 200 | 2.100 | 200 | 1.900 | 160 | 1.500 | 120 | 900 | 65 | 1.000 | 70 | 550 | 25 |
| 12,0 | 1.750 | 160 | 1.750 | 200 | 1.750 | 200 | 1.600 | 160 | 1.250 | 120 | 750 | 65 | 850 | 70 | 450 | 25 |
| 16,0 | 1.300 | 160 | 1.300 | 200 | 1.300 | 200 | 1.200 | 160 | 950 | 120 | 550 | 65 | 650 | 70 | 350 | 25 |
| 20,0 | 1.050 | 160 | 1.050 | 200 | 1.050 | 200 | 950 | 160 | 750 | 120 | 450 | 65 | 500 | 70 | 280 | 25 |
| Grooving $d_{oc}$ | 0,1 *D* | | 0,2 *D* | | | | | | | | 0,05 *D* | | 0,1 *D* | | | |

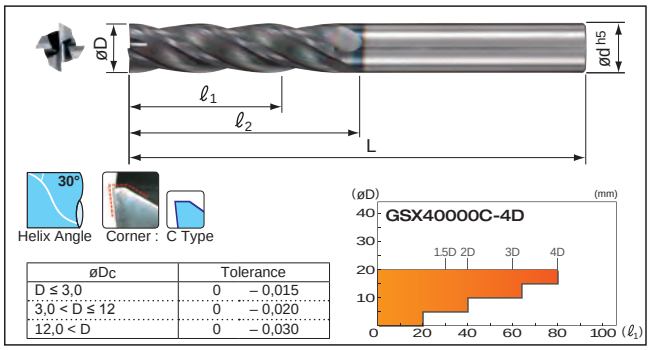
# GSX MILL Endmills

New

# GSX 40000C-4D Type

Coated Carbide Grades | GSX Coating

| Structural Steel | Carbon Steel | Alloy Steel | Pre-hardened Steel | Tempered Die Steel | Hardened Steel 45~55 HRC | Hardened Steel 55~60 HRC | Hardened Steel 60~65 HRC | Stainless Steel | Ti Alloy / Heat Resistant Alloy | Cast iron | Al Alloy | Cu Alloy | Graphite |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ○ | ◎ | ◎ | ◎ | ◎ | ◎ | ○ | | ◎ | ○ | ○ | | | |




| øDc | Tolerance |
|---|---|
| D ≤ 3,0 | 0 – 0,015 |
| 3,0 < D ≤ 12 | 0 – 0,020 |
| 12,0 < D | 0 – 0,030 |

Grade: ACF20

## ■ Endmills

(mm)

| Cat. No. | Stock | øD | $\ell_1$ | $\ell_2$ | L | ød |
|---|---|---|---|---|---|---|
| **GSX 40100C-4D** | ● | 1,0 | 4,0 | 5,0 | 40 | 4 |
| **GSX 40150C-4D** | ● | 1,5 | 6,0 | 7,0 | 40 | 4 |
| **GSX 40200C-4D** | ● | 2,0 | 8,0 | 9,0 | 40 | 4 |
| **GSX 40250C-4D** | ● | 2,5 | 10,0 | 11,0 | 50 | 4 |
| **GSX 40300C-4D** | ● | 3,0 | 12,0 | 13,5 | 50 | 6 |
| **GSX 40400C-4D** | ● | 4,0 | 16,0 | 17,5 | 50 | 6 |
| **GSX 40500C-4D** | ● | 5,0 | 20,0 | 22,0 | 60 | 6 |
| **GSX 40600C-4D** | ● | 6,0 | 24,0 | – | 60 | 6 |
| **GSX 40800C-4D** | ● | 8,0 | 32,0 | – | 80 | 8 |
| **GSX 41000C-4D** | ● | 10,0 | 40,0 | – | 90 | 10 |
| **GSX 41200C-4D** | ● | 12,0 | 48,0 | – | 100 | 12 |
| **GSX 41600C-4D** | ● | 16,0 | 64,0 | – | 120 | 16 |
| **GSX 42000C-4D** | | 20,0 | 80,0 | – | 140 | 20 |

● = Euro stock

## ■ Endmill Identification (GSX MILL Series)

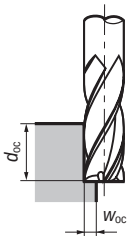
**GSX 4 0100 C - 4D**

| ① | ② | ③ | ④ | ⑤ |
|---|---|---|---|---|
| Series Code | No. of Teeth | Diameter | Cutting Edge | Cutting Edge Length |

④ Cutting Edge: S: Sharp Edge, C: Gash Land Drilling

## ■ Recommended Cutting Conditions

1. For stable machining performance use rigid, high-precision machines and holders.
2. Use air blowing when dry machining.
3. Use wet machining for stainless steel, heat resistant alloy, and titanium alloy applications.
4. In rear cases, chattering may occur in early milling stages, dissipating after 2m of cutting.
5. If chattering is a problem, reduce the spindle speed and feed rate indicated in the table below by the same ratio, or reduce the depth of cut.
6. This series is not recommended for grooving.
7. If the machine cannot achieve the recommended spindle speed, please use the max. spindle speed available.




## ● Shoulder Milling

| Work Material / Cond. | Structural Steel | | Carbon Steel (150 to 250HB) | | Cast Iron | | Alloy Steel (25 to 35HRC) | | Tempered Steel, Hardened Steel (35 to 45HRC) | | Hardened Steel (45 to 55HRC) | | Stainless Steel | | Heat Resistive Steel, Titanium Alloy | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| øD (mm) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) |
| 1,0 | 9.000 | 140 | 9.000 | 140 | 9.000 | 140 | 7.000 | 80 | 6.500 | 60 | 4.500 | 40 | 5.400 | 40 | 4.500 | 40 |
| 2,0 | 4.500 | 140 | 4.500 | 140 | 4.500 | 140 | 3.500 | 100 | 3.200 | 80 | 2.300 | 55 | 2.700 | 55 | 2.300 | 40 |
| 4,0 | 2.250 | 200 | 2.250 | 200 | 2.250 | 200 | 1.750 | 120 | 1.600 | 100 | 1.200 | 60 | 1.350 | 50 | 1.200 | 35 |
| 6,0 | 1.500 | 250 | 1.500 | 250 | 1.500 | 250 | 1.150 | 160 | 1.050 | 140 | 800 | 65 | 900 | 45 | 800 | 35 |
| 8,0 | 1.100 | 220 | 1.100 | 220 | 1.100 | 220 | 850 | 160 | 800 | 130 | 600 | 65 | 660 | 45 | 600 | 35 |
| 10,0 | 900 | 210 | 900 | 210 | 900 | 210 | 700 | 140 | 650 | 120 | 460 | 65 | 540 | 45 | 460 | 35 |
| 12,0 | 750 | 200 | 750 | 200 | 750 | 200 | 580 | 140 | 520 | 110 | 400 | 65 | 450 | 45 | 400 | 35 |
| 16,0 | 550 | 170 | 550 | 170 | 550 | 170 | 440 | 120 | 400 | 95 | 300 | 55 | 330 | 45 | 300 | 35 |
| 20,0 | 450 | 150 | 450 | 150 | 450 | 150 | 350 | 100 | 320 | 80 | 240 | 50 | 270 | 45 | 240 | 35 |
| Shoulder cutting $d_{oc}$ | 3,5 *D* | | | | | | | | | | 3,0 *D* | | | | | |
| Shoulder cutting $w_{oc}$ | øD< 3: 0,04 *D* , 3 ≤ øD< 8: 0,08 *D* , 8 ≤ øD: 0,1 *D* | | | | | | | | | | 0,02 *D* | | | | | |

# GSXVL 4000-2.5D Type



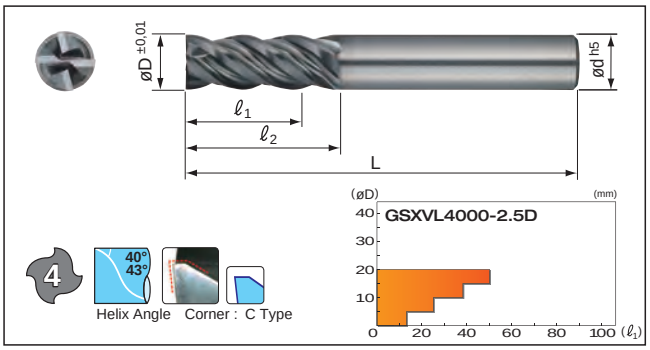
New

## SAFE-LOCK™ Applicable Endmills (4 Flutes)

Coated Carbide — Grades

GSX — Coating

| Structual Steel | Carbon Steel | Alloy Steel | Pre-hardened Steel | Tempered Die Steel | Hardened Steel 45~55 HRC | Hardened Steel 55~60 HRC | Hardened Steel 60~65 HRC | Stainless Steel | Ti Alloy / Heat Resistant Alloy | Cast iron | Al Alloy | Cu Alloy | Graphite |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ○ | ◎ | ◎ | ◎ | ◎ | ◎ | ○ | | ◎ | ○ | ○ | | | |




Grade: ACF20

## ■ Endmills

(mm)

| Cat. No. | Stock | øD | ℓ1 | ℓ2 | L | ød |
|---|---|---|---|---|---|---|
| GSXVL 4020-2.5D | ● | 2,0 | 5 | 6,5 | 50 | 4 |
| GSXVL 4030-2.5D | ● | 3,0 | 8 | 9,5 | 50 | 6 |
| GSXVL 4040-2.5D | ● | 4,0 | 10 | 11,5 | 50 | 6 |
| GSXVL 4050-2.5D | ● | 5,0 | 13 | 14,5 | 60 | 6 |
| GSXVL 4060-2.5D | ● | 6,0 | 15 | – | 60 | 6 |
| GSXVL 4070-2.5D | ● | 7,0 | 18 | 20,0 | 70 | 8 |
| GSXVL 4080-2.5D | ● | 8,0 | 20 | – | 80 | 8 |
| GSXVL 4090-2.5D | ● | 9,0 | 23 | 25,0 | 90 | 10 |
| GSXVL 4100-2.5D | ● | 10,0 | 25 | – | 90 | 10 |
| GSXVL 4110-2.5D | ● | 11,0 | 28 | 30,5 | 90 | 12 |
| GSXVL 4120-2.5D | ● | 12,0 | 30 | – | 90 | 12 |
| GSXVL 4140-2.5D | ● | 14,0 | 35 | 37,5 | 110 | 16 |
| GSXVL 4150-2.5D | ● | 15,0 | 38 | 41,0 | 110 | 16 |
| GSXVL 4160-2.5D | ● | 16,0 | 40 | – | 115 | 16 |
| GSXVL 4180-2.5D | ● | 18,0 | 45 | 48,0 | 120 | 20 |
| GSXVL 4200-2.5D | ● | 20,0 | 50 | – | 125 | 20 |
| GSXVL 4250-2.5D | ❍ | 25,0 | 63 | – | 140 | 25 |

## SAFE-λOCK™ Applicable Endmills





## ■ Endmills

(mm)

| Cat. No. | Stock | øD | ℓ1 | ℓ2 | L | ød |
|---|---|---|---|---|---|---|
| GSXVL 4120S-2.5D | ● | 12,0 | 30 | – | 90 | 12 |
| GSXVL 4140S-2.5D | ● | 14,0 | 35 | 37,5 | 110 | 16 |
| GSXVL 4150S-2.5D | ● | 15,0 | 38 | 41,0 | 110 | 16 |
| GSXVL 4160S-2.5D | ● | 16,0 | 40 | – | 115 | 16 |
| GSXVL 4180S-2.5D | ● | 18,0 | 45 | 48,0 | 120 | 20 |
| GSXVL 4200S-2.5D | ● | 20,0 | 50 | – | 125 | 20 |
| GSXVL 4250S-2.5D | ❍ | 25,0 | 63 | – | 140 | 25 |

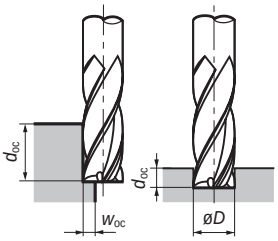
● = Euro stock
❍ = Delivery on request

## ■ Recommended Cutting Conditions

1. For stable machining performance use rigid, high-precision machines and holders.
2. Use air blowing when dry machining.
3. Use wet machining for stainless steel, heat resistant alloy, and titanium alloy applications.
4. If the machine cannot achieve the recommended spindle speed, please use the max. spindle speed available.

### ● Shoulder Milling

| Work Material / Cond. / øD (mm) | Carbon Steel, Cast Iron (150 to 250HB) Spindle Speed (rpm) | Feed Rate (mm/min) | Alloy Steel (25 to 35HRC) Spindle Speed (rpm) | Feed Rate (mm/min) | Tempered Steel, Hardened Steel (40 to 50HRC) Spindle Speed (rpm) | Feed Rate (mm/min) | Stainless Steel Spindle Speed (rpm) | Feed Rate (mm/min) | Heat Resistive Steel, Titanium Alloy (20 to 45HRC) Spindle Speed (rpm) | Feed Rate (mm/min) |
|---|---|---|---|---|---|---|---|---|---|---|
| 2,0 | 13.000 | 1.000 | 10.000 | 800 | 8.000 | 700 | 10.000 | 580 | 5.000 | 200 |
| 4,0 | 9.600 | 1.200 | 8.000 | 1.000 | 6.000 | 800 | 5.500 | 650 | 3.000 | 230 |
| 6,0 | 6.800 | 1.500 | 5.600 | 1.200 | 4.200 | 900 | 3.800 | 680 | 2.100 | 240 |
| 8,0 | 5.200 | 1.600 | 4.400 | 1.300 | 3.200 | 950 | 2.800 | 650 | 1.600 | 250 |
| 10,0 | 4.200 | 1.500 | 3.500 | 1.200 | 2.600 | 800 | 2.300 | 600 | 1.300 | 210 |
| 12,0 | 3.500 | 1.400 | 3.000 | 1.200 | 2.200 | 700 | 1.900 | 550 | 1.100 | 180 |
| 14,0 | 3.000 | 1.200 | 2.600 | 1.100 | 1.800 | 600 | 1.600 | 500 | 900 | 150 |
| 16,0 | 2.700 | 1.100 | 2.200 | 1.000 | 1.600 | 600 | 1.400 | 480 | 760 | 130 |
| 18,0 | 2.400 | 1.000 | 2.000 | 900 | 1.400 | 570 | 1.300 | 450 | 680 | 120 |
| 20,0 | 2.200 | 900 | 1.700 | 800 | 1.200 | 550 | 1.100 | 400 | 600 | 100 |
| 25,0 | 1.700 | 680 | 1.400 | 630 | 1.000 | 450 | 890 | 310 | 480 | 82 |
| Shoulder cutting $d_{oc}$ | 1,5 *D* | | | | | | | | | |
| Shoulder cutting $w_{oc}$ | 0,1 *D* | | | | 0,05 *D* | | 0,1 *D* | | 0,05 *D* | |




### ● Shoulder Milling

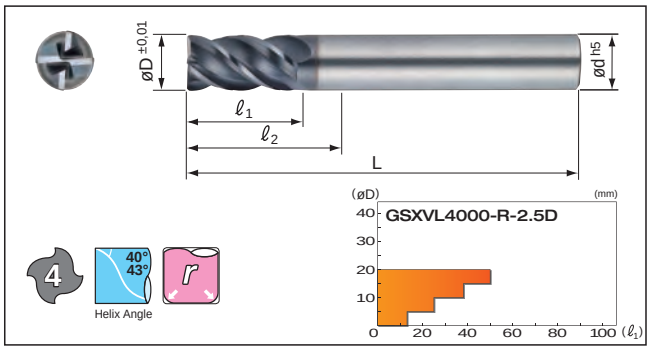
| Work Material / Cond. / øD (mm) | Carbon Steel, Cast Iron (150 to 250HB) Spindle Speed (rpm) | Feed Rate (mm/min) | Alloy Steel (25 to 35HRC) Spindle Speed (rpm) | Feed Rate (mm/min) | Tempered Steel, Hardened Steel (40 to 50HRC) Spindle Speed (rpm) | Feed Rate (mm/min) | Stainless Steel Spindle Speed (rpm) | Feed Rate (mm/min) | Heat Resistive Steel, Titanium Alloy (20 to 45HRC) Spindle Speed (rpm) | Feed Rate (mm/min) |
|---|---|---|---|---|---|---|---|---|---|---|
| 2,0 | 13.000 | 750 | 10.000 | 550 | 8.400 | 500 | 6.500 | 300 | 4.000 | 140 |
| 4,0 | 8.200 | 800 | 6.000 | 600 | 5.200 | 500 | 4.000 | 330 | 2.000 | 130 |
| 6,0 | 6.100 | 1.100 | 4.000 | 600 | 3.500 | 580 | 2.700 | 350 | 1.350 | 150 |
| 8,0 | 4.600 | 1.000 | 3.000 | 580 | 2.600 | 570 | 2.000 | 330 | 1.000 | 140 |
| 10,0 | 3.600 | 1.000 | 2.400 | 550 | 2.100 | 510 | 1.600 | 200 | 800 | 130 |
| 12,0 | 3.100 | 920 | 2.000 | 500 | 1.700 | 450 | 1.300 | 280 | 660 | 110 |
| 14,0 | 2.600 | 750 | 1.700 | 450 | 1.500 | 400 | 1.100 | 250 | 570 | 100 |
| 16,0 | 2.300 | 670 | 1.500 | 420 | 1.300 | 350 | 1.000 | 230 | 500 | 90 |
| 18,0 | 2.000 | 620 | 1.300 | 380 | 1.100 | 330 | 900 | 200 | 430 | 80 |
| 20,0 | 1.900 | 600 | 1.200 | 360 | 1.000 | 320 | 800 | 180 | 380 | 70 |
| 25,0 | 1.500 | 470 | 1.000 | 300 | 790 | 250 | 640 | 140 | 300 | 55 |
| Grooving $d_{oc}$ | 1,0 *D* | | | | 0,2 *D* | | 0,3 *D* | | 0,2 *D* | |

# Anti-Vibration MILL with R. Corner
# GSXVL 4000-R-2.5D Type

New

Coated Carbide Grades | GSX Coating

| Structal Steel | Carbon Steel | Alloy Steel | Pre-hardened Steel | Tempered Die Steel | Hardened Steel 45~55 HRC | Hardened Steel 55~60 HRC | Hardened Steel 60~65 HRC | Stainless Steel | Ti Alloy / Heat Resistant Alloy | Cast iron | Al Alloy | Cu Alloy | Graphite |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ○ | ◎ | ◎ | ◎ | ◎ | ◎ | ○ | | ◎ | ○ | ○ | | | |




## ■ Endmills

(mm)

| Cat. No. | Stock | øD | r | $\ell_1$ | $\ell_2$ | L | ød |
|---|---|---|---|---|---|---|---|
| GSXVL 4030-R02-2.5D | ○ | 3,0 | 0,2 | 8 | 9,5 | 50 | 6 |
| GSXVL 4030-R05-2.5D | ○ | 3,0 | 0,5 | 8 | 9,5 | 50 | 6 |
| GSXVL 4040-R02-2.5D | ○ | 4,0 | 0,2 | 10 | 11,5 | 50 | 6 |
| GSXVL 4040-R05-2.5D | ○ | 4,0 | 0,5 | 10 | 11,5 | 50 | 6 |
| GSXVL 4040-R10-2.5D | ○ | 4,0 | 1,0 | 10 | 11,5 | 50 | 6 |
| GSXVL 4050-R02-2.5D | ○ | 5,0 | 0,2 | 13 | 14,5 | 60 | 6 |
| GSXVL 4050-R05-2.5D | ○ | 5,0 | 0,5 | 13 | 14,5 | 60 | 6 |
| GSXVL 4050-R10-2.5D | ○ | 5,0 | 1,0 | 13 | 14,5 | 60 | 6 |
| GSXVL 4060-R03-2.5D | ○ | 6,0 | 0,3 | 15 | – | 60 | 6 |
| GSXVL 4060-R05-2.5D | ○ | 6,0 | 0,5 | 15 | – | 60 | 6 |
| GSXVL 4060-R10-2.5D | ○ | 6,0 | 1,0 | 15 | – | 60 | 6 |
| GSXVL 4060-R15-2.5D | ○ | 6,0 | 1,5 | 15 | – | 60 | 6 |
| GSXVL 4080-R03-2.5D | ○ | 8,0 | 0,3 | 20 | – | 80 | 8 |
| GSXVL 4080-R05-2.5D | ○ | 8,0 | 0,5 | 20 | – | 80 | 8 |
| GSXVL 4080-R10-2.5D | ○ | 8,0 | 1,0 | 20 | – | 80 | 8 |
| GSXVL 4080-R15-2.5D | ○ | 8,0 | 1,5 | 20 | – | 80 | 8 |
| GSXVL 4080-R20-2.5D | ○ | 8,0 | 2,0 | 20 | – | 80 | 8 |
| GSXVL 4100-R03-2.5D | ○ | 10,0 | 0,3 | 25 | – | 90 | 10 |
| GSXVL 4100-R05-2.5D | ○ | 10,0 | 0,5 | 25 | – | 90 | 10 |
| GSXVL 4100-R10-2.5D | ○ | 10,0 | 1,0 | 25 | – | 90 | 10 |
| GSXVL 4100-R15-2.5D | ○ | 10,0 | 1,5 | 25 | – | 90 | 10 |
| GSXVL 4100-R20-2.5D | ○ | 10,0 | 2,0 | 25 | – | 90 | 10 |
| GSXVL 4120-R05-2.5D | ○ | 12,0 | 0,5 | 30 | – | 90 | 12 |
| GSXVL 4120-R10-2.5D | ○ | 12,0 | 1,0 | 30 | – | 90 | 12 |
| GSXVL 4120-R15-2.5D | ○ | 12,0 | 1,5 | 30 | – | 90 | 12 |
| GSXVL 4120-R20-2.5D | ○ | 12,0 | 2,0 | 30 | – | 90 | 12 |
| GSXVL 4120-R30-2.5D | ○ | 12,0 | 3,0 | 30 | – | 90 | 12 |
| GSXVL 4160-R10-2.5D | ○ | 16,0 | 1,0 | 40 | – | 115 | 16 |
| GSXVL 4160-R15-2.5D | ○ | 16,0 | 1,5 | 40 | – | 115 | 16 |
| GSXVL 4160-R20-2.5D | ○ | 16,0 | 2,0 | 40 | – | 115 | 16 |
| GSXVL 4160-R30-2.5D | ○ | 16,0 | 3,0 | 40 | – | 115 | 16 |
| GSXVL 4200-R10-2.5D | ○ | 20,0 | 1,0 | 50 | – | 125 | 20 |
| GSXVL 4200-R15-2.5D | ○ | 20,0 | 1,5 | 50 | – | 125 | 20 |
| GSXVL 4200-R20-2.5D | ○ | 20,0 | 2,0 | 50 | – | 125 | 20 |
| GSXVL 4200-R30-2.5D | ○ | 20,0 | 3,0 | 50 | – | 125 | 20 |
| GSXVL 4250-R10-2.5D | ○ | 25,0 | 1,0 | 63 | – | 140 | 25 |
| GSXVL 4250-R15-2.5D | ○ | 25,0 | 1,5 | 63 | – | 140 | 25 |
| GSXVL 4250-R20-2.5D | ○ | 25,0 | 2,0 | 63 | – | 140 | 25 |
| GSXVL 4250-R30-2.5D | ○ | 25,0 | 3,0 | 63 | – | 140 | 25 |

Grade: ACF20

## ■ Endmills

SAFE-λOCK™

Applicable Endmills





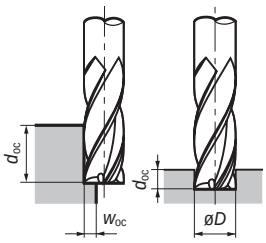
(mm)

| Cat. No. | Stock | øD | r | $\ell_1$ | $\ell_2$ | L | ød |
|---|---|---|---|---|---|---|---|
| GSXVL 4120S-R05-2.5D | ○ | 12,0 | 0,5 | 30 | – | 90 | 12 |
| GSXVL 4120S-R10-2.5D | ○ | 12,0 | 1,0 | 30 | – | 90 | 12 |
| GSXVL 4120S-R15-2.5D | ○ | 12,0 | 1,5 | 30 | – | 90 | 12 |
| GSXVL 4120S-R20-2.5D | ○ | 12,0 | 2,0 | 30 | – | 90 | 12 |
| GSXVL 4120S-R30-2.5D | ○ | 12,0 | 3,0 | 30 | – | 90 | 12 |
| GSXVL 4160S-R10-2.5D | ○ | 16,0 | 1,0 | 40 | – | 115 | 16 |
| GSXVL 4160S-R15-2.5D | ○ | 16,0 | 1,5 | 40 | – | 115 | 16 |
| GSXVL 4160S-R20-2.5D | ○ | 16,0 | 2,0 | 40 | – | 115 | 16 |
| GSXVL 4160S-R30-2.5D | ○ | 16,0 | 3,0 | 40 | – | 115 | 16 |
| GSXVL 4200S-R10-2.5D | ○ | 20,0 | 1,0 | 50 | – | 125 | 20 |
| GSXVL 4200S-R15-2.5D | ○ | 20,0 | 1,5 | 50 | – | 125 | 20 |
| GSXVL 4200S-R20-2.5D | ○ | 20,0 | 2,0 | 50 | – | 125 | 20 |
| GSXVL 4200S-R30-2.5D | ○ | 20,0 | 3,0 | 50 | – | 125 | 20 |
| GSXVL 4250S-R10-2.5D | ○ | 25,0 | 1,0 | 63 | – | 140 | 25 |
| GSXVL 4250S-R15-2.5D | ○ | 25,0 | 1,5 | 63 | – | 140 | 25 |
| GSXVL 4250S-R20-2.5D | ○ | 25,0 | 2,0 | 63 | – | 140 | 25 |
| GSXVL 4250S-R30-2.5D | ○ | 25,0 | 3,0 | 63 | – | 140 | 25 |

Grade: ACF20

## ■ Recommended Cutting Conditions

1. For stable machining performance use rigid, high-precision machines and holders.
2. Use air blowing when dry machining.
3. Use wet machining for stainless steel, heat resistant alloy, and titanium alloy applications.
4. If the machine cannot achieve the recommended spindle speed, please use the max. spindle speed available.




## ● Shoulder Milling and Grooving

| Work Material / Cond. / øD (mm) | Carbon Steel, Cast Iron (150 to 250HB) Spindle Speed (rpm) | Carbon Steel, Cast Iron (150 to 250HB) Feed Rate (mm/min) | Alloy Steel (25 to 35HRC) Spindle Speed (rpm) | Alloy Steel (25 to 35HRC) Feed Rate (mm/min) | Tempered Steel, Hardened Steel (40 to 50HRC) Spindle Speed (rpm) | Tempered Steel, Hardened Steel (40 to 50HRC) Feed Rate (mm/min) | Stainless Steel Spindle Speed (rpm) | Stainless Steel Feed Rate (mm/min) | Heat Resistive Steel, Titanium Alloy (20 to 45HRC) Spindle Speed (rpm) | Heat Resistive Steel, Titanium Alloy (20 to 45HRC) Feed Rate (mm/min) |
|---|---|---|---|---|---|---|---|---|---|---|
| 2,0 | 9.000 | 720 | 6.000 | 430 | 4.000 | 320 | 5.500 | 320 | 2.600 | 120 |
| 4,0 | 6.600 | 800 | 4.500 | 450 | 3.000 | 380 | 4.000 | 320 | 2.000 | 120 |
| 6,0 | 4.800 | 960 | 3.000 | 480 | 2.500 | 380 | 3.000 | 480 | 1.200 | 120 |
| 8,0 | 3.600 | 1.000 | 2.200 | 610 | 2.000 | 400 | 2.000 | 520 | 1.000 | 140 |
| 10,0 | 2.800 | 1.000 | 1.800 | 610 | 1.500 | 400 | 1.700 | 550 | 800 | 160 |
| 12,0 | 2.400 | 950 | 1.500 | 550 | 1.200 | 380 | 1.500 | 500 | 700 | 140 |
| 14,0 | 2.200 | 880 | 1.300 | 490 | 1.000 | 360 | 1.200 | 430 | 600 | 130 |
| 16,0 | 1.800 | 650 | 1.100 | 420 | 800 | 300 | 1.000 | 360 | 500 | 120 |
| 18,0 | 1.600 | 580 | 1.000 | 360 | 750 | 270 | 900 | 340 | 450 | 110 |
| 20,0 | 1.400 | 500 | 900 | 330 | 700 | 250 | 820 | 300 | 400 | 100 |
| Shoulder cutting $d_{oc}$ | 1,5 *D* | | | | | | | | | |
| Shoulder cutting $w_{oc}$ | 0,1 *D* | | | | 0,05 *D* | | 0,1 *D* | | 0,05 *D* | |
| Grooving $d_{oc}$ | 1,0 *D* | | | | 0,2 *D* | | 0,3 *D* | | 0,2 *D* | |

## ■ Corner Radius Selection

| øD | r0,2 | r0,3 | r0,5 | r1,0 | r1,5 | r2,0 | r3,0 |
|---|---|---|---|---|---|---|---|
| ø3 | ○ | | ○ | | | | |
| ø4 | ○ | | ○ | ○ | | | |
| ø5 | ○ | | ○ | ○ | | | |
| ø6 | | ○ | ○ | ○ | ○ | | |
| ø8 | | ○ | ○ | ○ | ○ | ○ | |
| ø10 | | ○ | ○ | ○ | ○ | ○ | |
| ø12 | | | ○ | ○ | ○ | ○ | ○ |
| ø16 | | | | ○ | ○ | ○ | ○ |
| ø20 | | | | ○ | ○ | ○ | ○ |
| ø25 | | | | ○ | ○ | ○ | ○ |

❍ = Delivery on request

# SSEH Series

New



☞ J 24, J 41

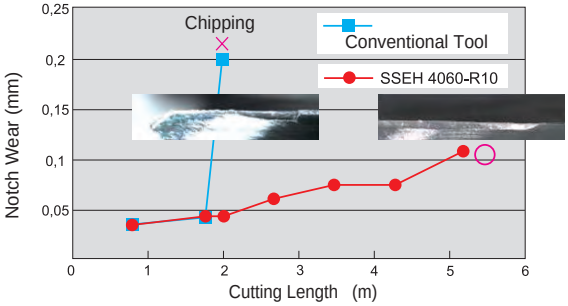
## SSEH Radius

### ■ Characteristics and Applications

- Steep helix (45° helix) improves sharpness.
- Combination of unique flute design and semi-mirrored surface improves chip evacuation and adhesion resistance.
- Ultra-smooth coating with improved hardness and heat resistance combined with tough carbide substrate improves tool life when working with heat resistant alloys.
- Unique, smooth radius shape mitigates cutting impact and improves fracture resistance.
- Both coated and uncoated types are available in stock to meet various conditions.

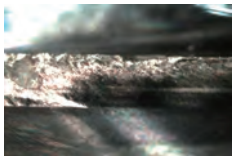
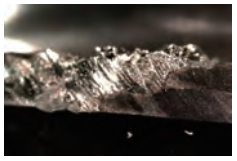
### ■ Application Examples

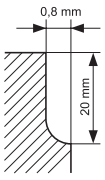
- Inconel 718 (Side Milling)




Tool Diameter: ø6×R1
Cutting Conditions: $v_c$ = 20 m/min, $f_t$ = 0,025 mm/t, $d_{oc}$ = 5 mm, $w_{oc}$ = 0,5 mm, wet

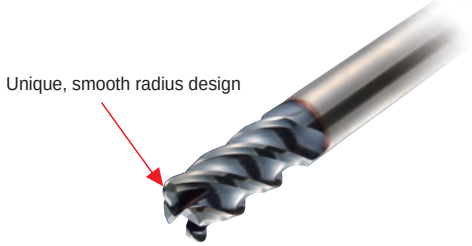
- Inconel 713 (Side Milling)

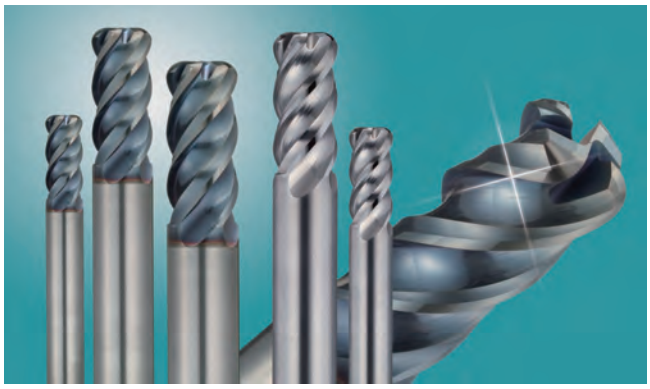
| SSEH 4100W-R10 | Competitor's Product |
|---|---|
|  |  |




Tool Diameter : ø10xR1
Cutting Conditions : $v_c$= 32 m/min, $f_t$ = 0,018 mm/t
$d_{oc}$ = 20 mm, $w_{oc}$ =0,8m, Dry

In Sumitomo Electric Hardmetal tests, the special coating with excellent adhesion resistance provided less cutting edge adhesion than the competitor's product and enabled fracturefree machining.
The competitor's product suffered from edge adhesion leading to breakage.



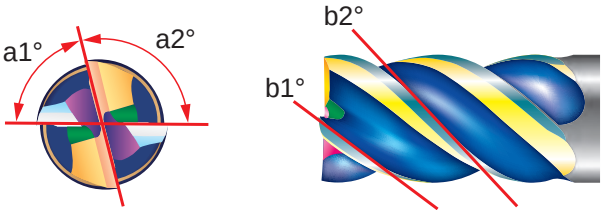
☞ J 23, J 41

## SSEH Radius Anti-vibration Type

### ■ Characteristics and Applications

- New anti-vibration type added to the SSEH type endmill for exotic alloys.
- Builds on the same features of existing endmills by adding an irregular lead for exceptionally good anti-vibration performance.
- Compatible with wide range of milling for exotic alloys including SUS, Inconel, and titanium.
- Reduces chattering for high-speed, high-feed cutting.
- Both coated and uncoated types are available in stock to meet various conditions.

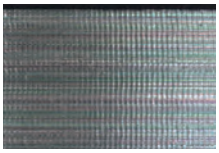
Irregular Pitch + Irregular Lead



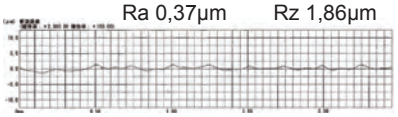

### ■ Application Examples

- Surface Roughness Comparison

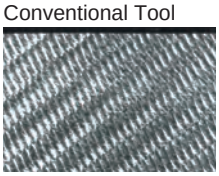
**SSEH** Anti-vibration Type



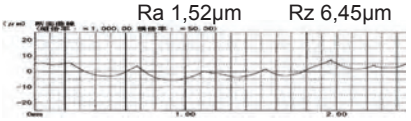
Good Surface Quality
Ra 0,37µm Rz 1,86µm



Conventional Tool



Surface shows chattering
Ra 1,52µm Rz 6,45µm



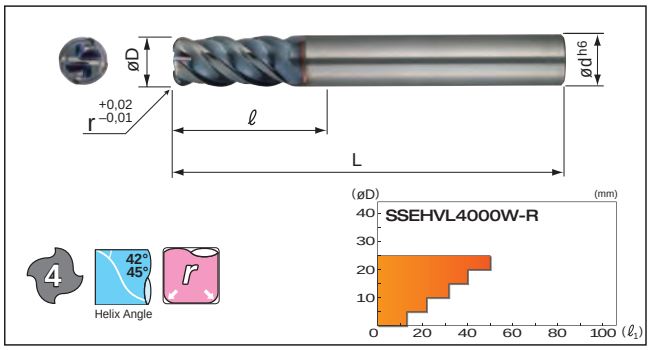
Work Material: X5CrNi1810 (Surface Milling)
Tool Diameter: ø12mm
Cutting Conditions: n = 1.300 rpm, $v_f$ = 300 mm/min
$d_{oc}$ = 18 mm, $w_{oc}$ = 1,2 mm
Equipment: BT50

# Anti-Vibration MILL with R. Corner
# SSEHVL 4000W-R Type

New

Coated Carbide Grades | GS HARD Coating

| Structual Steel | Carbon Steel | Alloy Steel | Pre-hardened Steel | Tempered Die Steel | Hardened Steel 45~55 HRC | Hardened Steel 55~60 HRC | Hardened Steel 60~65 HRC | Stainless Steel | Ti Alloy / Heat Resistant Alloy | Cast iron | Al Alloy | Cu Alloy | Graphite |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ○ | ○ | ○ | ○ | ○ | | | | ◎ | ◎ | | | | |




Grade: ACW52

## ■ Endmills

(mm)

| Cat. No. | Stock | øD | $\ell_1$ | $\ell_2$ | L | ød |
|---|---|---|---|---|---|---|
| **SSEHVL 4045W-R05** | ● | 4,5 | 0,5 | 12 | 50 | 6 |
| **SSEHVL 4045W-R10** | ● | 4,5 | 1,0 | 12 | 50 | 6 |
| **SSEHVL 4050W-R05** | ● | 5,0 | 0,5 | 13 | 60 | 6 |
| **SSEHVL 4050W-R10** | ● | 5,0 | 1,0 | 13 | 60 | 6 |
| **SSEHVL 4060W-R10** | ● | 6,0 | 1,0 | 13 | 60 | 6 |
| **SSEHVL 4080W-R10** | ● | 8,0 | 1,0 | 19 | 80 | 8 |
| **SSEHVL 4100W-R10** | ● | 10,0 | 1,0 | 22 | 90 | 10 |
| **SSEHVL 4100W-R30** | ● | 10,0 | 3,0 | 22 | 90 | 10 |
| **SSEHVL 4120W-R10** | ● | 12,0 | 1,0 | 26 | 90 | 12 |
| **SSEHVL 4120W-R30** | ● | 12,0 | 3,0 | 26 | 90 | 12 |
| **SSEHVL 4160W-R10** | ● | 16,0 | 1,0 | 32 | 115 | 16 |
| **SSEHVL 4160W-R30** | ● | 16,0 | 3,0 | 32 | 115 | 16 |
| **SSEHVL 4200W-R10** | ❍ | 20,0 | 1,0 | 40 | 125 | 20 |
| **SSEHVL 4200W-R30** | ❍ | 20,0 | 3,0 | 40 | 125 | 20 |
| **SSEHVL 4250W-R10** | ❍ | 25,0 | 1,0 | 50 | 140 | 25 |
| **SSEHVL 4250W-R30** | ❍ | 25,0 | 3,0 | 50 | 140 | 25 |

## ■ Diameter and Corner Radius Selection Range

| øD | r0,5 | r1,0 | r3,0 |
|---|---|---|---|
| ø 4,5 | ● | ● | |
| ø 5 | ● | ● | |
| ø 6 | | ● | |
| ø 8 | | ● | |
| ø 10 | | ● | ● |
| ø 12 | | ● | ● |
| ø 16 | | ● | ● |
| ø 20 | | ❍ | ❍ |
| ø 25 | | ❍ | ❍ |

## SAFE-λOCK™

Applicable Endmills





## ■ Endmills

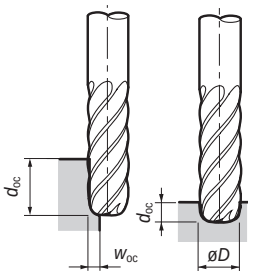
(mm)

| Cat. No. | Stock | øD | $\ell_1$ | $\ell_2$ | L | ød |
|---|---|---|---|---|---|---|
| **SSEHVL 4120WS-R10** | ● | 12,0 | 1,0 | 26 | 90 | 12 |
| **SSEHVL 4120WS-R30** | ● | 12,0 | 3,0 | 26 | 90 | 12 |
| **SSEHVL 4160WS-R10** | ● | 16,0 | 1,0 | 32 | 115 | 16 |
| **SSEHVL 4160WS-R30** | ● | 16,0 | 3,0 | 32 | 115 | 16 |
| **SSEHVL 4200WS-R10** | ❍ | 20,0 | 1,0 | 40 | 125 | 20 |
| **SSEHVL 4200WS-R30** | ❍ | 20,0 | 3,0 | 40 | 125 | 20 |
| **SSEHVL 4250WS-R10** | ❍ | 25,0 | 1,0 | 50 | 140 | 25 |
| **SSEHVL 4250WS-R30** | ❍ | 25,0 | 3,0 | 50 | 140 | 25 |

● = Euro stock
❍ = Delivery on request

## ■ Recommended cutting conditions

1. For stable machining, a more rigid machine is recommended.
2. Wet machining is recommended for stainless steel and heat resistant alloy applications.
3. If cutting noise and vibration are present, please change the cutting conditions accordingly.




### ● Shoulder Milling

| Work Material / Cond. | | Stainless Steel | | Titanium Alloy | | Heat Resistive Steel | |
|---|---|---|---|---|---|---|---|
| øD (mm) | | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) |
| 4,5 | | 3.500 | 350 | 3.500 | 280 | 2.100 | 170 |
| 5,0 | | 3.200 | 380 | 3.200 | 320 | 1.900 | 190 |
| 6,0 | | 2.700 | 430 | 2.700 | 320 | 1.600 | 190 |
| 8,0 | | 2.000 | 400 | 2.000 | 280 | 1.200 | 170 |
| 10,0 | | 1.600 | 380 | 1.600 | 260 | 1.000 | 160 |
| 12,0 | | 1.300 | 360 | 1.300 | 230 | 800 | 140 |
| 16,0 | | 1.000 | 320 | 1.000 | 200 | 600 | 120 |
| 20,0 | | 800 | 260 | 800 | 160 | 480 | 100 |
| 25,0 | | 640 | 200 | 640 | 130 | 380 | 80 |
| Shoulder cutting | $d_{oc}$ | 1,5 *D* | | | | | |
| | $w_{oc}$ | *0,1 D* | | *0,05 D* | | *0,05 D* | |

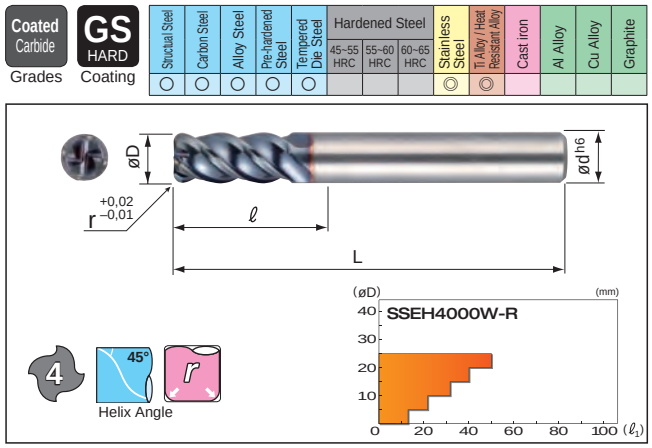
### ● Grooving

| Work Material / Cond. | | Stainless Steel | | Titanium Alloy | | Heat Resistive Steel | |
|---|---|---|---|---|---|---|---|
| øD (mm) | | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) | Spindle Speed (rpm) | Feed Rate (mm/min) |
| 4,5 | | 4,200 | 200 | 3,900 | 270 | 1,400 | 100 |
| 5,0 | | 3,800 | 240 | 3,500 | 300 | 1,300 | 120 |
| 6,0 | | 3,200 | 260 | 2,900 | 300 | 1,100 | 140 |
| 8,0 | | 2,400 | 240 | 2,200 | 270 | 800 | 120 |
| 10,0 | | 1,900 | 220 | 1,700 | 250 | 650 | 110 |
| 12,0 | | 1,600 | 200 | 1,400 | 230 | 550 | 100 |
| 16,0 | | 1,200 | 130 | 1,100 | 200 | 400 | 80 |
| 20,0 | | 950 | 95 | 890 | 90 | 320 | 60 |
| 25,0 | | 760 | 75 | 700 | 70 | 250 | 50 |
| Grooving | $d_{oc}$ | 0,3 *D* | | 0,2 *D* | | 0,15 *D* | |

# SSEH 4000W-R Type

4 Flutes Endmills with Radius Corner and

HAIMER's SAFE-LOCK™ Applicable Endmills




Grade: ACW52

## ■ Endmills

(mm)

| Cat. No. | Stock | øD | $\ell_1$ | $\ell_2$ | L | ød |
|---|---|---|---|---|---|---|
| **SSEH 4045W-R05** | ● | 4,5 | 0,5 | 12 | 50 | 6 |
| **SSEH 4045W-R10** | ● | 4,5 | 1,0 | 12 | 50 | 6 |
| **SSEH 4050W-R05** | ● | 5,0 | 0,5 | 13 | 60 | 6 |
| **SSEH 4050W-R10** | ● | 5,0 | 1,0 | 13 | 60 | 6 |
| **SSEH 4060W-R10** | ● | 6,0 | 1,0 | 13 | 60 | 6 |
| **SSEH 4080W-R10** | ● | 8,0 | 1,0 | 19 | 80 | 8 |
| **SSEH 4100W-R10** | ● | 10,0 | 1,0 | 22 | 90 | 10 |
| **SSEH 4100W-R30** | ● | 10,0 | 3,0 | 22 | 90 | 10 |
| **SSEH 4120W-R10** | ● | 12,0 | 1,0 | 26 | 90 | 12 |
| **SSEH 4120W-R30** | ● | 12,0 | 3,0 | 26 | 90 | 12 |
| **SSEH 4160W-R10** | ● | 16,0 | 1,0 | 32 | 115 | 16 |
| **SSEH 4160W-R30** | ● | 16,0 | 3,0 | 32 | 115 | 16 |
| **SSEH 4200W-R10** | ❍ | 20,0 | 1,0 | 40 | 125 | 20 |
| **SSEH 4200W-R30** | ❍ | 20,0 | 3,0 | 40 | 125 | 20 |
| **SSEH 4250W-R10** | ❍ | 25,0 | 1,0 | 50 | 140 | 25 |
| **SSEH 4250W-R30** | ❍ | 25,0 | 3,0 | 50 | 140 | 25 |

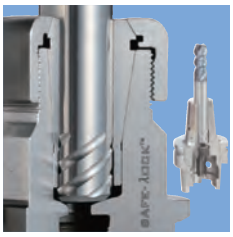
## ■ Diameter and Corner Radius Selection Range

| øD | r0,5 | r1,0 | r3,0 |
|---|---|---|---|
| ø 4,5 | ● | ● | |
| ø 5 | ● | ● | |
| ø 6 | | ● | |
| ø 8 | | ● | |
| ø 10 | | ● | ● |
| ø 12 | | ● | ● |
| ø 16 | | ● | ● |
| ø 20 | | ❍ | ❍ |
| ø 25 | | ❍ | ❍ |

SAFE-LOCK™

Applicable Endmills





## ■ Endmills

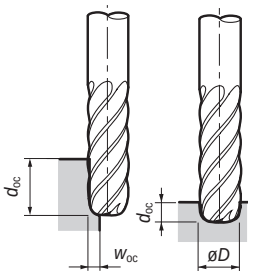
(mm)

| Cat. No. | Stock | øD | $\ell_1$ | $\ell_2$ | L | ød |
|---|---|---|---|---|---|---|
| **SSEH 4120WS-R10** | ● | 12,0 | 1,0 | 26 | 90 | 12 |
| **SSEH 4120WS-R30** | ● | 12,0 | 3,0 | 26 | 90 | 12 |
| **SSEH 4160WS-R10** | ● | 16,0 | 1,0 | 32 | 115 | 16 |
| **SSEH 4160WS-R30** | ● | 16,0 | 3,0 | 32 | 115 | 16 |
| **SSEH 4200WS-R10** | ❍ | 20,0 | 1,0 | 40 | 125 | 20 |
| **SSEH 4200WS-R30** | ❍ | 20,0 | 3,0 | 40 | 125 | 20 |
| **SSEH 4250WS-R10** | ❍ | 25,0 | 1,0 | 50 | 140 | 25 |
| **SSEH 4250WS-R30** | ❍ | 25,0 | 3,0 | 50 | 140 | 25 |

● = Euro stock
❍ = Delivery on request

## ■ Recommended cutting conditions

1. For stable machining, a more rigid machine is recommended.
2. Wet machining is recommended for stainless steel and heat resistant alloy applications.
3. If cutting noise and vibration are present, please change the cutting conditions accordingly.




### ● Shoulder Milling

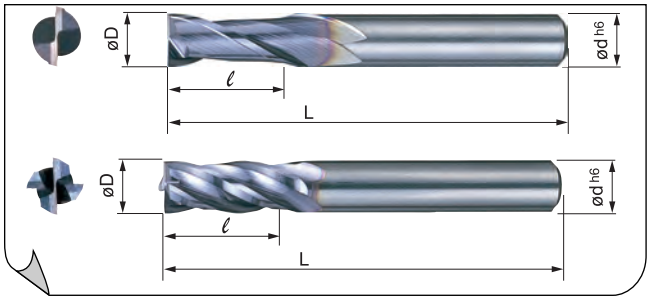
| Work Material / Cond. / øD (mm) | Stainless Steel Spindle Speed (rpm) | Stainless Steel Feed Rate (mm/min) | Titanium Alloy Spindle Speed (rpm) | Titanium Alloy Feed Rate (mm/min) | Heat Resistive Steel Spindle Speed (rpm) | Heat Resistive Steel Feed Rate (mm/min) |
|---|---|---|---|---|---|---|
| 4,5 | 3.500 | 350 | 3.500 | 280 | 2.100 | 170 |
| 5,0 | 3.200 | 380 | 3.200 | 320 | 1.900 | 190 |
| 6,0 | 2.700 | 430 | 2.700 | 320 | 1.600 | 190 |
| 8,0 | 2.000 | 400 | 2.000 | 280 | 1.200 | 170 |
| 10,0 | 1.600 | 380 | 1.600 | 260 | 1.000 | 160 |
| 12,0 | 1.300 | 360 | 1.300 | 230 | 800 | 140 |
| 16,0 | 1.000 | 320 | 1.000 | 200 | 600 | 120 |
| 20,0 | 800 | 260 | 800 | 160 | 480 | 100 |
| 25,0 | 640 | 200 | 640 | 130 | 380 | 80 |
| Shoulder cutting $d_{oc}$ | 1,5 *D* | | | | | |
| Shoulder cutting $w_{oc}$ | *0,1 D* | | *0,05 D* | | *0,05 D* | |

### ● Grooving

| Work Material / Cond. / øD (mm) | Stainless Steel Spindle Speed (rpm) | Stainless Steel Feed Rate (mm/min) | Titanium Alloy Spindle Speed (rpm) | Titanium Alloy Feed Rate (mm/min) | Heat Resistive Steel Spindle Speed (rpm) | Heat Resistive Steel Feed Rate (mm/min) |
|---|---|---|---|---|---|---|
| 4,5 | 4,200 | 200 | 3,900 | 270 | 1,400 | 100 |
| 5,0 | 3,800 | 240 | 3,500 | 300 | 1,300 | 120 |
| 6,0 | 3,200 | 260 | 2,900 | 300 | 1,100 | 140 |
| 8,0 | 2,400 | 240 | 2,200 | 270 | 800 | 120 |
| 10,0 | 1,900 | 220 | 1,700 | 250 | 650 | 110 |
| 12,0 | 1,600 | 200 | 1,400 | 230 | 550 | 100 |
| 16,0 | 1,200 | 130 | 1,100 | 200 | 400 | 80 |
| 20,0 | 950 | 95 | 890 | 90 | 320 | 60 |
| 25,0 | 760 | 75 | 700 | 70 | 250 | 50 |
| Grooving $d_{oc}$ | 0,3 *D* | | 0,2 *D* | | 0,15 *D* | |

# GS MILL Series
# GLM 2000/4000 SF Type

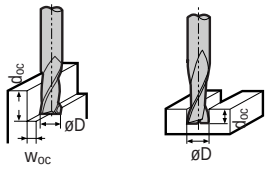
Coated carbide grade: **ACZ20W**




## Endmills

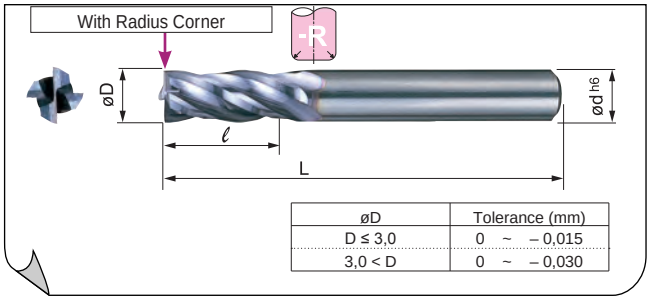
(mm)

| No. of teeth | Cat. No. | Stock | øD | ℓ | L | ød |
|---|---|---|---|---|---|---|
| 2 | 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 |
| 4 | 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 |




# GS MILL Series
# GLM 4000SF-R Type

Coated carbide grade: **ACZ20W**




## Endmills

(mm)

| No. of teeth | Cat. No. | Stock | øD | R | ℓ | L | ød |
|---|---|---|---|---|---|---|---|
| 4 | GLM 4030 SF-R02 | ▲ | 3,0 | 0,2 | 7,5 | 38 | 3 |
| | GLM 4030 SF-R05 | ▲ | 3,0 | 0,5 | 7,5 | 38 | 3 |
| | GLM 4040 SF-R02 | ▲ | 4,0 | 0,2 | 11 | 45 | 4 |
| | GLM 4040 SF-R05 | ▲ | 4,0 | 0,5 | 11 | 45 | 4 |
| | GLM 4040 SF-R10 | ▲ | 4,0 | 1,0 | 11 | 45 | 4 |
| | GLM 4050 SF-R02 | ▲ | 5,0 | 0,2 | 13 | 50 | 6 |
| | GLM 4050 SF-R05 | ▲ | 5,0 | 0,5 | 13 | 50 | 6 |
| | GLM 4050 SF-R10 | ▲ | 5,0 | 1,0 | 13 | 50 | 6 |
| | GLM 4060 SF-R02 | ▲ | 6,0 | 0,2 | 13 | 50 | 6 |
| | GLM 4060 SF-R05 | ▲ | 6,0 | 0,5 | 13 | 50 | 6 |
| | GLM 4060 SF-R10 | ▲ | 6,0 | 1,0 | 13 | 50 | 6 |
| | GLM 4060 SF-R15 | ▲ | 6,0 | 1,5 | 13 | 50 | 6 |
| | GLM 4080 SF-R02 | ▲ | 8,0 | 0,2 | 19 | 60 | 8 |
| | GLM 4080 SF-R05 | ▲ | 8,0 | 0,5 | 19 | 60 | 8 |
| | GLM 4080 SF-R10 | ▲ | 8,0 | 1,0 | 19 | 60 | 8 |
| | GLM 4080 SF-R15 | ▲ | 8,0 | 1,5 | 19 | 60 | 8 |
| | GLM 4100 SF-R02 | ▲ | 10,0 | 0,2 | 22 | 70 | 10 |
| | GLM 4100 SF-R05 | ▲ | 10,0 | 0,5 | 22 | 70 | 10 |
| | GLM 4100 SF-R10 | ▲ | 10,0 | 1,0 | 22 | 70 | 10 |
| | GLM 4100 SF-R15 | ▲ | 10,0 | 1,5 | 22 | 70 | 10 |
| | GLM 4100 SF-R20 | ▲ | 10,0 | 2,0 | 22 | 70 | 10 |
| | GLM 4120 SF-R02 | ▲ | 12,0 | 0,2 | 26 | 75 | 12 |
| | GLM 4120 SF-R05 | ▲ | 12,0 | 0,5 | 26 | 75 | 12 |
| | GLM 4120 SF-R10 | ▲ | 12,0 | 1,0 | 26 | 75 | 12 |
| | GLM 4120 SF-R15 | ▲ | 12,0 | 1,5 | 26 | 75 | 12 |
| | GLM 4120 SF-R20 | ▲ | 12,0 | 2,0 | 26 | 75 | 12 |

▲ = To be replaced by new item. (Please confirm stock availability)

## Recommended cutting conditions

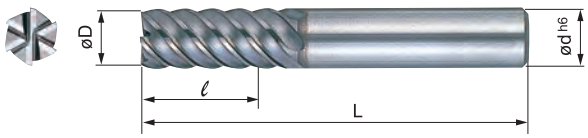
### ● GS Mill, 2 teeth square type endmill, GLM 2000SF

| Material / Cutting data / Tool Dia. (mm) | | Carbon steel, Cast iron (HB150~250) | | Alloy steel, Prehardened steel (HRC25~35) | | Heat treated alloy steel, hardened steel (HRC35~45) | | Hardened steel (HRC45~55) | | Stainless steel | | Heat resistant alloys Titanium alloy | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Speed (rpm) | Feed (mm/min) | Speed (rpm) | Feed (mm/min) | Speed (rpm) | Feed (mm/min) | Speed (rpm) | Feed (mm/min) | Speed (rpm) | Feed (mm/min) | Speed (rpm) | Feed (mm/min) |
| 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 / Tool Dia. (mm) | | Carbon steel, Cast iron (HB150~250) | | Alloy steel, Prehardened steel (HRC25~35) | | Heat treated alloy steel, hardened steel (HRC35~45) | | Hardened steel (HRC45~55) | | Stainless steel | | Heat resistant alloys Titanium alloy | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Speed (rpm) | Feed (mm/min) | Speed (rpm) | Feed (mm/min) | Speed (rpm) | Feed (mm/min) | Speed (rpm) | Feed (mm/min) | Speed (rpm) | Feed (mm/min) | Speed (rpm) | Feed (mm/min) |
| 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 carbide grade: **ACF07C**




Helix angle : 50˚
Corner : Edge with honing

| øD | Tolerance (mm) |
|---|---|
| D ≤ 3,0 | 0 ~ – 0,015 |
| 3,0 < D | 0 ~ – 0,030 |



## ■ Endmills

(mm)

| No. of teeth | Cat. No. | Stock | øD | ℓ | L | ød |
|---|---|---|---|---|---|---|
| 4 | **GSH 4010 SF** | ❍ | 1,0 | 3 | 50 | 6 |
| | **GSH 4015 SF** | ❍ | 1,5 | 4 | 50 | 6 |
| | **GSH 4020 SF** | ❍ | 2,0 | 6 | 50 | 6 |
| 6 | **GSH 6030 SF** | ● | 3,0 | 8 | 50 | 6 |
| | **GSH 6040 SF** | ● | 4,0 | 11 | 50 | 6 |
| | **GSH 6050 SF** | ● | 5,0 | 12 | 50 | 6 |
| | **GSH 6060 SF** | ● | 6,0 | 13 | 50 | 6 |
| | **GSH 6080 SF** | ● | 8,0 | 19 | 60 | 8 |
| | **GSH 6100 SF** | ● | 10,0 | 22 | 70 | 10 |
| | **GSH 6120 SF** | ● | 12,0 | 26 | 75 | 12 |
| 8 | **GSH 8160 SF** | ● | 16,0 | 32 | 90 | 16 |
| | **GSH 8200 SF** | ● | 20,0 | 38 | 100 | 20 |

● = Euro stock
❍ = Delivery on request

Recommended :
(1) Cutting performance is improved when using a high rigidity machine.
(2) Speeds and feeds should be reduced when there is any excessive vibration or strange noise during the operation.

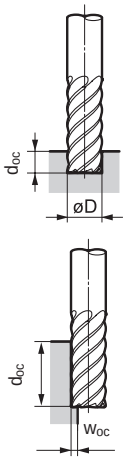
## ■ Recommended cutting conditions

### Conventional Milling Operations

| Material / Cutting data / Tool Dia. (mm) | | Alloy steel, Prehardened steel ( ~ HRC35) | | Heat treated alloy steel, hardened steel (HRC35~45) | | Hardened steel (HRC45~55) | | Hardened steel (HRC55~60) | | Hardened steel (HRC60~65) | | Hardened steel (HRC65 ~ ) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Speed (rpm) | Feed (mm/min) | Speed (rpm) | Feed (mm/min) | Speed (rpm) | Feed (mm/min) | Speed (rpm) | Feed (mm/min) | Speed (rpm) | Feed (mm/min) | Speed (rpm) | Feed (mm/min) |
| 1 | | 20.000 | 540 | 20.000 | 390 | 15.600 | 260 | 12.300 | 160 | 11.100 | 140 | 7.800 | 95 |
| 2 | | 19.000 | 1.100 | 17.200 | 770 | 13.400 | 530 | 10.500 | 320 | 9.500 | 270 | 6.700 | 190 |
| 3 | | 15.000 | 2.150 | 13.400 | 1.540 | 10.400 | 1.050 | 8.200 | 650 | 7.400 | 540 | 5.200 | 380 |
| 4 | | 11.200 | 2.400 | 10.000 | 1.740 | 7.800 | 1.180 | 6.100 | 730 | 5.600 | 600 | 3.900 | 420 |
| 5 | | 9.000 | 2.700 | 8.000 | 1.930 | 6.200 | 1.300 | 4.900 | 810 | 4.400 | 670 | 3.100 | 470 |
| 6 | | 7.500 | 2.700 | 6.700 | 1.930 | 5.200 | 1.300 | 4.100 | 810 | 3.700 | 670 | 2.600 | 470 |
| 8 | | 5.600 | 2.700 | 5.000 | 1.930 | 3.900 | 1.300 | 3.050 | 810 | 2.800 | 670 | 1.950 | 470 |
| 10 | | 4.500 | 2.700 | 4.000 | 1.930 | 3.100 | 1.300 | 2.450 | 810 | 2.200 | 670 | 1.550 | 470 |
| 12 | | 3.750 | 2.700 | 3.350 | 1.930 | 2.600 | 1.300 | 2.050 | 810 | 1.850 | 670 | 1.300 | 470 |
| 16 | | 2.800 | 2.500 | 2.500 | 1.800 | 1.950 | 1.220 | 1.530 | 760 | 1.400 | 630 | 980 | 440 |
| 20 | | 2.250 | 2.100 | 2.000 | 1.540 | 1.550 | 1.050 | 1.230 | 650 | 1.100 | 540 | 780 | 380 |
| Shoulder cutting | $d_{oc}$ | 1 ~ 1,5D | | | | 1 ~ 1,5D | | | | 1 ~ 1,5D | | | |
| | $w_{oc}$ | 0,1D | | | | 0,05D | | | | 0,02D | | | |
| Slotting | $d_{oc}$ | 0,1D | | | | 0,05D | | | | ~ 0,05D (Max 0,5) | | | |

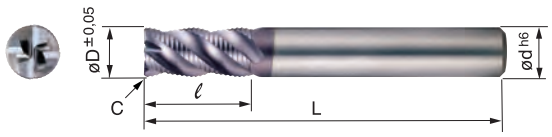
### HSC Machining Centre Operations

| Material / Cutting data / Tool Dia. (mm) | | Alloy steel, Prehardened steel ( ~ HRC35) | | Heat treated alloy steel, hardened steel (HRC35~45) | | Hardened steel (HRC45~55) | | Hardened steel (HRC55~60) | | Hardened steel (HRC60~65) | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Speed (rpm) | Feed (mm/min) | Speed (rpm) | Feed (mm/min) | Speed (rpm) | Feed (mm/min) | Speed (rpm) | Feed (mm/min) | Speed (rpm) | Feed (mm/min) |
| 1 | | 48.000 | 1.250 | 48.000 | 1.250 | 48.000 | 1.250 | 48.000 | 930 | 38.000 | 700 |
| 2 | | 48.000 | 2.850 | 48.000 | 2.850 | 48.000 | 2.850 | 36.000 | 1.600 | 24.000 | 1.000 |
| 3 | | 32.000 | 4.900 | 32.000 | 4.900 | 32.000 | 4.900 | 24.000 | 2.740 | 16.000 | 1.700 |
| 4 | | 24.000 | 5.200 | 24.000 | 5.200 | 24.000 | 5.200 | 18.000 | 2.900 | 12.000 | 1.800 |
| 5 | | 19.200 | 5.800 | 19.200 | 5.800 | 19.200 | 5.800 | 14.300 | 3.200 | 9.600 | 2.000 |
| 6 | | 16.000 | 5.800 | 16.000 | 5.800 | 16.000 | 5.800 | 12.000 | 3.200 | 8.000 | 2.000 |
| 8 | | 12.000 | 5.800 | 12.000 | 5.800 | 12.000 | 5.800 | 9.000 | 3.200 | 6.000 | 2.000 |
| 10 | | 9.600 | 5.800 | 9.600 | 5.800 | 9.600 | 5.800 | 7.200 | 3.200 | 4.800 | 2.000 |
| 12 | | 8.000 | 5.800 | 8.000 | 5.800 | 8.000 | 5.800 | 6.000 | 3.200 | 4.000 | 2.000 |
| 16 | | 6.000 | 5.400 | 6.000 | 5.400 | 6.000 | 5.400 | 4.500 | 3.000 | 3.000 | 1.900 |
| 20 | | 4.800 | 4.600 | 4.800 | 4.600 | 4.800 | 4.600 | 3.600 | 2.580 | 2.400 | 1.600 |
| Shoulder | $d_{oc}$ | 1 ~ 1,5D | | 1 ~ 1,5D | | | | 1 ~ 1,5D | | 1 ~ 1,5D | |
| cutting | $w_{oc}$ | 0,1D | | 0,05D | | | | 0,02D | | 0,12D | |



# GS MILL Series
# GSRE 4000SF Type

Coated carbide grade: **ACZ20W**




Helix angle : 40°



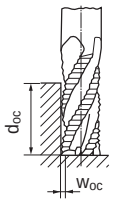
## Endmills

(mm)

| No. of teeth | Cat. No. | Stock | øD | ℓ | L | ød |
|---|---|---|---|---|---|---|
| 4 | **GSRE 4060 SF** | ● | 6,0 | 13 | 50 | 6 |
| | **GSRE 4070 SF** | ● | 7,0 | 16 | 60 | 8 |
| | **GSRE 4080 SF** | ● | 8,0 | 19 | 60 | 8 |
| | **GSRE 4090 SF** | ● | 9,0 | 19 | 70 | 10 |
| | **GSRE 4100 SF** | ● | 10,0 | 22 | 70 | 10 |
| | **GSRE 4110 SF** | ● | 11,0 | 22 | 75 | 12 |
| | **GSRE 4120 SF** | ● | 12,0 | 26 | 75 | 12 |
| | **GSRE 4140 SF** | ● | 14,0 | 26 | 90 | 16 |
| | **GSRE 4160 SF** | ● | 16,0 | 32 | 90 | 16 |
| | **GSRE 4180 SF** | ❍ | 18,0 | 32 | 100 | 20 |
| | **GSRE 4200 SF** | ● | 20,0 | 38 | 100 | 20 |

● = Euro stock
❍ = Delivery on request

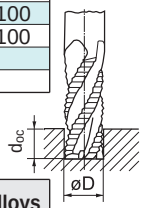
Recommended :
(1) Cutting performance is improved when using a high rigidity machine.
(2) Speeds and feeds should be reduced when there is any excessive vibration or strange noise during the operation.




## Recommended cutting conditions

### Shoulder cutting

| Material / Cutting data / Tool Dia. (mm) | Carbon steel ( HB150~250) Speed (rpm) | Carbon steel Feed (mm/min) | Cast iron Speed (rpm) | Cast iron Feed (mm/min) | Alloy steel, Prehardened steel (HRC25~35) Speed (rpm) | Alloy steel, Prehardened steel Feed (mm/min) | Hardened steel (HRC40~50) Speed (rpm) | Hardened steel Feed (mm/min) | Stainless steel Speed (rpm) | Stainless steel Feed (mm/min) | Heat resistant alloys Titanium alloy Speed (rpm) | Heat resistant alloys Titanium alloy Feed (mm/min) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 4.800 | 1.200 | 5.800 | 1.500 | 3.200 | 380 | 2.600 | 400 | 4.300 | 250 | 1.600 | 90 |
| 2 | 4.100 | 1.200 | 5.000 | 1.500 | 2.700 | 380 | 2.200 | 400 | 4.500 | 250 | 1.350 | 90 |
| 3 | 3.600 | 1.200 | 4.500 | 1.500 | 2.400 | 380 | 2.000 | 400 | 4.000 | 250 | 1.250 | 90 |
| 4 | 3.200 | 1.200 | 4.000 | 1.500 | 2.100 | 380 | 1.800 | 400 | 3.500 | 250 | 1.050 | 90 |
| 5 | 2.800 | 1.200 | 2.500 | 1.500 | 1.900 | 380 | 1.600 | 400 | 3.200 | 250 | 1.000 | 100 |
| 6 | 2.600 | 1.200 | 3.000 | 1.400 | 1.700 | 380 | 1.500 | 400 | 2.900 | 250 | 900 | 100 |
| 8 | 2.400 | 1.200 | 2.900 | 1.400 | 1.600 | 400 | 1.300 | 400 | 2.600 | 250 | 800 | 100 |
| 10 | 2.200 | 1.100 | 2.600 | 1.300 | 1.300 | 380 | 1.100 | 350 | 2.200 | 200 | 700 | 100 |
| 12 | 1.800 | 900 | 2.200 | 1.100 | 1.200 | 380 | 1.000 | 350 | 2.000 | 180 | 600 | 100 |
| 16 | 1.400 | 700 | 1.800 | 900 | 1.000 | 380 | 900 | 350 | 1.800 | 150 | 550 | 100 |
| 20 | 1.400 | 700 | 1.700 | 800 | 850 | 380 | 800 | 350 | 1.600 | 150 | 500 | 100 |
| Shoulder cutting $d_{oc}$ | 1,5D | | | | | | 1,5D | | | | | |
| Shoulder cutting $w_{oc}$ | 0,5D | | | | | | 0,3D | | | | | |




### Slotting

| Material / Cutting data / Tool Dia. (mm) | Carbon steel ( HB150~250) Speed (rpm) | Carbon steel Feed (mm/min) | Cast iron Speed (rpm) | Cast iron Feed (mm/min) | Alloy steel, Prehardened steel (HRC25~35) Speed (rpm) | Alloy steel, Prehardened steel Feed (mm/min) | Hardened steel (HRC40~50) Speed (rpm) | Hardened steel Feed (mm/min) | Stainless steel Speed (rpm) | Stainless steel Feed (mm/min) | Heat resistant alloys Titanium alloy Speed (rpm) | Heat resistant alloys Titanium alloy Feed (mm/min) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 3.600 | 900 | 4.300 | 1.100 | 2.400 | 300 | 1.700 | 260 | 4.200 | 250 | 1.100 | 60 |
| 2 | 3.000 | 900 | 3.700 | 1.100 | 2.000 | 280 | 1.500 | 260 | 3.600 | 250 | 900 | 60 |
| 3 | 2.700 | 900 | 3.400 | 1.100 | 1.800 | 280 | 1.350 | 260 | 3.200 | 250 | 800 | 60 |
| 4 | 2.400 | 900 | 3.000 | 1.100 | 1.600 | 280 | 1.200 | 260 | 2.800 | 250 | 700 | 60 |
| 5 | 2.100 | 900 | 2.600 | 1.100 | 1.400 | 280 | 1.100 | 270 | 2.500 | 250 | 650 | 65 |
| 6 | 2.000 | 900 | 2.300 | 1.100 | 1.300 | 280 | 1.000 | 270 | 2.300 | 250 | 600 | 70 |
| 8 | 1.800 | 900 | 2.200 | 1.100 | 1.200 | 300 | 900 | 270 | 2.100 | 250 | 550 | 70 |
| 10 | 1.600 | 800 | 2.000 | 1.100 | 1.000 | 290 | 750 | 240 | 1.800 | 180 | 450 | 65 |
| 12 | 1.350 | 650 | 1.650 | 850 | 900 | 280 | 700 | 240 | 1.600 | 160 | 400 | 65 |
| 16 | 1.200 | 550 | 1.500 | 750 | 800 | 280 | 600 | 230 | 1.400 | 140 | 350 | 60 |
| 20 | 1.050 | 500 | 1.350 | 700 | 700 | 280 | 550 | 210 | 1.250 | 125 | 300 | 60 |
| Slotting $d_{oc}$ | 1,0D | | | | | | 0,5D | | | | | |

# 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.

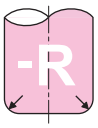
Unique flute design and strong cutting edge ensure excellent chip control even when rough machining slots.

**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



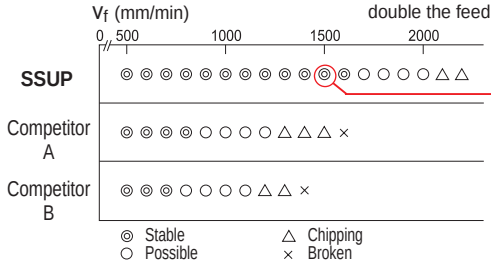

SSUP 4000ZX-R Series
Diameter and Corner Radius Range

| øD \ R | R0,2 | R0,3 | R0,5 | R1,0 | R1,5 | R2.0 | R3.0 |
|---|---|---|---|---|---|---|---|
| ø3 | ● | | ● | | | | |
| ø4 | ● | | ● | ● | | | |
| ø5 | ● | | ● | ● | | | |
| ø6 | | ● | ● | ● | ● | | |
| ø8 | | ● | ● | ● | ● | | |
| ø10 | | ● | ● | ● | ● | ● | |
| ø12 | | | ● | ● | ● | ● | ● |
| ø16 | | | | ● | ● | ● | ● |
| ø20 | | | | ● | ● | ● | ● |

## Performance

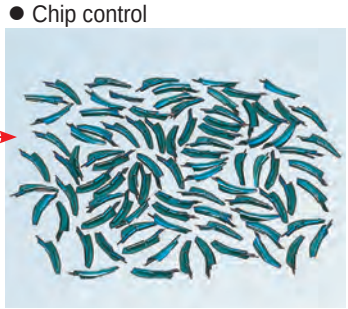
● Feed rate comparisons

<Results>
Stable milling at double the feed rate

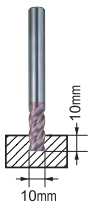



| | |
|---|---|
| Work material:<br>X155CrVMo12 1 (HB220)<br>Tool : ø10mm, 4 flute<br>Cutting length: 10m | Cutting conditions :<br>n = 2250 rpm, $v_c$ = 80m/min<br>$d_{oc}$=10mm, $w_{oc}$=10mm<br>Dry |

● Chip control

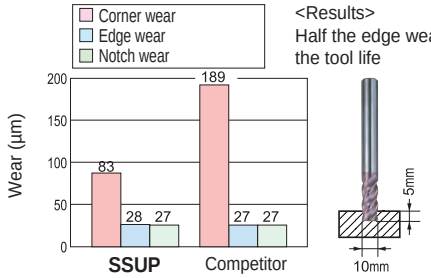


<Results>
Excellent chip control




| | |
|---|---|
| Work material:<br>X155CrVMo12 1 (HB220)<br>Tool : ø10mm, 4 flute | Cutting conditions :<br>n = 2250 rpm, $v_c$ = 80m/min<br>$f_t$ = 0,147mm/tooth ($v_f$ =1500 mm/min)<br>$d_{oc}$=10mm, $w_{oc}$=10mm, Dry |

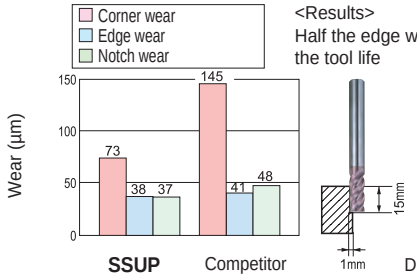
● Wear resistance comparison - slotting




<Results>
Half the edge wear - double the tool life

| | |
|---|---|
| Work material: 40CrMoV5 $H_RC40$<br>Tool : ø10mm, 4 flute<br>Cutting length: 7,5m | Cutting conditions :<br>n = 1600 rpm, $v_c$ = 50m/min<br>$f_t$ = 0,04mm/tooth ($v_f$ =500 mm/min)<br>$d_{oc}$=5mm, $w_{oc}$=10mm, Dry |

● Wear resistance comparison - shoulder cutting

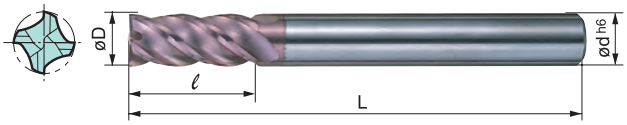



<Results>
Half the edge wear - double the tool life

| | |
|---|---|
| Work material:<br>X155CrVMo12 1 (HB220)<br>Tool : ø10mm, 4 flute<br>Cutting length: 15m | Cutting conditions :<br>n = 1750 rpm, $v_c$ = 55m/min<br>$f_t$ = 0,086mm/tooth ($v_f$ =600 mm/min)<br>$d_{oc}$=15mm, $w_{oc}$=1mm, Dry |

# ZX Coated UP MILL
# SSUP 4000ZX Type

Coated carbide grade: ACZ50M




Helix angle : 40°
Corner : Sharp edge

| øD | Tolerance (mm) |
|---|---|
| D ≤ 3,0 | – 0,014 – 0,028 |
| 3,0 < D ≤ 6,0 | – 0,020 – 0,038 |
| 6,0 < D | – 0,025 – 0,047 |

## Endmills

(mm)

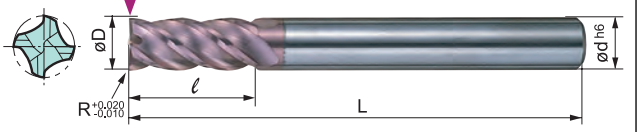
| | Cat. No. | Stock | øD | ℓ | L | ød |
|---|---|---|---|---|---|---|
| 4 | SSUP 4020ZX | ● | 2,0 | 6 | 50 | 4 |
| | SSUP 4030ZX | ● | 3,0 | 8 | 50 | 6 |
| | SSUP 4040ZX | ● | 4,0 | 11 | 50 | 6 |
| | SSUP 4050ZX | ● | 5,0 | 13 | 60 | 6 |
| | SSUP 4060ZX | ● | 6,0 | 13 | 60 | 6 |
| | SSUP 4070ZX | ● | 7,0 | 16 | 70 | 8 |
| | SSUP 4080ZX | ● | 8,0 | 19 | 80 | 8 |
| | SSUP 4090ZX | ● | 9,0 | 19 | 90 | 10 |
| | SSUP 4100ZX | ● | 10,0 | 22 | 90 | 10 |
| | SSUP 4110ZX | ● | 11,0 | 22 | 90 | 12 |
| | SSUP 4120ZX | ● | 12,0 | 26 | 90 | 12 |
| | SSUP 4140ZX | ● | 14,0 | 26 | 110 | 16 |
| | SSUP 4150ZX | | 15,0 | 26 | 110 | 16 |
| | SSUP 4160ZX | ● | 16,0 | 32 | 115 | 16 |
| | SSUP 4180ZX | ❍ | 18,0 | 32 | 120 | 20 |
| | SSUP 4200ZX | ● | 20,0 | 38 | 125 | 20 |

● = Euro stock
❍ = Delivery on request

# ZX Coated UP MILL
# SSUP 4000ZX-R Type

With Radius Corner

Coated carbide grade: ACZ50M




Helix angle : 40°
Corner : Sharp edge

-R

| øD | Tolerance (mm) |
|---|---|
| D ≤ 3,0 | – 0,014 – 0,028 |
| 3,0 < D ≤ 6,0 | – 0,020 – 0,038 |
| 6,0 < D | – 0,025 – 0,047 |

## Endmills

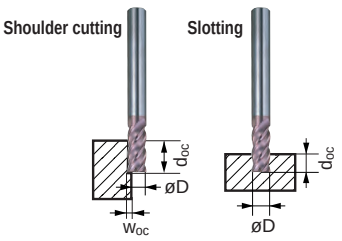
(mm)

| | Cat. No. | Stock | øD | R | ℓ | L | ød |
|---|---|---|---|---|---|---|---|
| 4 | SSUP 4030ZX-R02 | ● | 3,0 | 0,2 | 8 | 50 | 6 |
| | SSUP 4030ZX-R05 | ❍ | 3,0 | 0,5 | 8 | 50 | 6 |
| | SSUP 4040ZX-R02 | ● | 4,0 | 0,2 | 11 | 50 | 6 |
| | SSUP 4040ZX-R05 | ● | 4,0 | 0,5 | 11 | 50 | 6 |
| | SSUP 4040ZX-R10 | ❍ | 4,0 | 1,0 | 11 | 50 | 6 |
| | SSUP 4050ZX-R02 | ● | 5,0 | 0,2 | 13 | 60 | 6 |
| | SSUP 4050ZX-R05 | ● | 5,0 | 0,5 | 13 | 60 | 6 |
| | SSUP 4050ZX-R10 | ❍ | 5,0 | 1,0 | 13 | 60 | 6 |
| | SSUP 4060ZX-R03 | ● | 6,0 | 0,3 | 13 | 60 | 6 |
| | SSUP 4060ZX-R05 | ● | 6,0 | 0,5 | 13 | 60 | 6 |
| | SSUP 4060ZX-R10 | ● | 6,0 | 1,0 | 13 | 60 | 6 |
| | SSUP 4060ZX-R15 | ❍ | 6,0 | 1,5 | 13 | 60 | 6 |
| | SSUP 4080ZX-R03 | ● | 8,0 | 0,3 | 13 | 80 | 8 |
| | SSUP 4080ZX-R05 | ● | 8,0 | 0,5 | 13 | 80 | 8 |
| | SSUP 4080ZX-R10 | ● | 8,0 | 1,0 | 19 | 80 | 8 |
| | SSUP 4080ZX-R15 | ❍ | 8,0 | 1,5 | 19 | 80 | 8 |
| | SSUP 4080ZX-R20 | ❍ | 8,0 | 2,0 | 19 | 80 | 8 |
| | SSUP 4100ZX-R03 | ● | 10,0 | 0,3 | 22 | 90 | 10 |
| | SSUP 4100ZX-R05 | ● | 10,0 | 0,5 | 22 | 90 | 10 |
| | SSUP 4100ZX-R10 | ● | 10,0 | 1,0 | 22 | 90 | 10 |
| | SSUP 4100ZX-R15 | ❍ | 10,0 | 1,5 | 22 | 90 | 10 |
| | SSUP 4100ZX-R20 | ❍ | 10,0 | 2,0 | 22 | 90 | 10 |
| | SSUP 4120ZX-R05 | ● | 12,0 | 0,5 | 26 | 90 | 12 |
| | SSUP 4120ZX-R10 | ● | 12,0 | 1,0 | 26 | 90 | 12 |
| | SSUP 4120ZX-R15 | ● | 12,0 | 1,5 | 26 | 90 | 12 |
| | SSUP 4120ZX-R20 | ❍ | 12,0 | 2,0 | 26 | 90 | 12 |
| | SSUP 4120ZX-R30 | ❍ | 12,0 | 3,0 | 26 | 90 | 12 |
| | SSUP 4160ZX-R10 | ● | 16,0 | 1,0 | 32 | 115 | 16 |
| | SSUP 4160ZX-R15 | ● | 16,0 | 1,5 | 32 | 115 | 16 |
| | SSUP 4160ZX-R20 | ❍ | 16,0 | 2,0 | 32 | 115 | 16 |
| | SSUP 4160ZX-R30 | ❍ | 16,0 | 3,0 | 32 | 115 | 16 |
| | SSUP 4200ZX-R10 | ● | 20,0 | 1,0 | 38 | 125 | 20 |
| | SSUP 4200ZX-R15 | ● | 20,0 | 1,5 | 38 | 125 | 20 |
| | SSUP 4200ZX-R20 | ❍ | 20,0 | 2,0 | 38 | 125 | 20 |
| | SSUP 4200ZX-R30 | ❍ | 20,0 | 3,0 | 38 | 125 | 20 |

● = Euro stock
❍ = Delivery on request

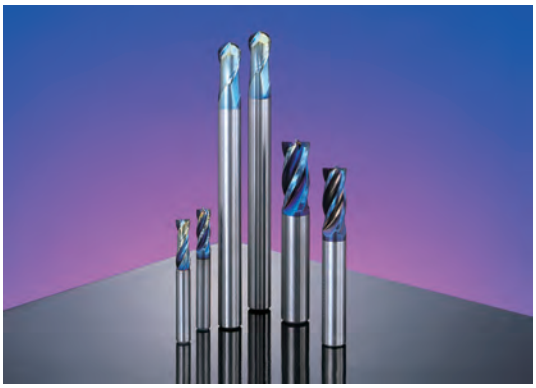
## Recommended cutting conditions

| Material / Cutting data | | 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) | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| øD (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) |
| 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 | | | | 0,2D | | 0,3D | | 0,2D | |




(1) Cutting performance is improved when using a high rigidity machine.
(2) Speeds and feeds should be reduced when slotting some stainless steels.
(3) In case of chatter first check the cutting conditions.

# AURORA COAT Series



## Features

Sumitomo Electric's "AURORA" COAT is a high hardness, low coefficient layer of "Diamond Like Carbon" (DLC).

Other than producing excellent surface finish for machining of Aluminium and non-ferrous metals, DLC coat can be used for dry cutting and is environmental friendly.

## Characteristics / Application

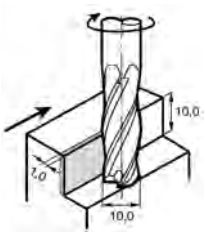
- Very smooth AURORA COAT results in low adhesion as well as good surface finish
- With lower cutting forces and high rigidity, this series is suitable for low rigidity machine
- Available in 2 and 4 flutes square type as well as ballnose type endmills

## Product Range

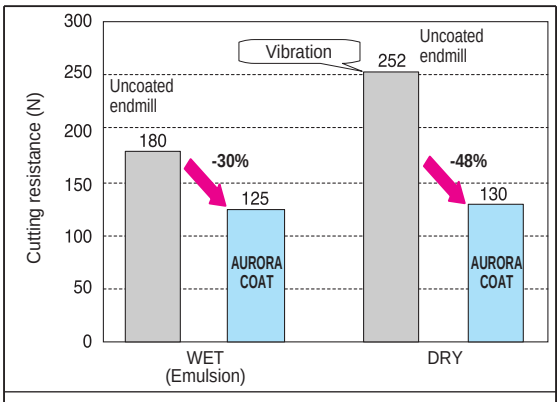
| Series | No. of teeth | Shape | Diameter |
|---|---|---|---|
| **ASM2000DL** | 2 | Square  | ø2~ø16 |
| **ASM4000DL** | 4 | Square  | ø2~ø16 |
| **SNB2000DL** | 2 | Ballnose  | ø2~ø16 (R1~R8) |



## Efficiency

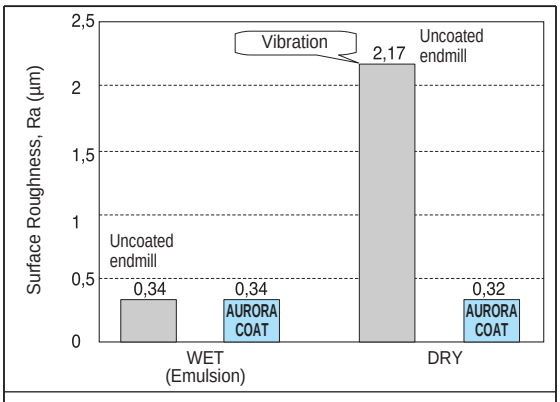



● Performance Comparison




Work Material: A5052
Tool: ASM4100DL, ø10mm 4 teeth
Cutting Conditions: $v_c$=200m/min, n=6,300rpm, $v_f$=1300mm/min
$f_t$=0,05mm/tooth, $d_{oc}$=10mm, $w_{oc}$=1,0mm
Down Cut

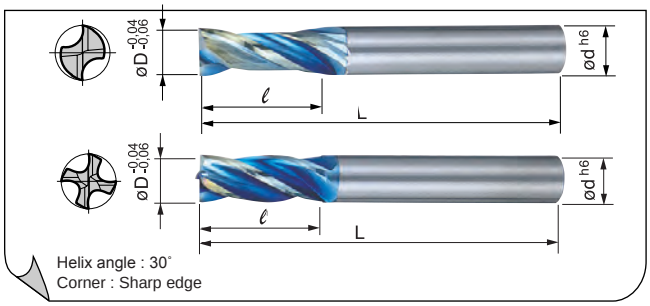
● Surface Finish Comparison




Work Material: A5052
Tool: ASM4100DL, ø10mm 4 teeth
Cutting Conditions: $v_c$=200m/min, n=6,300rpm, $v_f$=1300mm/min
$f_t$=0,05mm/tooth, $d_{oc}$=10mm, $w_{oc}$=1,0mm
Down Cut

# AURORA Coated Spiral Endmills
# ASM 2000/4000 DL Type

DLC coated carbide grade: DL1000




## Endmills (mm)

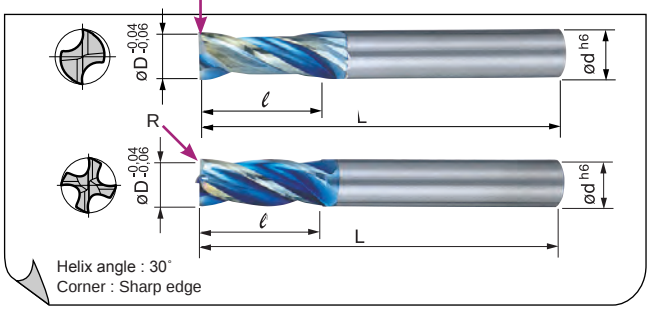
| | Cat. No. | Stock | øD | ℓ | L | ød |
|---|---|---|---|---|---|---|
| 2 | ASM 2020 DL | ● | 2,0 | 6 | 40 | 4 |
| | ASM 2030 DL | ● | 3,0 | 10 | 45 | 6 |
| | ASM 2040 DL | ● | 4,0 | 12 | 45 | 6 |
| | ASM 2050 DL | ● | 5,0 | 15 | 50 | 6 |
| | ASM 2060 DL | ● | 6,0 | 15 | 50 | 6 |
| | ASM 2080 DL | ● | 8,0 | 18 | 60 | 8 |
| | ASM 2100 DL | ● | 10,0 | 22 | 71 | 10 |
| | ASM 2120 DL | ● | 12,0 | 25 | 75 | 12 |
| | ASM 2160 DL | ● | 16,0 | 32 | 90 | 16 |
| 4 | ASM 4020 DL | ● | 2,0 | 6 | 40 | 4 |
| | ASM 4030 DL | ● | 3,0 | 10 | 45 | 6 |
| | ASM 4040 DL | ● | 4,0 | 12 | 45 | 6 |
| | ASM 4050 DL | ● | 5,0 | 15 | 50 | 6 |
| | ASM 4060 DL | ● | 6,0 | 15 | 50 | 6 |
| | ASM 4080 DL | ● | 8,0 | 18 | 60 | 8 |
| | ASM 4100 DL | ● | 10,0 | 22 | 71 | 10 |
| | ASM 4120 DL | ● | 12,0 | 25 | 75 | 12 |
| | ASM 4160 DL | ● | 16,0 | 32 | 90 | 16 |

● = Euro stock

# AURORA Coated Spiral Endmills
# ASM 2000/4000 DL-R Type

With Radius Corner

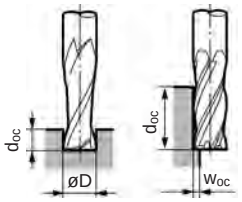
DLC coated carbide grade: DL1000




## Endmills (mm)

| | Cat. No. | Stock | øD | R | ℓ | L | ød |
|---|---|---|---|---|---|---|---|
| 2 | ASM 2080 DL-R10 | ● | 8,0 | 1,0 | 18 | 60 | 8 |
| | ASM 2080 DL-R20 | ● | 8,0 | 2,0 | 18 | 60 | 8 |
| | ASM 2100 DL-R10 | ● | 10,0 | 1,0 | 22 | 71 | 10 |
| | ASM 2100 DL-R20 | ● | 10,0 | 2,0 | 22 | 71 | 10 |
| | ASM 2120 DL-R20 | ● | 12,0 | 2,0 | 25 | 75 | 12 |
| | ASM 2120 DL-R30 | ● | 12,0 | 3,0 | 25 | 75 | 12 |
| | ASM 2160 DL-R30 | ● | 16,0 | 3,0 | 32 | 90 | 16 |
| 4 | ASM 4080 DL-R10 | ● | 8,0 | 1,0 | 18 | 60 | 8 |
| | ASM 4080 DL-R20 | ● | 8,0 | 2,0 | 18 | 60 | 8 |
| | ASM 4100 DL-R10 | ● | 10,0 | 1,0 | 22 | 71 | 10 |
| | ASM 4100 DL-R20 | ● | 10,0 | 2,0 | 22 | 71 | 10 |
| | ASM 4120 DL-R20 | ● | 12,0 | 2,0 | 25 | 75 | 12 |
| | ASM 4120 DL-R30 | ● | 12,0 | 3,0 | 25 | 75 | 12 |
| | ASM 4160 DL-R30 | ● | 16,0 | 3,0 | 32 | 90 | 16 |

● = Euro stock




## Recommended cutting conditions

Recommended :

(1) Cutting performance is improved when using a high rigidity machine.

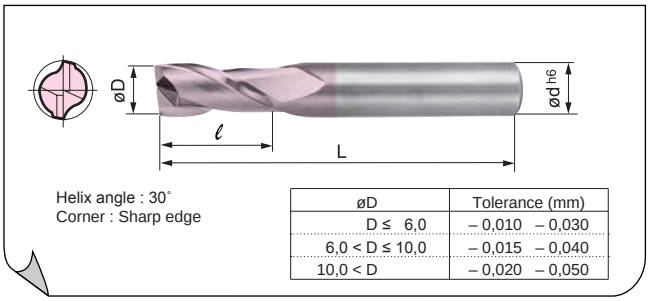
(2) Speeds and feeds should be reduced when there is any excessive vibration or strange noise during the operation.

(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 | 18.000 | 520 | 26.000 | 1.800 | 18.000 | 360 |
| 5,0 | | 20.000 | 2.600 | 14.000 | 520 | 20.000 | 1.800 | 14.000 | 360 |
| 6,0 | | 17.000 | 2.700 | 12.000 | 540 | 17.000 | 1.900 | 12.000 | 370 |
| 8,0 | | 13.000 | 2.700 | 9.000 | 540 | 13.000 | 1.900 | 9.000 | 370 |
| 10,0 | | 11.000 | 2.800 | 7.200 | 560 | 11.000 | 2.000 | 7.200 | 390 |
| 12,0 | | 8.500 | 2.800 | 6.000 | 560 | 8.500 | 2.000 | 6.000 | 390 |
| 16,0 | | 6.400 | 2.800 | 4.500 | 560 | 6.400 | 2.000 | 4.500 | 390 |
| Depth and wide of cut | $d_{oc}$ | 1,5D | | 1,0D | | 1,5D | | 0,5D | |
| | $W_{oc}$ | 0,2D | | (D) | | 0,2D | | (D) | |

# ZX Coated Spiral Endmills
# SSM 2000ZX Type

Coated carbide grade: ACZ50




Helix angle : 30˚
Corner : Sharp edge

| 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 |

## Endmills (mm)

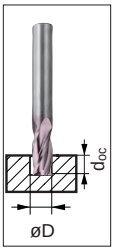
| | Cat. No. | Stock | øD | ℓ | L | ød |
|---|---|---|---|---|---|---|
| 2 | SSM 2010ZX | ● | 1,0 | 3 | 40 | 4 |
| | SSM 2015ZX | ● | 1,5 | 5 | 40 | 4 |
| | SSM 2020ZX | ● | 2,0 | 6 | 40 | 4 |
| | SSM 2021ZX | | 2,1 | 6 | 40 | 4 |
| | SSM 2022ZX | | 2,2 | 6 | 40 | 4 |
| | SSM 2023ZX | | 2,3 | 6 | 40 | 4 |
| | SSM 2024ZX | | 2,4 | 6 | 40 | 4 |
| | SSM 2025ZX | ● | 2,5 | 8 | 40 | 4 |
| | SSM 2026ZX | | 2,6 | 8 | 40 | 4 |
| | SSM 2027ZX | | 2,7 | 8 | 40 | 4 |
| | SSM 2028ZX | | 2,8 | 8 | 40 | 4 |
| | SSM 2029ZX | | 2,9 | 8 | 40 | 4 |
| | SSM 2030ZX | ● | 3,0 | 8 | 45 | 6 |
| | SSM 2035ZX | ● | 3,5 | 8 | 45 | 6 |
| | SSM 2040ZX | ● | 4,0 | 10 | 45 | 6 |
| | SSM 2045ZX | ● | 4,5 | 10 | 45 | 6 |
| | SSM 2050ZX | ● | 5,0 | 12 | 50 | 6 |
| | SSM 2055ZX | ● | 5,5 | 12 | 50 | 6 |
| | SSM 2060ZX | ● | 6,0 | 12 | 50 | 6 |
| | SSM 2065ZX | ❍ | 6,5 | 12 | 50 | 8 |
| | SSM 2070ZX | ● | 7,0 | 15 | 55 | 8 |
| | SSM 2075ZX | ● | 7,5 | 15 | 55 | 8 |
| | SSM 2080ZX | ● | 8,0 | 15 | 55 | 8 |
| | SSM 2085ZX | ● | 8,5 | 15 | 55 | 10 |
| | SSM 2090ZX | ● | 9,0 | 15 | 55 | 10 |
| | SSM 2095ZX | ● | 9,5 | 15 | 55 | 10 |
| | SSM 2100ZX | ● | 10,0 | 18 | 65 | 10 |
| | SSM 2105ZX | | 10,5 | 18 | 70 | 12 |
| | SSM 2110ZX | ● | 11,0 | 18 | 70 | 12 |
| | SSM 2115ZX | | 11,5 | 18 | 70 | 12 |
| | SSM 2120ZX | ● | 12,0 | 18 | 70 | 12 |
| | SSM 2130ZX | | 13,0 | 20 | 80 | 16 |
| | SSM 2140ZX | ● | 14,0 | 20 | 80 | 16 |
| | SSM 2150ZX | ● | 15,0 | 25 | 80 | 16 |
| | SSM 2160ZX | ● | 16,0 | 35 | 90 | 16 |
| | SSM 2180ZX | ● | 18,0 | 40 | 105 | 20 |
| | SSM 2200ZX | ● | 20,0 | 40 | 105 | 20 |

● = Euro stock
❍ = Delivery on request

### Recommended conditions

(Slotting) øD<ø3 ; $d_{oc}$ =0,5 x øD
øD≥ø3 ; $d_{oc}$ =1,0 x øD

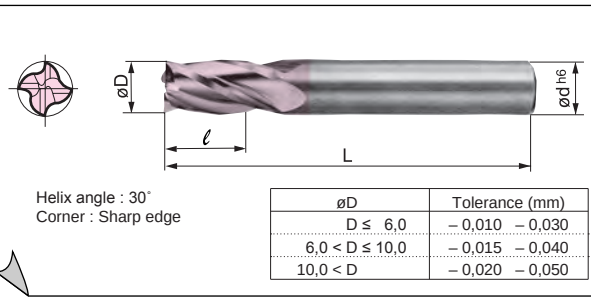
| øD \ Material | | Carbon steel, Alloy steel | (BelowHRC45) | Cast iron | Stainless steel, Ti-alloy etc, |
|---|---|---|---|---|---|
| 1,0 ~ 2,9 | $v_c$ | 200-**250**-300 | 100-**150**-200 | 100-**120**-150 | 60-**75**-90 |
| | $f_t$ | 0,003~0,010 | 0,002~0,005 | 0,005~0,016 | 0,002~0,005 |
| 3,0 ~ 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

Coated carbide grade: ACZ50




Helix angle : 30˚
Corner : Sharp edge

| 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 |

## Endmills (mm)

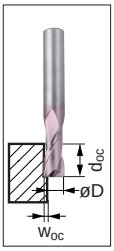
| | Cat. No. | Stock | øD | ℓ | L | ød |
|---|---|---|---|---|---|---|
| 4 | SSM 4015ZX | ● | 1,5 | 5,0 | 40 | 4 |
| | SSM 4020ZX | ● | 2,0 | 6,0 | 40 | 4 |
| | SSM 4025ZX | ● | 2,5 | 8,0 | 40 | 4 |
| | SSM 4030ZX | ● | 3,0 | 8,0 | 45 | 6 |
| | SSM 4035ZX | ● | 3,5 | 8,0 | 45 | 6 |
| | SSM 4040ZX | ● | 4,0 | 10,0 | 45 | 6 |
| | SSM 4045ZX | ● | 4,5 | 10,0 | 45 | 6 |
| | SSM 4050ZX | ● | 5,0 | 12,0 | 50 | 6 |
| | SSM 4055ZX | ● | 5,5 | 12,0 | 50 | 6 |
| | SSM 4060ZX | ● | 6,0 | 12,0 | 50 | 6 |
| | SSM 4065ZX | ● | 6,5 | 12,0 | 50 | 8 |
| | SSM 4070ZX | ● | 7,0 | 15,0 | 55 | 8 |
| | SSM 4075ZX | ● | 7,5 | 15,0 | 55 | 8 |
| | SSM 4080ZX | ● | 8,0 | 15,0 | 55 | 8 |
| | SSM 4085ZX | ● | 8,5 | 15,0 | 55 | 10 |
| | SSM 4090ZX | ● | 9,0 | 15,0 | 55 | 10 |
| | SSM 4095ZX | ● | 9,5 | 15,0 | 55 | 10 |
| | SSM 4100ZX | ● | 10,0 | 18,0 | 65 | 10 |
| | SSM 4105ZX | | 10,5 | 18,0 | 65 | 12 |
| | SSM 4110ZX | ● | 11,0 | 18,0 | 70 | 12 |
| | SSM 4115ZX | | 11,5 | 18,0 | 70 | 12 |
| | SSM 4120ZX | ● | 12,0 | 18,0 | 70 | 12 |
| | SSM 4130ZX | ● | 13,0 | 20,0 | 80 | 16 |
| | SSM 4135ZX | | 13,5 | 20,0 | 80 | 16 |
| | SSM 4140ZX | ● | 14,0 | 20,0 | 80 | 16 |
| | SSM 4150ZX | ● | 15,0 | 25,0 | 80 | 16 |
| | SSM 4160ZX | ● | 16,0 | 35,0 | 90 | 16 |
| | SSM 4170ZX | | 17,0 | 35,0 | 90 | 20 |
| | SSM 4180ZX | | 18,0 | 40,0 | 105 | 20 |
| | SSM 4190ZX | ❍ | 19,0 | 40,0 | 105 | 20 |
| | SSM 4200ZX | ● | 20,0 | 40,0 | 105 | 20 |
| | SSM 4220ZX | | 22,0 | 40,0 | 105 | 25 |
| | SSM 4240ZX | | 24,0 | 45,0 | 115 | 25 |
| | SSM 4250ZX | ● | 24,0 | 50,0 | 120 | 25 |
| | SSM 4300ZX | | 30,0 | 55,0 | 130 | 32 |
| | SSM 4320ZX | | 32,0 | 55,0 | 130 | 32 |

● = Euro stock
❍ = Delivery on request

### Recommended conditions

(Shoulder processing) $d_{oc}$ =1,5 x øD
$w_{oc}$ =0,1 x øD

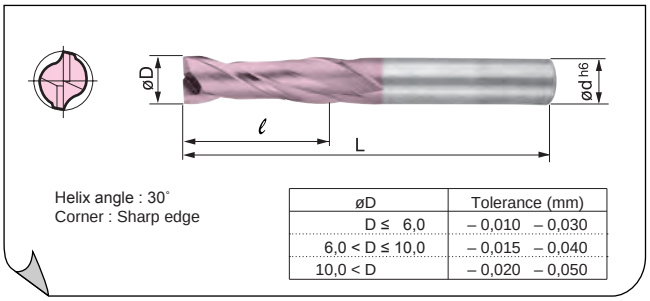
| øD \ Material | | Carbon steel, Alloy steel (BelowHRC25) | (BelowHRC45) | Cast iron | Stainless steel, Ti-alloy etc, |
|---|---|---|---|---|---|
| 1,0 ~ 2,9 | $v_c$ | 200-**250**-300 | 100-**150**-200 | 100-**120**-150 | 60-**75**-90 |
| | $f_t$ | 0,004~0,017 | 0,002~0,008 | 0,008~0,020 | 0,002~0,008 |
| 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 2000ZX Type

Coated carbide grade: ACZ50




Helix angle : 30°
Corner : Sharp edge

| 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 |

## ■ Endmills

(mm)

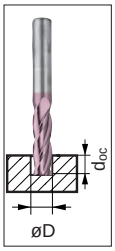
| | Cat. No. | Stock | øD | ℓ | L | ød |
|---|---|---|---|---|---|---|
| 2 | **LSM 2010ZX** | | 1,0 | 5,0 | 45 | 4 |
| | **LSM 2015ZX** | | 1,5 | 7,0 | 45 | 4 |
| | **LSM 2020ZX** | | 2,0 | 9,0 | 45 | 4 |
| | **LSM 2025ZX** | | 2,5 | 12,0 | 45 | 4 |
| | **LSM 2030ZX** | ❍ | 3,0 | 12,0 | 50 | 6 |
| | **LSM 2035ZX** | ❍ | 3,5 | 12,0 | 50 | 6 |
| | **LSM 2040ZX** | ❍ | 4,0 | 15,0 | 50 | 6 |
| | **LSM 2045ZX** | | 4,5 | 15,0 | 50 | 6 |
| | **LSM 2050ZX** | ❍ | 5,0 | 18,0 | 55 | 6 |
| | **LSM 2055ZX** | | 5,5 | 18,0 | 55 | 6 |
| | **LSM 2060ZX** | ❍ | 6,0 | 18,0 | 55 | 6 |
| | **LSM 2065ZX** | ❍ | 6,5 | 18,0 | 55 | 8 |
| | **LSM 2070ZX** | ❍ | 7,0 | 25,0 | 65 | 8 |
| | **LSM2075ZX** | | 7,5 | 25,0 | 65 | 8 |
| | **LSM 2080ZX** | ❍ | 8,0 | 25,0 | 65 | 8 |
| | **LSM 2085ZX** | | 8,5 | 25,0 | 65 | 10 |
| | **LSM 2090ZX** | ❍ | 9,0 | 25,0 | 65 | 10 |
| | **LSM 2095ZX** | | 9,5 | 25,0 | 65 | 10 |
| | **LSM 2100ZX** | ❍ | 10,0 | 30,0 | 75 | 10 |
| | **LSM 2105ZX** | | 10,5 | 30,0 | 80 | 12 |
| | **LSM 2110ZX** | ❍ | 11,0 | 30,0 | 80 | 12 |
| | **LSM 2115ZX** | | 11,5 | 30,0 | 80 | 12 |
| | **LSM 2120ZX** | ❍ | 12,0 | 30,0 | 80 | 12 |
| | **LSM 2130ZX** | ❍ | 13,0 | 35,0 | 95 | 16 |
| | **LSM 2140ZX** | | 14,0 | 40,0 | 95 | 16 |
| | **LSM 2150ZX** | | 15,0 | 40,0 | 95 | 16 |
| | **LSM 2160ZX** | | 16,0 | 50,0 | 105 | 16 |
| | **LSM 2170ZX** | | 17,0 | 50,0 | 105 | 20 |
| | **LSM 2180ZX** | | 18,0 | 50,0 | 115 | 20 |
| | **LSM 2190ZX** | | 19,0 | 55,0 | 120 | 20 |
| | **LSM 2200ZX** | | 20,0 | 55,0 | 120 | 20 |
| | **LSM 2240ZX** | | 24,0 | 65,0 | 140 | 25 |
| | **LSM 2250ZX** | | 25,0 | 65,0 | 140 | 25 |

❍ = Delivery on request

## Recommended conditions

(Slotting) øD<ø3 ; $d_{oc}$ =0,5 x øD
øD≥ø3 ; $d_{oc}$ =1,0 x øD

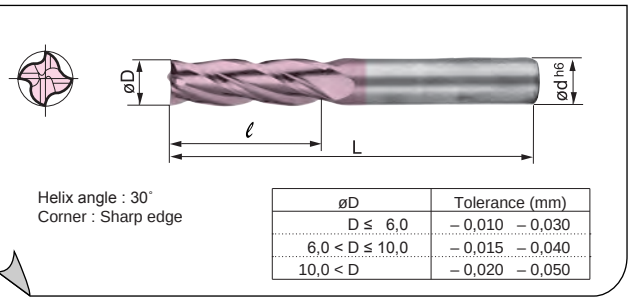
| øD \ Material | | Carbon steel, Alloy steel (BelowHRC25) | Carbon steel, Alloy steel (BelowHRC45) | Cast iron | Stainless steel, Ti-alloy etc, |
|---|---|---|---|---|---|
| 1,0 ~ 2,9 | $v_c$ | 200-**250**-300 | 100-**150**-200 | 100-**120**-150 | 60-**75**-90 |
| | $f_t$ | 0,002~0,008 | 0,001~0,004 | 0,003~0,01 2 | 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

# ZX Coated Long Spiral Endmills
# LSM 4000ZX Type

Coated carbide grade: ACZ50




Helix angle : 30°
Corner : Sharp edge

| 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 |

## ■ Endmills

(mm)

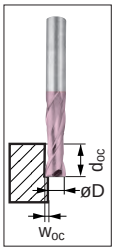
| | Cat. No. | Stock | øD | ℓ | L | ød |
|---|---|---|---|---|---|---|
| 4 | **LSM 4030ZX** | ❍ | 3,0 | 12,0 | 50 | 6 |
| | **LSM 4035ZX** | ❍ | 3,5 | 12,0 | 50 | 6 |
| | **LSM 4040ZX** | ❍ | 4,0 | 15,0 | 50 | 6 |
| | **LSM 4045ZX** | ❍ | 4,5 | 15,0 | 50 | 6 |
| | **LSM 4050ZX** | ❍ | 5,0 | 18,0 | 55 | 6 |
| | **LSM 4055ZX** | | 5,5 | 18,0 | 55 | 6 |
| | **LSM 4060ZX** | ❍ | 6,0 | 18,0 | 55 | 6 |
| | **LSM 4065ZX** | | 6,5 | 18,0 | 55 | 8 |
| | **LSM 4070ZX** | ❍ | 7,0 | 25,0 | 65 | 8 |
| | **LSM 4075ZX** | ❍ | 7,5 | 25,0 | 65 | 8 |
| | **LSM 4080ZX** | ❍ | 8,0 | 25,0 | 65 | 8 |
| | **LSM 4085ZX** | | 8,5 | 25,0 | 65 | 10 |
| | **LSM 4090ZX** | ❍ | 9,0 | 25,0 | 65 | 10 |
| | **LSM 4095ZX** | | 9,5 | 25,0 | 65 | 10 |
| | **LSM 4100ZX** | ❍ | 10,0 | 30,0 | 75 | 10 |
| | **LSM 4110ZX** | ❍ | 11,0 | 30,0 | 80 | 12 |
| | **LSM 4115ZX** | | 11,5 | 30,0 | 80 | 12 |
| | **LSM 4120ZX** | ❍ | 12,0 | 30,0 | 80 | 12 |
| | **LSM 4130ZX** | ❍ | 13,0 | 35,0 | 95 | 16 |
| | **LSM4140ZX** | ❍ | 14,0 | 40,0 | 95 | 16 |
| | **LSM 4150ZX** | ❍ | 15,0 | 40,0 | 95 | 16 |
| | **LSM 4160ZX** | ❍ | 16,0 | 50,0 | 105 | 16 |
| | **LSM 4170ZX** | | 17,0 | 50,0 | 105 | 20 |
| | **LSM 4180ZX** | | 18,0 | 50,0 | 115 | 20 |
| | **LSM 4190ZX** | | 19,0 | 55,0 | 120 | 20 |
| | **LSM 4200ZX** | | 20,0 | 55,0 | 120 | 20 |
| | **LSM 4220ZX** | | 22,0 | 60,0 | 135 | 25 |
| | **LSM 4250ZX** | | 25,0 | 65,0 | 140 | 25 |

❍ = Delivery on request

## Recommended conditions

(Shoulder processing) $d_{oc}$ =1,5 x øD
$w_{oc}$ =0,1 x øD

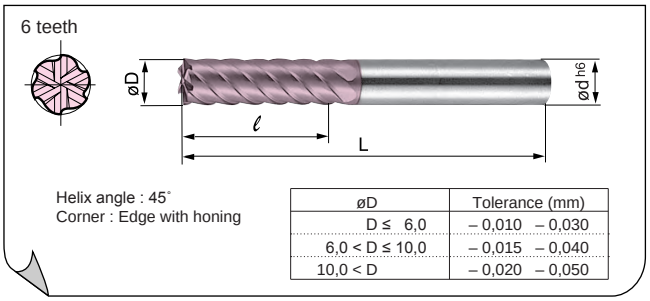
| øD \ Material | | Carbon steel, Alloy steel (BelowHRC25) | Carbon steel, Alloy steel (BelowHRC45) | Cast iron | Stainless steel, Ti-alloy etc, |
|---|---|---|---|---|---|
| 3,0 ~ 5,9 | $v_c$ | 200-**250**-300 | 100-**150**-200 | 100-**120**-150 | 60-**75**-90 |
| | $f_t$ | 0,013~0,027 | 0,007~0,01 3 | 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 Long Fast Helix Endmills
# LHHM 4000/6000/8000 ZX Type

Coated carbide grade: ACZ10M




Helix angle : 45°
Corner : Edge with honing

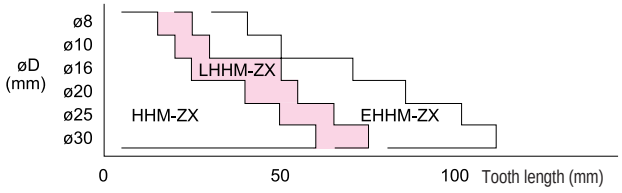
| øD | Tolerance (mm) |
|---|---|
| D ≤ 6,0 | – 0,010 – 0,030 |
| 6,0 < D ≤ 10,0 | – 0,015 – 0,040 |
| 10,0 < D | – 0,020 – 0,050 |

## Endmills

(mm)

| | Cat. No. | Stock | øD | ℓ | L | ød |
|---|---|---|---|---|---|---|
| 4 | **LHHM 4030ZX** | ❍ | 3,0 | 12 | 55 | 6 |
| | **LHHM 4040ZX** | ❍ | 4,0 | 15 | 60 | 6 |
| | **LHHM 4050ZX** | ❍ | 5,0 | 18 | 60 | 6 |
| 6 | **LHHM 6060ZX** | ❍ | 6,0 | 18 | 60 | 6 |
| | **LHHM 6080ZX** | ❍ | 8,0 | 25 | 75 | 8 |
| | **LHHM 6100ZX** | ❍ | 10,0 | 30 | 80 | 10 |
| | **LHHM 6120ZX** | ❍ | 12,0 | 30 | 100 | 12 |
| 8 | **LHHM 8160ZX** | ❍ | 16,0 | 50 | 105 | 16 |
| | **LHHM 8200ZX** | ❍ | 20,0 | 55 | 120 | 20 |
| | **LHHM 8250ZX** | ❍ | 25,0 | 65 | 140 | 25 |
| | **LHHM 8300ZX** | ❍ | 30,0 | 75 | 160 | 32 |
| | **LHHM 8320ZX** | ❍ | 32,0 | 85 | 170 | 32 |

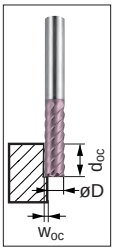
● = Euro stock
❍ = Delivery on request




## Recommended conditions

(Shoulder processing) $d_{oc}$ = 1,5 x øD
$w_{oc}$=0,025(HRC56~65) ~ 0,2(below HRC25) x øD

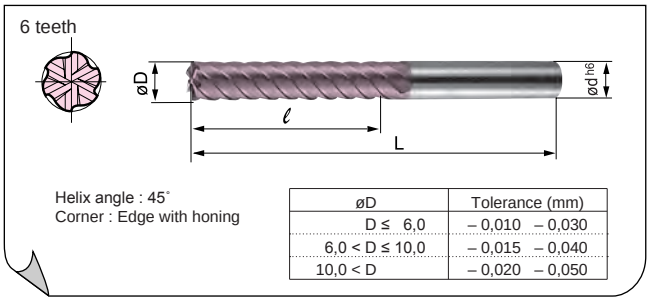
| øD \ Material | | Carbon steel, Alloy steel (BelowHRC25) | Carbon steel, Alloy steel (BelowHRC45) | Hardened steel (BelowHRC65) | Cast iron |
|---|---|---|---|---|---|
| 3,0 ~ 5,0 | $v_c$ | 200-**250**-300 | 100-**150**-200 | 80-**100**-120 | 60-**75**-90 |
| | $f_t$ | 0,030~0,060 | 0,022~0,037 | 0,007~0,015 | 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

Coated carbide grade: ACZ10M




Helix angle : 45°
Corner : Edge with honing

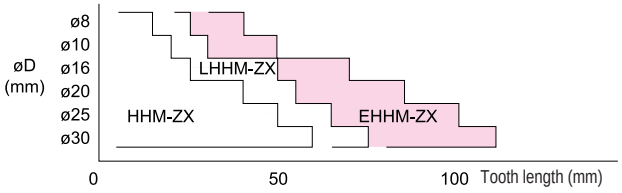
| øD | Tolerance (mm) |
|---|---|
| D ≤ 6,0 | – 0,010 – 0,030 |
| 6,0 < D ≤ 10,0 | – 0,015 – 0,040 |
| 10,0 < D | – 0,020 – 0,050 |

## Endmills

(mm)

| | Cat. No. | Stock | øD | ℓ | L | ød |
|---|---|---|---|---|---|---|
| 4 | **EHHM 4030ZX** | ❍ | 3,0 | 20 | 60 | 6 |
| | **EHHM 4040ZX** | ❍ | 4,0 | 25 | 65 | 6 |
| | **EHHM 4050ZX** | ❍ | 5,0 | 30 | 70 | 6 |
| 6 | **EHHM 6060ZX** | ❍ | 6,0 | 30 | 70 | 6 |
| | **EHHM 6080ZX** | ❍ | 8,0 | 40 | 90 | 8 |
| | **EHHM 6100ZX** | ❍ | 10,0 | 50 | 100 | 10 |
| | **EHHM 6120ZX** | ❍ | 12,0 | 50 | 120 | 12 |
| 8 | **EHHM 8160ZX** | ❍ | 16,0 | 70 | 140 | 16 |
| | **EHHM 8200ZX** | ❍ | 20,0 | 85 | 165 | 20 |
| | **EHHM 8250ZX** | ❍ | 25,0 | 100 | 185 | 25 |
| | **EHHM 8300ZX** | | 30,0 | 110 | 205 | 32 |
| | **EHHM 8320ZX** | | 32,0 | 110 | 205 | 32 |

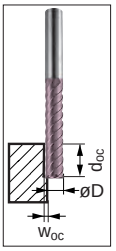
❍ = Delivery on request




## Recommended conditions

(Shoulder processing) $d_{oc}$= 1,5 x øD
$w_{oc}$=0,025(HRC56~65) ~ 0,2(below HRC25) x øD

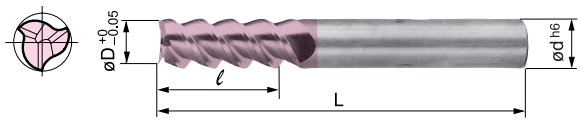
| øD \ Material | | Carbon steel, Alloy steel (BelowHRC25) | Carbon steel, Alloy steel (BelowHRC45) | Hardened steel (BelowHRC65) | Cast iron |
|---|---|---|---|---|---|
| 3,0 ~ 5,0 | $v_c$ | 200-**250**-300 | 100-**150**-200 | 80-**100**-120 | 100-**120**-150 |
| | $f_t$ | 0,020~0,040 | 0,015~0,025 | 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 | 0,01 0~0,019 | 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

# HSM 2000/3000/4000 ZX Type

Coated carbide grade: ACZ10M




Helix angle : 60°
Corner : Edge with honing

| 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 |

## Endmills

(mm)

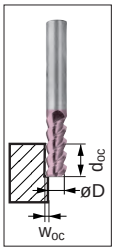
| | Cat. No. | Stock | øD | ℓ | L | ød |
|---|---|---|---|---|---|---|
| 2 | **HSM 2020ZX** | ❍ | 2,0 | 6 | 40 | 4 |
| | **HSM 2030ZX** | ❍ | 3,0 | 8 | 45 | 6 |
| | **HSM 2040ZX** | ❍ | 4,0 | 10 | 45 | 6 |
| 3 | **HSM 3030ZX** | ● | 3,0 | 12 | 45 | 6 |
| | **HSM 3040ZX** | ● | 4,0 | 15 | 45 | 6 |
| | **HSM 3050ZX** | ● | 5,0 | 12 | 50 | 6 |
| | **HSM 3060ZX** | ● | 6,0 | 15 | 50 | 6 |
| | **HSM 3070ZX** | ❍ | 7,0 | 18 | 60 | 8 |
| | **HSM 3080ZX** | ● | 8,0 | 18 | 60 | 8 |
| | **HSM 3090ZX** | ❍ | 9,0 | 20 | 65 | 10 |
| | **HSM 3100ZX** | ● | 10,0 | 25 | 70 | 10 |
| | **HSM 3110ZX** | | 11,0 | 25 | 75 | 12 |
| | **HSM 3120ZX** | ● | 12,0 | 30 | 75 | 12 |
| | **HSM 3130ZX** | | 13,0 | 30 | 80 | 16 |
| | **HSM 3140ZX** | ❍ | 14,0 | 30 | 90 | 16 |
| | **HSM 3150ZX** | ● | 15,0 | 30 | 95 | 16 |
| | **HSM 3160ZX** | ● | 16,0 | 35 | 95 | 16 |
| | **HSM 3180ZX** | | 18,0 | 40 | 110 | 20 |
| | **HSM 3200ZX** | ❍ | 20,0 | 40 | 110 | 20 |
| 4 | **HSM 4200ZX** | ❍ | 20,0 | 40 | 110 | 20 |
| | **HSM 4250ZX** | | 25,0 | 50 | 120 | 25 |

● = Euro stock
❍ = Delivery on request

## Recommended conditions

(Shoulder processing) $d_{oc}$ =1,5 x øD
$w_{oc}$ =0,1 x øD

| øD \ Material | | Carbon steel, Alloy steel (BelowHRC25) | Carbon steel, Alloy steel (BelowHRC45) | Cast iron | Stainless steel, Ti-alloy etc, |
|---|---|---|---|---|---|
| 1,0 ~ 2,9 | $v_c$ | 200-**250**-300 | 100-**150**-200 | 100-**120**-150 | 60-**75**-90 |
| | $f_t$ | 0,010~0,035 | 0,005~0,017 | 0,015~0,055 | 0,005~0,017 |
| 3,0 ~ 5,9 | $v_c$ | 200-**250**-300 | 100-**150**-200 | 100-**120**-150 | 60-**75**-90 |
| | $f_t$ | 0,040~0050 | 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 |



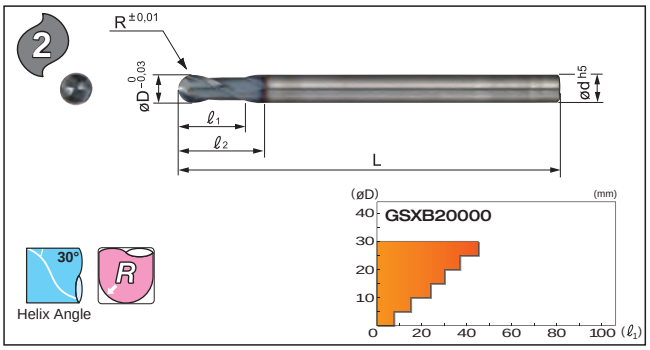

$v_c$ =m/min $f_t$ =mm/tooth

# GSX MILL Ball Endmills
# GSXB 20000 Type

New

Coated Carbide Grades | GSX Coating

| Structual Steel | Carbon Steel | Alloy Steel | Pre-hardened Steel | Tempered Die Steel | Hardened Steel 45~55 HRC | Hardened Steel 55~60 HRC | Hardened Steel 60~65 HRC | Stainless Steel | Ti Alloy / Heat Resistant Alloy | Cast iron | Al Alloy | Cu Alloy | Graphite |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | ○ | | ◎ | ○ | ○ | | | |




Coated carbide grade: **ACF20**

## Endmill Identification (GSXB Type)

**GSXB 2 0200**

① Series Code | ② No. of Teeth | ③ Radius of Ballnose

## Endmills

(mm)

| Cat. No. | Stock | R | øD | $\ell_1$ | $\ell_2$ | L | ød |
|---|---|---|---|---|---|---|---|
| **GSXB 20020** | ● | 0,20 | 0,4 | 0,6 | 0,8 | 50 | 4 |
| **GSXB 20030** | ● | 0,30 | 0,6 | 0,9 | 1,2 | 50 | 4 |
| **GSXB 20050** | ● | 0,50 | 1,0 | 1,5 | 2,0 | 50 | 4 |
| **GSXB 20075** | ● | 0,75 | 1,5 | 2,5 | 3,0 | 50 | 4 |
| **GSXB 20100** | ● | 1,00 | 2,0 | 3,0 | 4,0 | 60 | 6 |
| **GSXB 20125** | ● | 1,25 | 2,5 | 4,0 | 5,0 | 60 | 6 |
| **GSXB 20150** | ● | 1,50 | 3,0 | 4,5 | 6,0 | 60 | 6 |
| **GSXB 20200** | ● | 2,00 | 4,0 | 6,0 | 8,0 | 70 | 6 |
| **GSXB 20250** | ● | 2,50 | 5,0 | 7,5 | 10,0 | 80 | 6 |
| **GSXB 20300** | ● | 3,00 | 6,0 | 9,0 | – | 80 | 6 |
| **GSXB 20350** | ● | 3,50 | 7,0 | 11,0 | 20,0 | 90 | 8 |
| **GSXB 20400** | ● | 4,00 | 8,0 | 12,0 | – | 90 | 8 |
| **GSXB 20500** | ● | 5,00 | 10,0 | 15,0 | – | 100 | 10 |
| **GSXB 20600** | ● | 6,00 | 12,0 | 18,0 | – | 110 | 12 |
| **GSXB 20700** | ● | 7,00 | 14,0 | 21,0 | 38,0 | 110 | 16 |
| **GSXB 20800** | ● | 8,00 | 16,0 | 24,0 | – | 140 | 16 |
| **GSXB 20900** | ● | 9,00 | 18,0 | 27,0 | 50,0 | 140 | 20 |
| **GSXB 21000** | ● | 10,00 | 20,0 | 30,0 | – | 160 | 20 |
| **GSXB 21250** | | 12,50 | 25,0 | 38,0 | – | 180 | 25 |
| **GSXB 21500** | | 15,00 | 30,0 | 45,0 | 80,0 | 180 | 32 |

● = Euro stock



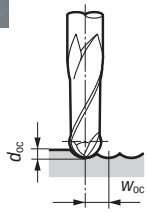
New "Global Standard" Mills
Ball nose type with 2 teeth





## Recommended cutting conditions

(1) If cutting noise and vibration are present, please change the cutting conditions accordingly.
(2) If the machine is not designed to achieve the recommended spindle speed, please use the max. spindle speed available.

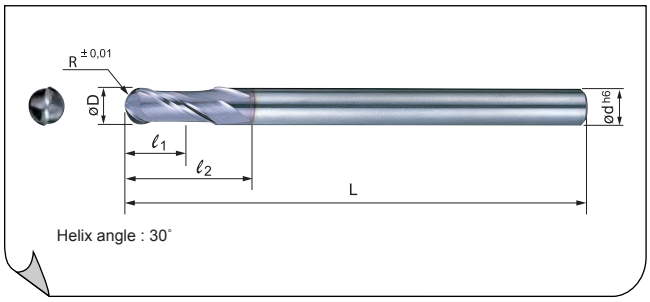



### Radius Milling

| Work Material / Cutting Conditions / R (mm) | Carbon Steel, Alloy Steel (Below 25HRC) Spindle Speed (rpm) | Carbon Steel, Alloy Steel (Below 25HRC) Feed Rate (mm/min) | Carbon Steel, Alloy Steel (Below 50HRC) Spindle Speed (rpm) | Carbon Steel, Alloy Steel (Below 50HRC) Feed Rate (mm/min) | Cast Iron Special Cast Iron Spindle Speed (rpm) | Cast Iron Special Cast Iron Feed Rate (mm/min) | Stainless Steel Titanium Alloy Spindle Speed (rpm) | Stainless Steel Titanium Alloy Feed Rate (mm/min) |
|---|---|---|---|---|---|---|---|---|
| 0,20 | 50.000 | 2.100 | 35.000 | 1.150 | 50.000 | 2.100 | 50.000 | 1.750 |
| 0,30 | 50.000 | 2.500 | 35.000 | 1.350 | 50.000 | 2.500 | 50.000 | 2.100 |
| 0,50 | 50.000 | 3.000 | 35.000 | 1.600 | 50.000 | 3.000 | 50.000 | 2.500 |
| 0,75 | 35.000 | 3.000 | 24.000 | 1.650 | 35.000 | 3.200 | 34.000 | 2.500 |
| 1,00 | 27.500 | 3.000 | 19.000 | 1.700 | 35.000 | 3.900 | 26.000 | 2.500 |
| 1,25 | 22.500 | 3.000 | 15.500 | 1.700 | 28.000 | 3.900 | 21.000 | 2.500 |
| 1,50 | 19.000 | 3.000 | 13.000 | 1.700 | 24.000 | 3.900 | 17.500 | 2.500 |
| 2,00 | 17.000 | 3.800 | 12.000 | 2.100 | 20.000 | 4.100 | 15.000 | 2.700 |
| 2,50 | 15.500 | 4.300 | 11.000 | 2.200 | 18.000 | 4.600 | 12.000 | 2.500 |
| 3,00 | 14.000 | 4.700 | 10.500 | 2.500 | 16.500 | 5.300 | 10.500 | 2.500 |
| 3,50 | 12.500 | 4.200 | 9.000 | 2.100 | 14.000 | 4.500 | 9.000 | 2.200 |
| 4,00 | 11.000 | 3.500 | 7.900 | 1.900 | 12.500 | 4.000 | 7.800 | 1.900 |
| 5,00 | 9.000 | 2.800 | 6.300 | 1.500 | 10.500 | 3.300 | 6.300 | 1.500 |
| 6,00 | 7.500 | 2.400 | 5.200 | 1.250 | 8.700 | 2.800 | 5.200 | 1.250 |
| 7,00 | 6.400 | 2.100 | 4.500 | 1.100 | 7.400 | 2.400 | 4.500 | 1.100 |
| 8,00 | 5.600 | 1.800 | 3.900 | 950 | 6.500 | 2.100 | 3.900 | 950 |
| 9,00 | 5.000 | 1.600 | 3.500 | 850 | 5.800 | 1.900 | 3.500 | 850 |
| 10,00 | 4.500 | 1.450 | 3.100 | 750 | 5.200 | 1.700 | 3.150 | 750 |
| 12,50 | 3.600 | 1.150 | 2.500 | 600 | 4.200 | 1.350 | 2.500 | 600 |
| 15,00 | 3.000 | 960 | 2.100 | 500 | 3.500 | 1.150 | 2.100 | 500 |
| Depth and wide of cut $d_{oc}$ | 0,02 *D* | | 0,02 *D* | | 0,02 *D* | | 0,02 *D* | |
| Depth and wide of cut $w_{oc}$ | 0,05 *D* | | 0,05 *D* | | 0,05 *D* | | 0,05 *D* | |

# GLB 2000SF Type

Coated carbide grade: **ACZ20W**




## ■ Endmills

(mm)

| | Cat. No. | | R | øD | $\ell_1$ | $\ell_2$ | L | ød |
|---|---|---|---|---|---|---|---|---|
| 2 | **GLB 2010 SF** | ▲ | 0,5 | 1,0 | 1,5 | 2 | 50 | 4 |
| | **GLB 2015 SF** | ▲ | 0,75 | 1,5 | 2,5 | 3 | 50 | 4 |
| | **GLB 2020 SF** | ▲ | 1,0 | 2,0 | 3 | 4 | 60 | 6 |
| | **GLB 2025 SF** | ▲ | 1,25 | 2,5 | 4 | 5 | 60 | 6 |
| | **GLB 2030 SF** | ▲ | 1,5 | 3,0 | 4,5 | 6 | 60 | 6 |
| | **GLB 2040 SF** | ▲ | 2,0 | 4,0 | 6 | 8 | 70 | 6 |
| | **GLB 2050 SF** | ▲ | 2,5 | 5,0 | 7,5 | 10 | 80 | 6 |
| | **GLB 2060 SF** | ▲ | 3,0 | 6,0 | 9 | – | 80 | 6 |
| | **GLB 2080 SF** | ▲ | 4,0 | 8,0 | 12 | – | 90 | 8 |
| | **GLB 2100 SF** | ▲ | 5,0 | 10,0 | 15 | – | 100 | 10 |
| | **GLB 2120 SF** | ▲ | 6,0 | 12,0 | 21 | – | 110 | 12 |

▲= To be replaced by new item. (Please confirm stock availability)



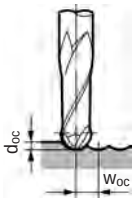
## ■ Recommended cutting conditions

### Conventional Milling Operations

Recommended :

(1) Cutting performance is enhanced when using a high quality machine and rigid set up.

(2) In case of chatter check immediately rigidity of set up and the cutting conditions.



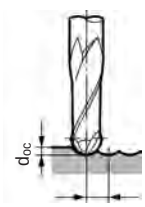

### ● GS Mill, 2 teeth ball nose type endmill, GLB 2000SF

| Material / Cutting data / R (mm) | | Carbon steel, Cast iron (HB150~250) | | Alloy steel, Prehardened steel (HRC25~35) | | Heat treated alloy steel, hardened steel (HRC35~45) | | Hardened steel (HRC45~55) | | Stainless steel | | Heat resistant alloys Titanium alloy | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Speed (rpm) | Feed (mm/min) | Speed (rpm) | Feed (mm/min) | Speed (rpm) | Feed (mm/min) | Speed (rpm) | Feed (mm/min) | Speed (rpm) | Feed (mm/min) | Speed (rpm) | Feed (mm/min) |
| R = 1 | | 19.100 | 770 | 12.800 | 370 | 10.200 | 270 | 8.900 | 190 | 8.900 | 210 | 6.400 | 120 |
| R = 2 | | 10.800 | 1.100 | 7.200 | 550 | 5.700 | 400 | 5.000 | 280 | 5.000 | 310 | 3.600 | 180 |
| R = 3 | | 7.700 | 1.300 | 5.200 | 660 | 4.100 | 480 | 3.600 | 330 | 3.600 | 380 | 2.600 | 210 |
| R = 4 | | 6.000 | 1.400 | 4.000 | 700 | 3.200 | 510 | 2.800 | 360 | 2.800 | 400 | 2.000 | 230 |
| R = 5 | | 4.800 | 1.400 | 3.200 | 700 | 2.600 | 520 | 2.300 | 370 | 2.300 | 410 | 1.600 | 230 |
| R = 6 | | 4.000 | 1.400 | 2.700 | 710 | 2.200 | 530 | 1.900 | 370 | 1.900 | 410 | 1.400 | 240 |
| Depth and width of cut | $d_{oc}$ | 0,1D | | | | 0,05D | | | | 0,1D | | 0,05D | |
| | $W_{oc}$ | 0,2D | | | | 0,05D | | | | 0,2D | | 0,1D | |

### HSC Machining Centre Operations

### ● GS Mill, HSC operations with 2 teeth ball nose type endmill, GLB 2000SF

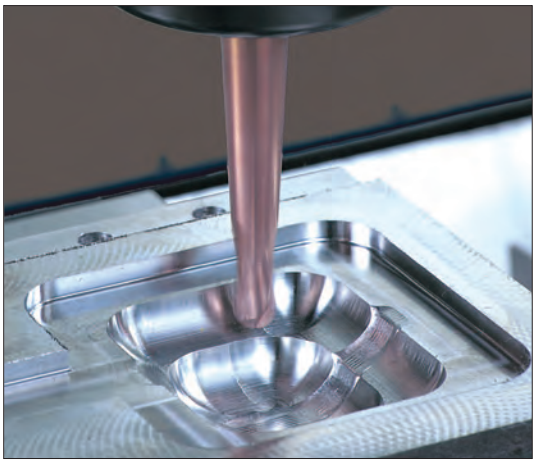
| Material / Cutting data / R (mm) | | Carbon steel, Cast iron (HB150~250) | | Alloy steel, Prehardened steel (HRC25~35) | | Heat treated alloy steel, hardened steel (HRC35~45) | | Hardened steel (HRC45~55) | | Stainless steel | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Speed (rpm) | Feed (mm/min) | Speed (rpm) | Feed (mm/min) | Speed (rpm) | Feed (mm/min) | Speed (rpm) | Feed (mm/min) | Speed (rpm) | Feed (mm/min) |
| R = 1 | | 51.000 | 2.100 | 39.800 | 1.300 | 35.700 | 960 | 23.700 | 640 | 35.700 | 960 |
| R = 2 | | 25.500 | 2.700 | 19.900 | 1.700 | 17.900 | 1.300 | 11.900 | 830 | 17.900 | 1.300 |
| R = 3 | | 17.000 | 3.000 | 13.300 | 1.900 | 11.900 | 1.400 | 7.900 | 920 | 11.900 | 1.400 |
| R = 4 | | 12.800 | 3.100 | 10.000 | 2.000 | 9.000 | 1.500 | 6.000 | 960 | 9.000 | 1.500 |
| R = 5 | | 10.200 | 3.100 | 8.000 | 2.000 | 7.200 | 1.500 | 4.800 | 960 | 7.200 | 1.500 |
| R = 6 | | 8.500 | 3.100 | 6.700 | 2.000 | 6.000 | 1.500 | 4.000 | 960 | 6.000 | 1.500 |
| Depth and wide of cut | $d_{oc}$ | 0,05D | | | | | | 0,02D | | 0,05D | |
| | $W_{oc}$ | 0,1D | | | | | | 0,05D | | 0,1D | |



# Ball Endmills "Neo"

## Extreme Hard ZX Coated Ball Endmills

Grade: ACZ10M



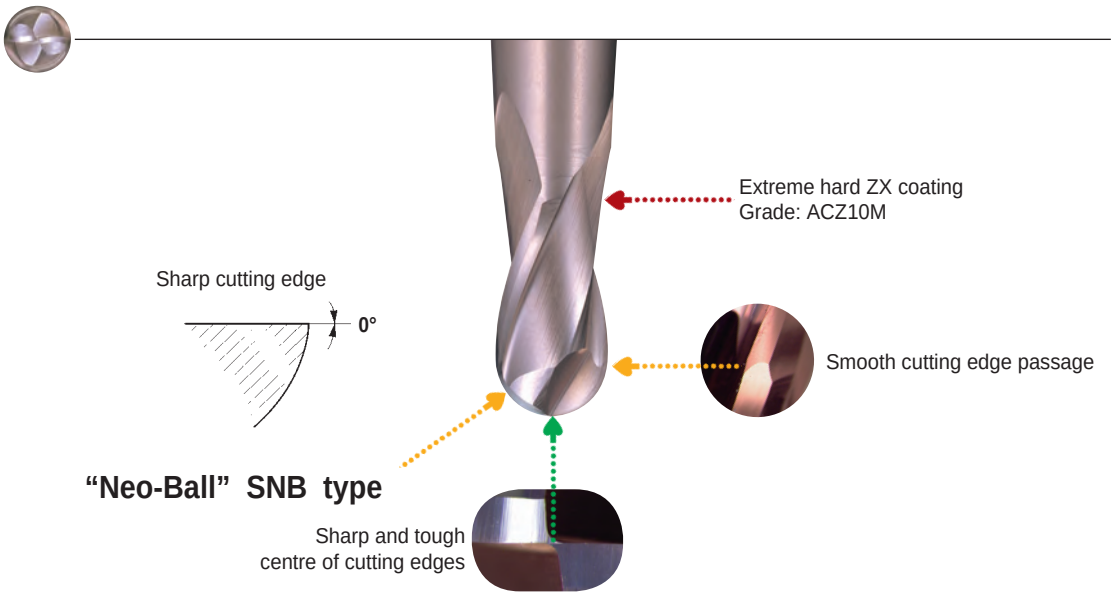
## Features

ZX coated ball-nose endmill "Neo" features the wave shaped sharp cutting edge for optimized chip control and performs a varity of high performance machining steels, stainless steels and high temperature alloys.

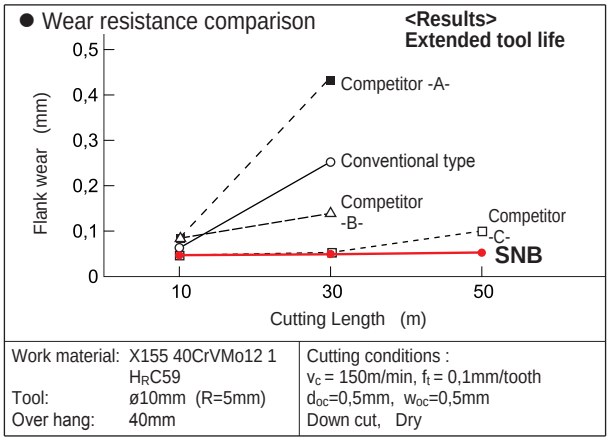
Extended tool life is realized even when hard machining thanks to a special stiff substrate and new ultra hard ZX coating.

## Advantages

- Smooth cutting due to sharp cutting edge
- Smooth passage at the cutting edge of radius part and straight part
- Sharp and tough ball-nose centre
- Extra durable due to the combination of extreme hard ZX coating (Hv4000) and stiff substrate
- Possible to high precision cutting with this high young ratio substrate




## Performance

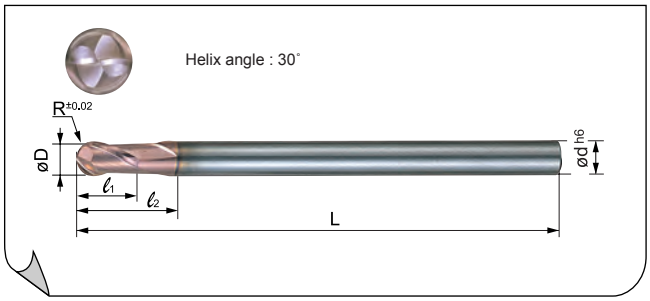



| | | | |
|---|---|---|---|
| Work material: | X155 40CrVMo12 1 $H_RC59$ | Cutting conditions : | |
| Tool: | ø10mm (R=5mm) | $v_c$ = 150m/min, $f_t$ = 0,1mm/tooth | |
| Over hang: | 40mm | $d_{oc}$=0,5mm, $w_{oc}$=0,5mm | |
| | | Down cut, Dry | |

# ZX Coated "Neo Ball" Endmills
# SNB 2000ZX Type

2

Coated carbide grade: ACZ10M




## Endmills (mm)

| | Cat. No. | Stock | R | øD | $\ell_1$ | $\ell_2$ | L | ød |
|---|---|---|---|---|---|---|---|---|
| | **SNB 2010ZX** | ● | 0,5 | 1 | 1,5 | 3 | 50 | 4 |
| | **SNB 2020ZX** | ● | 1,0 | 2 | 3,0 | 5 | 60 | 6 |
| | **SNB 2030ZX** | ● | 1,5 | 3 | 4,5 | 8 | 80 | 6 |
| | **SNB 2040ZX** | ● | 2,0 | 4 | 6,0 | 12 | 80 | 6 |
| | **SNB 2050ZX** | ❍ | 2,5 | 5 | 7,5 | 14 | 90 | 6 |
| | **SNB 2060ZX** | ● | 3,0 | 6 | 9,0 | – | 100 | 6 |
| | **SNB 2070ZX** | ❍ | 3,5 | 7 | 11,0 | 20 | 100 | 8 |
| | **SNB 2080ZX** | ● | 4,0 | 8 | 12,0 | – | 100 | 8 |
| | **SNB 2100ZX** | ● | 5,0 | 10 | 15,0 | – | 120 | 10 |
| | **SNB 2120ZX** | ● | 6,0 | 12 | 18,0 | – | 120 | 12 |
| | **SNB 2140ZX** | ● | 7,0 | 14 | 21,0 | 38 | 160 | 16 |
| | **SNB 2160ZX** | ● | 8,0 | 16 | 24,0 | – | 160 | 16 |
| | **SNB 2180ZX** | ● | 9,0 | 18 | 27,0 | 50 | 180 | 20 |
| | **SNB 2200ZX** | ● | 10,0 | 20 | 30,0 | – | 180 | 20 |
| | **SNB 2250ZX** | ❍ | 12,5 | 25 | 38,0 | – | 200 | 25 |
| | **SNB 2300ZX** | ❍ | 15,0 | 30 | 45,0 | 80 | 200 | 32 |

● = Euro stock
❍ = Delivery on request




### Recommended conditions

$d_{oc}$ =0,3 x øD, (Below R1,0 ; 0,2 x øD)
$w_{oc}$ =0,7 x øD, (Below R1,0 ; 0,6 x øD)

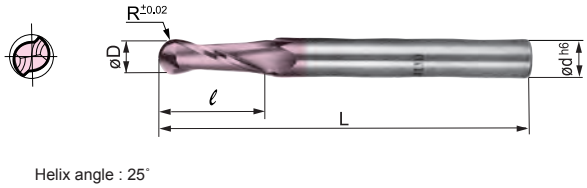
| R | | Carbon steel, Alloy steel (BelowHRC25) | Carbon steel, Alloy steel (BelowHRC45) | Hardened steel | Cast iron | Stainless steel, Ti-alloy etc, |
|---|---|---|---|---|---|---|
| R0,5 ~ R1,4 | $v_c$ | 200-**250**-300 | 100-**150**-200 | 100-**120**-150 | 100-**120**-150 | 60-**75**-90 |
| | $f_t$ | 0,005~0,010 | 0,003~0,005 | 0,002~0,003 | 0,008~0,015 | 0,003~0,005 |
| R1,5 ~ R2,9 | $v_c$ | 200-**250**-300 | 100-**150**-200 | 100-**120**-150 | 100-**120**-150 | 60-**75**-90 |
| | $f_t$ | 0,013~0,025 | 0,007~0,013 | 0,005~0,008 | 0,017~0,042 | 0,007~0,013 |
| R3,0 ~ R6,4 | $v_c$ | 200-**250**-300 | 100-**150**-200 | 100-**120**-150 | 100-**120**-150 | 60-**75**-90 |
| | $f_t$ | 0,030~0,050 | 0,017~0,033 | 0,010~0,020 | 0,056~0,136 | 0,017~0,033 |
| R6,5 ~ R9,9 | $v_c$ | 200-**250**-300 | 100-**150**-200 | 100-**120**-150 | 100-**120**-150 | 60-**75**-90 |
| | $f_t$ | 0,070~0,100 | 0,040~0,057 | 0,020~0,040 | 0,167~0,238 | 0,040~0,057 |
| R10,0 ~ R15,0 | $v_c$ | 200-**250**-300 | 100-**150**-200 | 100-**120**-150 | 100-**120**-150 | 60-**75**-90 |
| | $f_t$ | 0,118~0,167 | 0,085~0,095 | 0,045~0,080 | 0,250~0,350 | 0,085~0,095 |

$v_c$ =m/min $f_t$ =mm/tooth

# ZX Coated Ball Endmills
# SSB 2000ZX Type

2

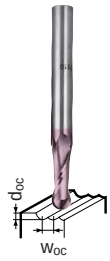
Coated carbide grade: ACZ50




## Endmills (mm)

| | Cat. No. | Stock | R | øD | ℓ | L | ød |
|---|---|---|---|---|---|---|---|
| | **SSB 2010ZX** | ▲ | 0,5 | 1 | 3 | 50 | 4 |
| | **SSB 2020ZX** | ▲ | 1,0 | 2 | 6 | 50 | 4 |
| | **SSB 2030ZX** | ▲ | 1,5 | 3 | 9 | 60 | 6 |
| | **SSB 2040ZX** | ▲ | 2,0 | 4 | 12 | 70 | 6 |
| | **SSB 2050ZX** | ▲ | 2,5 | 5 | 15 | 80 | 6 |
| | **SSB 2060ZX** | ▲ | 3,0 | 6 | 15 | 80 | 6 |
| | **SSB 2070ZX** | ▲ | 3,5 | 7 | 20 | 90 | 8 |
| | **SSB 2080ZX** | ▲ | 4,0 | 8 | 20 | 90 | 8 |
| | **SSB 2090ZX** | ▲ | 4,5 | 9 | 25 | 100 | 10 |
| | **SSB 2100ZX** | ▲ | 5,0 | 10 | 25 | 100 | 10 |
| | **SSB 2110ZX** | | 5,5 | 11 | 30 | 110 | 12 |
| | **SSB 2120ZX** | ▲ | 6,0 | 12 | 30 | 110 | 12 |
| | **SSB 2130ZX** | ▲ | 6,5 | 13 | 35 | 120 | 16 |
| | **SSB 2140ZX** | ▲ | 7,0 | 14 | 35 | 120 | 16 |
| | **SSB 2150ZX** | | 7,5 | 15 | 40 | 120 | 16 |
| | **SSB 2160ZX** | ▲ | 8,0 | 16 | 40 | 120 | 16 |
| | **SSB 2180ZX** | | 9,0 | 18 | 40 | 130 | 20 |
| | **SSB 2200ZX** | ▲ | 10,0 | 45 | 45 | 130 | 20 |
| | **SSB 2250ZX** | | 12,5 | 25 | 55 | 140 | 25 |

▲= To be replaced by new item. (Please confirm stock availability)




### Recommended conditions

$d_{oc}$ =0,3 x øD, (Below R1,0 ; 0,2 x øD)
$w_{oc}$ =0,7 x øD, (Below R1,0 ; 0,6 x øD)

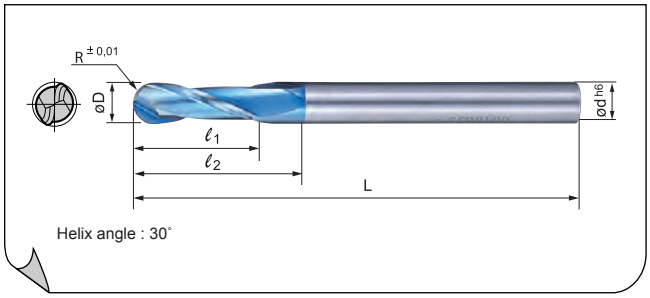
| R | | Carbon steel, Alloy steel (BelowHRC25) | Carbon steel, Alloy steel (BelowHRC45) | Cast iron | Stainless steel, Ti-alloy etc, |
|---|---|---|---|---|---|
| R0,5 ~ R1,4 | $v_c$ | 200-**250**-300 | 100-**150**-200 | 100-**120**-150 | 60-**75**-90 |
| | $f_t$ | 0,005~0,010 | 0,003~0,005 | 0,008~0,015 | 0,003~0,005 |
| R1,5 ~ R2,9 | $v_c$ | 200-**250**-300 | 100-**150**-200 | 100-**120**-150 | 60-**75**-90 |
| | $f_t$ | 0,013~0,025 | 0,007~0,013 | 0,017~0,042 | 0,007~0,013 |
| R3,0 ~ R6,4 | $v_c$ | 200-**250**-300 | 100-**150**-200 | 100-**120**-150 | 60-**75**-90 |
| | $f_t$ | 0,030~0,050 | 0,017~0,033 | 0,056~0,136 | 0,017~0,033 |
| R6,5 ~ R9,9 | $v_c$ | 200-**250**-300 | 100-**150**-200 | 100-**120**-150 | 60-**75**-90 |
| | $f_t$ | 0,070~0,100 | 0,040~0,057 | 0,167~0,238 | 0,040~0,057 |
| R10,0 ~ R12,5 | $v_c$ | 200-**250**-300 | 100-**150**-200 | 100-**120**-150 | 60-**75**-90 |
| | $f_t$ | 0,118~0,167 | 0,085~0,095 | 0,250~0,350 | 0,085~0,095 |

$v_c$ =m/min $f_t$ =mm/tooth

# SNB 2000DL Type

## DLC (Diamond Like Carbon) Coating

DLC coated carbide grade: DL1200




## ■ Endmills

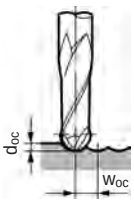
(mm)

| | Cat. No. | Stock | R | øD | ℓ1 | ℓ2 | L | ød |
|---|---|---|---|---|---|---|---|---|
| 2 | **SNB 2020 DL** | ● | 1,0 | 2,0 | 3 | 5 | 60 | 6 |
| | **SNB 2030 DL** | ● | 1,5 | 3,0 | 4,5 | 8 | 80 | 6 |
| | **SNB 2040 DL** | ● | 2,0 | 4,0 | 6 | 12 | 80 | 6 |
| | **SNB 2050 DL** | ● | 2,5 | 5,0 | 7,5 | 14 | 90 | 6 |
| | **SNB 2060 DL** | ● | 3,0 | 6,0 | 9 | – | 100 | 6 |
| | **SNB 2080 DL** | ● | 4,0 | 8,0 | 12 | – | 100 | 8 |
| | **SNB 2100 DL** | ● | 5,0 | 10,0 | 15 | – | 120 | 10 |
| | **SNB 2120 DL** | ● | 6,0 | 12,0 | 18 | – | 120 | 12 |
| | **SNB 2160 DL** | ● | 8,0 | 16,0 | 24 | – | 160 | 16 |

● = Euro stock

## ■ Characteristics / Application

- Very smooth AURORA COAT results in low adhesion as well as good surface finish
- With lower cutting forces and high rigidity, this series is suitable for low rigidity machine






## ■ Recommended cutting conditions

| Work Material | | Aluminum Alloy | | | |
|---|---|---|---|---|---|
| Cutting data / R (mm) | | Wet (Emulsion) | | Dry | |
| | | Speed (rpm) | Feed (mm/min) | Speed (rpm) | Feed (mm/min) |
| R = 1 | | 48.000 | 1.500 | 48.000 | 1.000 |
| R = 1,5 | | 48.000 | 2.100 | 48.000 | 1.500 |
| R = 2 | | 31.000 | 2.800 | 31.000 | 2.000 |
| R = 2,5 | | 24.000 | 2.800 | 24.000 | 2.000 |
| R = 3 | | 20.000 | 2.800 | 20.000 | 2.000 |
| R = 4 | | 15.000 | 2.800 | 15.000 | 2.000 |
| R = 5 | | 13.000 | 3.000 | 13.000 | 2.100 |
| R = 6 | | 10.000 | 3.000 | 10.000 | 2.100 |
| R = 8 | | 7.700 | 3.000 | 7.700 | 2.100 |
| Depth and wide of cut | $d_{oc}$ | 1,5D | | 1,0D | |
| | $W_{oc}$ | 0,2D | | (D) | |

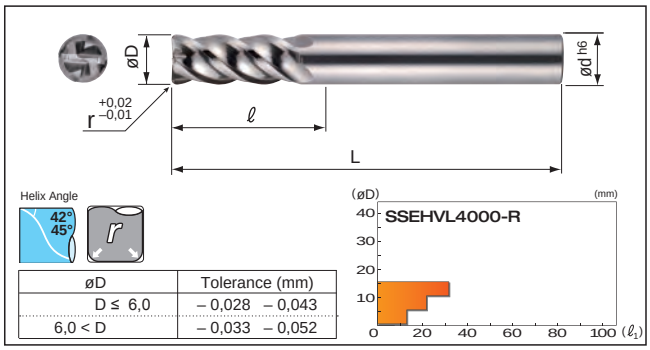
## Anti-Vibration Type Radius Endmills for Exotic Alloys

# SSEHVL 4000-R Type

New

Uncoated Carbide | 4

| Structal Steel | Carbon Steel | Alloy Steel | Pre-hardened Steel | Tempered Die Steel | Hardened Steel 45~55 HRC | Hardened Steel 55~60 HRC | Hardened Steel 60~65 HRC | Stainless Steel | Ti Alloy / Heat Resistant Alloy | Cast iron | Al Alloy | Cu Alloy | Graphite |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | ○ | ◎ | | | | |




| øD | Tolerance (mm) |
|---|---|
| D ≤ 6,0 | – 0,028 – 0,043 |
| 6,0 < D | – 0,033 – 0,052 |

Carbide grade: EH520

## Endmills

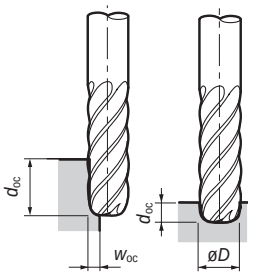
(mm)

| Cat. No. | Stock | øD | $\ell_1$ | $\ell_2$ | L | ød |
|---|---|---|---|---|---|---|
| **SSEHVL 4045-R05** | ● | 4,5 | 0,5 | 12 | 50 | 6 |
| **SSEHVL 4045-R10** | ● | 4,5 | 1,0 | 12 | 50 | 6 |
| **SSEHVL 4050-R05** | ● | 5,0 | 0,5 | 13 | 60 | 6 |
| **SSEHVL 4050-R10** | ● | 5,0 | 1,0 | 13 | 60 | 6 |
| **SSEHVL 4060-R10** | ● | 6,0 | 1,0 | 13 | 60 | 6 |
| **SSEHVL 4080-R10** | ● | 8,0 | 1,0 | 19 | 80 | 8 |
| **SSEHVL 4100-R10** | ● | 10,0 | 1,0 | 22 | 90 | 10 |
| **SSEHVL 4100-R30** | ● | 10,0 | 3,0 | 22 | 90 | 10 |
| **SSEHVL 4120-R10** | ● | 12,0 | 1,0 | 26 | 90 | 12 |
| **SSEHVL 4120-R30** | ● | 12,0 | 3,0 | 26 | 90 | 12 |
| **SSEHVL 4160-R10** | ● | 16,0 | 1,0 | 32 | 115 | 16 |
| **SSEHVL 4160-R30** | ● | 16,0 | 3,0 | 32 | 115 | 16 |

● = Euro stock

## Characteristics / Application

1. For stable machining, a more rigid machine is recommended.
2. Wet machining is recommended for stainless steel and heat resistant alloy applications.
3. If cutting noise and vibration are present, please change the cutting conditions accordingly.




### ● Shoulder Milling

| Work Material / Cond. / øD (mm) | Stainless Steel Spindle Speed (rpm) | Stainless Steel Feed Rate (mm/min) | Titanium Alloy Spindle Speed (rpm) | Titanium Alloy Feed Rate (mm/min) | Heat Resistive Steel Spindle Speed (rpm) | Heat Resistive Steel Feed Rate (mm/min) |
|---|---|---|---|---|---|---|
| 4.5 | 2.300 | 120 | 4.600 | 370 | 1.600 | 130 |
| 5.0 | 2.000 | 130 | 4.100 | 410 | 1.500 | 150 |
| 6.0 | 1.700 | 130 | 3.400 | 400 | 1.200 | 140 |
| 8.0 | 1.300 | 130 | 2.600 | 360 | 900 | 130 |
| 10.0 | 1.000 | 130 | 2.100 | 340 | 700 | 110 |
| 12.0 | 800 | 110 | 1.700 | 300 | 600 | 100 |
| 16.0 | 600 | 90 | 1.300 | 260 | 500 | 100 |
| Shoulder cutting $d_{oc}$ | 1.5 *D* | | | | | |
| Shoulder cutting $w_{oc}$ | *0.1 D* | | *0.05 D* | | *0.05 D* | |

### ● Grooving

| Work Material / Cond. / øD (mm) | Stainless Steel Spindle Speed (rpm) | Stainless Steel Feed Rate (mm/min) | Titanium Alloy Spindle Speed (rpm) | Titanium Alloy Feed Rate (mm/min) | Heat Resistive Steel Spindle Speed (rpm) | Heat Resistive Steel Feed Rate (mm/min) |
|---|---|---|---|---|---|---|
| 4,5 | 1.800 | 50 | 3.200 | 250 | 1.300 | 110 |
| 5,0 | 1.600 | 50 | 2.900 | 290 | 1.200 | 120 |
| 6,0 | 1.400 | 50 | 2.400 | 290 | 1.000 | 120 |
| 8,0 | 1.000 | 50 | 1.800 | 250 | 700 | 90 |
| 10,0 | 800 | 50 | 1.400 | 230 | 600 | 100 |
| 12,0 | 600 | 50 | 1.200 | 210 | 500 | 90 |
| 16,0 | 500 | 40 | 900 | 180 | 400 | 80 |
| Grooving $d_{oc}$ | 0,3 *D* | | 0,2 *D* | | 0,15 *D* | |

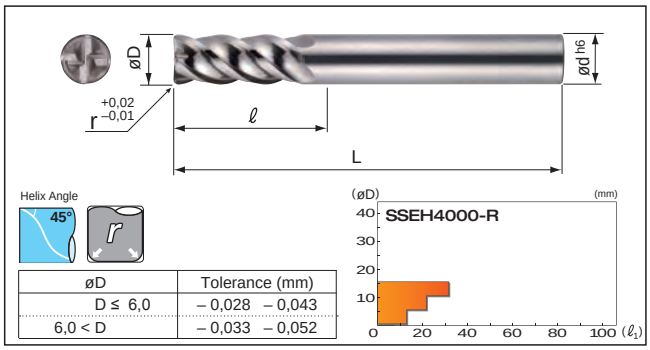
## Radius Endmills for Exotic Alloys

# SSEH 4000-R Type

New

Uncoated Carbide | 4

| Structal Steel | Carbon Steel | Alloy Steel | Pre-hardened Steel | Tempered Die Steel | Hardened Steel 45~55 HRC | Hardened Steel 55~60 HRC | Hardened Steel 60~65 HRC | Stainless Steel | Ti Alloy / Heat Resistant Alloy | Cast iron | Al Alloy | Cu Alloy | Graphite |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | ○ | ◎ | | | | |




| øD | Tolerance (mm) |
|---|---|
| D ≤ 6,0 | – 0,028 – 0,043 |
| 6,0 < D | – 0,033 – 0,052 |

Carbide grade: EH520

## Endmills

(mm)

| Cat. No. | Stock | øD | $\ell_1$ | $\ell_2$ | L | ød |
|---|---|---|---|---|---|---|
| **SSEH 4045-R05** | ● | 4,5 | 0,5 | 12 | 50 | 6 |
| **SSEH 4045-R10** | ● | 4,5 | 1,0 | 12 | 50 | 6 |
| **SSEH 4050-R05** | ● | 5,0 | 0,5 | 13 | 60 | 6 |
| **SSEH 4050-R10** | ● | 5,0 | 1,0 | 13 | 60 | 6 |
| **SSEH 4060-R10** | ● | 6,0 | 1,0 | 13 | 60 | 6 |
| **SSEH 4080-R10** | ● | 8,0 | 1,0 | 19 | 80 | 8 |
| **SSEH 4100-R10** | ● | 10,0 | 1,0 | 22 | 90 | 10 |
| **SSEH 4100-R30** | ● | 10,0 | 3,0 | 22 | 90 | 10 |
| **SSEH 4120-R10** | ● | 12,0 | 1,0 | 26 | 90 | 12 |
| **SSEH 4120-R30** | ● | 12,0 | 3,0 | 26 | 90 | 12 |
| **SSEH 4160-R10** | ● | 16,0 | 1,0 | 32 | 115 | 16 |
| **SSEH 4160-R30** | ● | 16,0 | 3,0 | 32 | 115 | 16 |

● = Euro stock

### ● Shoulder Milling

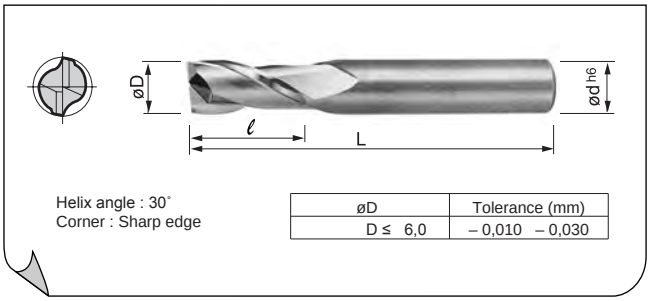
| Work Material / Cond. / øD (mm) | Stainless Steel Spindle Speed (rpm) | Stainless Steel Feed Rate (mm/min) | Titanium Alloy Spindle Speed (rpm) | Titanium Alloy Feed Rate (mm/min) | Heat Resistive Steel Spindle Speed (rpm) | Heat Resistive Steel Feed Rate (mm/min) |
|---|---|---|---|---|---|---|
| 4,5 | 1.800 | 90 | 3.500 | 280 | 1.400 | 110 |
| 5,0 | 1.600 | 100 | 3.200 | 320 | 1.300 | 130 |
| 6,0 | 1.300 | 100 | 2.700 | 320 | 1.100 | 130 |
| 8,0 | 1.000 | 100 | 2.000 | 280 | 800 | 110 |
| 10,0 | 800 | 100 | 1.600 | 260 | 600 | 100 |
| 12,0 | 700 | 100 | 1.300 | 230 | 500 | 90 |
| 16,0 | 500 | 80 | 1.000 | 200 | 400 | 80 |
| Shoulder cutting $d_{oc}$ | 1,5 *D* | | | | | |
| Shoulder cutting $w_{oc}$ | *0,1 D* | | *0,05 D* | | *0,05 D* | |

### ● Grooving

| Work Material / Cond. / øD (mm) | Stainless Steel Spindle Speed (rpm) | Stainless Steel Feed Rate (mm/min) | Titanium Alloy Spindle Speed (rpm) | Titanium Alloy Feed Rate (mm/min) | Heat Resistive Steel Spindle Speed (rpm) | Heat Resistive Steel Feed Rate (mm/min) |
|---|---|---|---|---|---|---|
| 4,5 | 1.400 | 40 | 2.500 | 200 | 1.100 | 90 |
| 5,0 | 1.300 | 40 | 2.200 | 220 | 1.000 | 100 |
| 6,0 | 1.100 | 40 | 1.900 | 230 | 800 | 100 |
| 8,0 | 800 | 40 | 1.400 | 200 | 600 | 80 |
| 10,0 | 600 | 40 | 1.100 | 180 | 500 | 80 |
| 12,0 | 500 | 40 | 900 | 160 | 400 | 70 |
| 16,0 | 400 | 30 | 700 | 140 | 300 | 60 |
| Grooving $d_{oc}$ | 0,3 *D* | | 0,2 *D* | | 0,15 *D* | |

# Solid Carbide Spiral Endmills
# SSM 2000 Type (ø0,2~ø4,3)

Carbide grade: A1 (Micrograin)




Helix angle : 30˚
Corner : Sharp edge

| øD | Tolerance (mm) |
|---|---|
| D ≤ 6,0 | – 0,010 – 0,030 |

## Endmills

(mm)

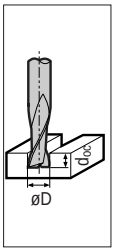
| | Cat. No. | Stock | øD | ℓ | L | ød |
|---|---|---|---|---|---|---|
| | SSM 2002 | ● | | 0,5 | 40 | 3 |
| | SSM 2003 | ● | 0,3 | 1 | 40 | 3 |
| | SSM 2004 | ● | 0,4 | 1 | 40 | 3 |
| | SSM 2005 | ● | 0,5 | 1,5 | 40 | 3 |
| | SSM 2006 | ● | 0,6 | 1,5 | 40 | 3 |
| | SSM 2007 | ● | 0,7 | 1,5 | 40 | 3 |
| | SSM 2008 | ● | 0,8 | 2 | 40 | 3 |
| | SSM 2009 | ● | 0,9 | 2 | 40 | 3 |
| | SSM 2010 | ● | 1,0 | 3 | 40 | |
| | SSM 2011 | | 1,1 | | 40 | |
| | SSM 2012 | ❍ | 1,2 | | 40 | |
| | SSM 2013 | | 1,3 | | 40 | |
| | SSM 2014 | | 1,4 | | 40 | |
| | 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 |
| 2 | 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 |

● = Euro stock

### Recommended conditions

(Slotting) øD<ø3 ; $d_{oc}$ =0,5 x øD
øD≥ø3 ; $d_{oc}$ =1,0 x øD

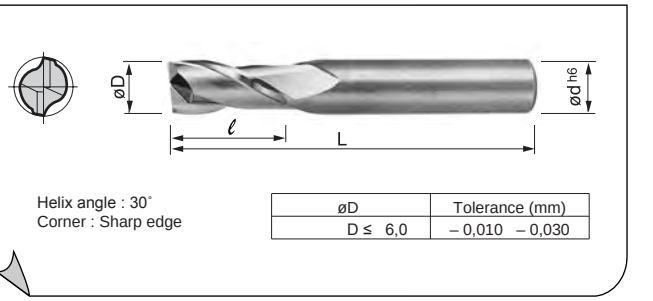
| øD \ Material | | Carbon steel, Alloy steel (BelowHRC30) | Carbon steel, Alloy steel (BelowHRC40) | Carbon steel, Alloy steel (BelowHRC45) | Cast iron |
|---|---|---|---|---|---|
| 0,2 ~ 0,9 | $v_c$ | 40-**50**-60 | 30-**40**-50 | 20-**30**-40 | 40-**50**-60 |
| | $f_t$ | ~ 0,002 | ~ 0,002 | ~ 0,001 | 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 |




$v_c$ =m/min $f_t$ =mm/tooth

# Solid Carbide Spiral Endmills
# SSM 2000 Type (ø4,4~ø8,5)

Carbide grade: A1 (Micrograin)




Helix angle : 30˚
Corner : Sharp edge

| øD | Tolerance (mm) |
|---|---|
| D ≤ 6,0 | – 0,010 – 0,030 |

## Endmills

(mm)

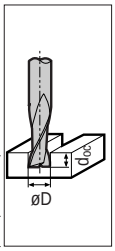
| | Cat. No. | Stock | øD | ℓ | L | ød |
|---|---|---|---|---|---|---|
| | SSM 2044 | | 4,4 | 10 | 45 | 6 |
| | SSM 2045 | ● | 4,5 | 10 | 45 | 6 |
| | SSM 2046 | | 4,6 | 12 | 50 | 6 |
| | SSM 2047 | | 4,7 | 12 | 50 | 6 |
| | SSM 2048 | | 4,8 | 12 | 50 | 6 |
| | SSM 2049 | | 4,9 | 12 | 50 | 6 |
| | SSM 2050 | ● | 5,0 | 12 | 50 | 6 |
| | SSM 2051 | | 5,1 | 12 | 50 | 6 |
| | SSM 2052 | | 5,2 | 12 | 50 | |
| | SSM 2053 | | 5,3 | | 50 | |
| | 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 | | 6 |
| 2 | SSM 2065 | ● | 6,5 | 12 | 50 | 8 |
| | SSM 2066 | | 6,6 | | 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
❍ = Delivery on request

### Recommended conditions

(Slotting) øD≥ø3 ; $d_{oc}$ =1,0 x øD

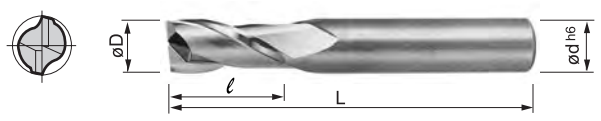
| øD \ Material | | Carbon steel, Alloy steel (BelowHRC30) | Carbon steel, Alloy steel (BelowHRC40) | Carbon steel, Alloy steel (BelowHRC45) | Cast iron |
|---|---|---|---|---|---|
| 5 ~ 5,9 | $v_c$ | 40-**50**-60 | 30-**40**-50 | 20-**30**-40 | 40-**50**-60 |
| | $f_t$ | 0,012~0,024 | 0,012~0,024 | 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 |




$v_c$ =m/min $f_t$ =mm/tooth

# Solid Carbide Spiral Endmills
# SSM 2000 Type (ø8,6~ø30)

Carbide grade: A1 (Micrograin)




Helix angle : 30°
Corner : Sharp edge

| øD | Tolerance (mm) |
|---|---|
| 6,0 < D ≤ 10,0 | – 0,015 – 0,040 |
| 10,0 < D | – 0,020 – 0,050 |

## ■ Endmills (mm)

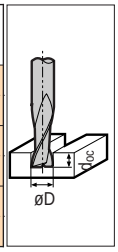
| | Cat. No. | Stock | øD | ℓ | L | ød |
|---|---|---|---|---|---|---|
| 2 | SSM 2086 | | 8,6 | 15 | 55 | 10 |
| | SSM 2087 | | 8,7 | 15 | 55 | 10 |
| | SSM 2088 | | 8,8 | 15 | 55 | 10 |
| | SSM 2089 | | 8,9 | 15 | 55 | 10 |
| | SSM 2090 | ● | 9,0 | 15 | 55 | 10 |
| | SSM 2091 | | 9,1 | 15 | 55 | 10 |
| | SSM 2092 | | 9,2 | 15 | 55 | 10 |
| | SSM 2093 | | 9,3 | 15 | 55 | 10 |
| | SSM 2094 | | 9,4 | 15 | 55 | 10 |
| | SSM 2095 | ❍ | 9,5 | 15 | 55 | 10 |
| | SSM 2096 | | 9,6 | 18 | 65 | 10 |
| | SSM 2097 | | 9,7 | 18 | 65 | 10 |
| | SSM 2098 | | 9,8 | 18 | 65 | 10 |
| | SSM 2099 | | 9,9 | 18 | 65 | 10 |
| | SSM 2100 | ● | 10,0 | 18 | 65 | 10 |
| | SSM 2105 | | 10,5 | 18 | 70 | 12 |
| | SSM 2110 | ● | 11,0 | 18 | 70 | 12 |
| | SSM 2115 | ❍ | 11,5 | 18 | 70 | 12 |
| | SSM 2120 | ● | 12,0 | 18 | 70 | 12 |
| | SSM 2125 | | 12,5 | 20 | 80 | 16 |
| | SSM 2130 | ● | 13,0 | 20 | 80 | 16 |
| | SSM 2135 | ❍ | 13,5 | | 80 | 16 |
| | SSM 2140 | ● | 14,0 | 20 | 80 | 16 |
| | SSM 2145 | | 14,5 | 25 | 80 | 16 |
| | SSM 2150 | ● | 15,0 | 25 | 80 | 16 |
| | SSM 2155 | | 15,5 | 35 | 90 | 16 |
| | SSM 2160 | ● | 16,0 | 35 | 90 | 16 |
| | SSM 2165 | | 16,5 | 35 | 90 | 20 |
| | SSM 2170 | ❍ | 17,0 | 35 | 90 | 20 |
| | SSM 2175 | | 17,5 | 40 | 105 | 20 |
| | SSM 2180 | ● | 18,0 | 40 | 105 | 20 |
| | SSM 2185 | | 18,5 | 40 | 105 | 20 |
| | SSM 2190 | ❍ | 19,0 | 40 | 105 | 20 |
| | SSM 2195 | | 19,5 | 40 | 105 | 20 |
| | SSM 2200 | ● | 20,0 | 40 | 105 | 20 |
| | SSM 2210 | ❍ | 21,0 | 40 | 105 | 25 |
| | SSM 2220 | ● | 22,0 | 40 | | 25 |
| | SSM 2230 | ❍ | | 45 | 115 | 25 |
| | SSM 2240 | ❍ | 24,0 | 45 | 115 | 25 |
| | SSM 2250 | ● | | 50 | | 25 |
| | SSM 2300 | | | 55 | 130 | 32 |

● = Euro stock
❍ = Delivery on request

### Recommended conditions

(Slotting) øD≥ø3 ; $d_{oc}$ =1,0 x øD

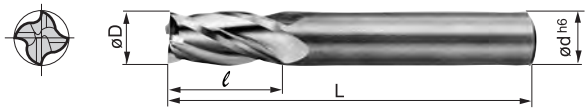
| Material / øD | | Carbon steel, Alloy steel (BelowHRC30) | Carbon steel, Alloy steel (BelowHRC40) | Carbon steel, Alloy steel (BelowHRC45) | Cast iron |
|---|---|---|---|---|---|
| 9 ~ 12,5 | $v_c$ | 40-**50**-60 | 30-**40**-50 | 20-**30**-40 | 40-**50**-60 |
| | $f_t$ | 0,025~0,050 | 0,025~0,050 | 0,013~0,025 | 0,045~0,105 |
| 13 ~ 19,5 | $v_c$ | 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 ~ 30 | $v_c$ | 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 (ø1,5~ø25)

Carbide grade: A1 (Micrograin)




Helix angle : 30°
Corner : Sharp edge

| 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 |

## ■ Endmills (mm)

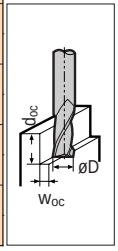
| | Cat. No. | Stock | øD | ℓ | L | ød |
|---|---|---|---|---|---|---|
| 4 | SSM 4015 | ● | 1,5 | 5 | 40 | 4 |
| | SSM 4020 | ● | 2,0 | 6 | 40 | 4 |
| | SSM 4025 | ● | 2,5 | 8 | 40 | 4 |
| | SSM 4030 | ● | 3,0 | 8 | 45 | 6 |
| | SSM 4035 | ● | 3,5 | 8 | 45 | 6 |
| | SSM 4040 | ● | 4,0 | 10 | 45 | 6 |
| | SSM 4045 | ● | 4,5 | 10 | 45 | 6 |
| | SSM 4050 | ● | 5,0 | 12 | 50 | 6 |
| | SSM 4055 | ● | 5,5 | 12 | 50 | 6 |
| | SSM 4060 | ● | 6,0 | 12 | 50 | 6 |
| | SSM 4065 | ● | 6,5 | 12 | 50 | 8 |
| | SSM 4070 | ● | 7,0 | 15 | 55 | 8 |
| | SSM 4075 | ● | 7,5 | 15 | 55 | 8 |
| | SSM 4080 | ● | 8,0 | 15 | 55 | 8 |
| | SSM 4085 | ● | 8,5 | 15 | 55 | 10 |
| | SSM 4090 | ● | 9,0 | 15 | 55 | 10 |
| | SSM 4095 | ● | 9,5 | 15 | 55 | 10 |
| | SSM 4100 | ● | 10,0 | 18 | 65 | 10 |
| | SSM 4105 | | 10,5 | 18 | 65 | 12 |
| | SSM 4110 | ● | 11,0 | 18 | 70 | 12 |
| | SSM 4120 | ● | 12,0 | 18 | 70 | 12 |
| | SSM 4130 | ❍ | 13,0 | 20 | 80 | 16 |
| | SSM 4140 | ● | 14,0 | 20 | 80 | 16 |
| | SSM 4150 | ● | 15,0 | 25 | 80 | 16 |
| | SSM 4160 | ● | 16,0 | 35 | 90 | 16 |
| | SSM 4170 | ❍ | 17,0 | 35 | 90 | 20 |
| | SSM 4180 | ● | 18,0 | 40 | 105 | 20 |
| | SSM 4190 | | 19,0 | 40 | 105 | 20 |
| | SSM 4200 | ● | 20,0 | 40 | 105 | 20 |
| | SSM 4210 | | 21,0 | 40 | 105 | 25 |
| | SSM 4220 | ❍ | 22,0 | 40 | 105 | 25 |
| | SSM 4230 | | 23,0 | 45 | 115 | 25 |
| | SSM 4240 | ❍ | 24,0 | 45 | 115 | 25 |
| | SSM 4250 | ❍ | 25,0 | 50 | 120 | 25 |

● = Euro stock
❍ = Delivery on request

### Recommended conditions

(Shoulder processing) $d_{oc}$ =1,5 x øD
$w_{oc}$ =0,1 x øD

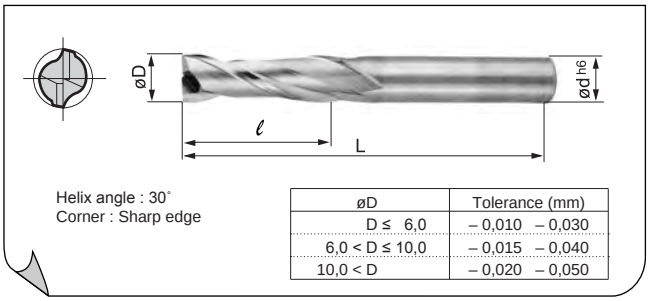
| Material / øD | | Carbon steel, Alloy steel (BelowHRC30) | Carbon steel, Alloy steel (BelowHRC40) | Carbon steel, Alloy steel (BelowHRC45) | Cast iron |
|---|---|---|---|---|---|
| 1 ~ 2,9 | $v_c$ | 40-**50**-60 | 30-**40**-50 | 20-**30**-40 | 40-**50**-60 |
| | $f_t$ | 0,004~0,017 | 0,004~0,017 | 0,002~0,008 | 0,008~0,020 |
| 3 ~ 5,9 | $v_c$ | 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 ~ 12,9 | $v_c$ | 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 ~ 19,9 | $v_c$ | 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

# Long Spiral Endmills
# LSM 2000 Type

Carbide grade: A1 (Micrograin)




Helix angle : 30˚
Corner : Sharp edge

| 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 |

## Endmills

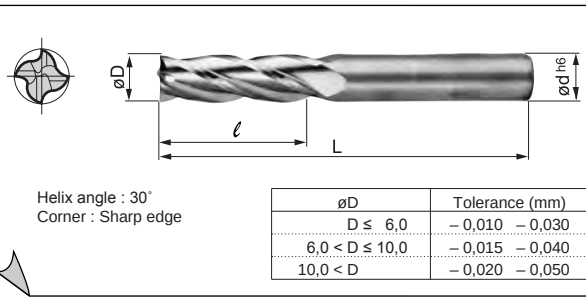
(mm)

| | Cat. No. | Stock | øD | ℓ | L | ød |
|---|---|---|---|---|---|---|
| 2 | LSM 2030 | ● | 3,0 | 12 | 50 | 6 |
| | LSM 2035 | ● | 3,5 | 12 | 50 | 6 |
| | LSM 2040 | ● | 4,0 | 15 | 50 | 6 |
| | LSM 2045 | ● | 4,5 | 15 | 50 | 6 |
| | LSM 2050 | ● | 5,0 | 18 | 55 | 6 |
| | LSM 2055 | ● | 5,5 | 18 | 55 | 6 |
| | LSM 2060 | ● | 6,0 | 18 | 55 | 6 |
| | LSM 2065 | ● | 6,5 | 18 | 55 | 8 |
| | LSM 2070 | ● | 7,0 | 25 | 65 | 8 |
| | LSM 2075 | ● | 7,5 | 25 | 65 | 8 |
| | LSM 2080 | ● | 8,0 | 25 | 65 | 8 |
| | LSM 2085 | ● | 8,5 | 25 | 65 | 10 |
| | LSM 2090 | ● | 9,0 | 25 | 65 | 10 |
| | LSM 2095 | ❍ | 9,5 | 25 | 65 | 10 |
| | LSM 2100 | ● | 10,0 | 30 | 75 | 10 |
| | LSM 2105 | | 10,5 | 30 | 80 | 12 |
| | LSM 2110 | ● | 11,0 | 30 | 80 | 12 |
| | LSM 2120 | ● | 12,0 | 30 | 80 | 12 |
| | LSM 2130 | ● | 13,0 | 35 | 95 | 16 |
| | LSM 2140 | ● | 14,0 | 40 | 95 | 16 |
| | LSM 2150 | ● | 15,0 | 40 | 95 | 16 |
| | LSM 2160 | ● | 16,0 | 50 | 105 | 16 |
| | LSM 2170 | | 17,0 | 50 | 105 | 20 |
| | LSM 2180 | ● | 18,0 | 50 | 115 | 20 |
| | LSM 2190 | | 19,0 | 55 | 120 | 20 |
| | LSM 2200 | ● | 20,0 | 55 | 120 | 20 |
| | LSM 2210 | | 21,0 | 60 | 125 | 25 |
| | LSM 2220 | | 22,0 | 60 | 135 | 25 |
| | LSM 2230 | | 23,0 | 60 | 135 | 25 |
| | LSM 2240 | | 24,0 | 65 | 140 | 25 |
| | LSM 2250 | ❍ | 25,0 | 65 | 140 | 25 |

● = Euro stock
❍ = Delivery on request

# Long Spiral Endmills
# LSM 4000 Type

Carbide grade: A1 (Micrograin)




Helix angle : 30˚
Corner : Sharp edge

| 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 |

## Endmills

(mm)

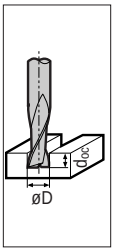
| | Cat. No. | Stock | øD | ℓ | L | ød |
|---|---|---|---|---|---|---|
| 2 | LSM 4030 | ● | 3,0 | 12 | 50 | 6 |
| | LSM 4035 | ● | 3,5 | 12 | 50 | 6 |
| | LSM 4040 | ● | 4,0 | 15 | 50 | 6 |
| | LSM 4045 | ❍ | 4,5 | 15 | 50 | 6 |
| | LSM 4050 | ● | 5,0 | 18 | 55 | 6 |
| | LSM 4055 | ● | 5,5 | 18 | 55 | 6 |
| | LSM 4060 | ● | 6,0 | 18 | 55 | 6 |
| | LSM 4065 | ● | 6,5 | | 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) øD≥ø3 ; $d_{oc}$ =1,0 x øD

| øD | Material | Carbon steel, Alloy steel (BelowHRC30) | Carbon steel, Alloy steel (BelowHRC40) | Carbon steel, Alloy steel (BelowHRC45) | Cast iron |
|---|---|---|---|---|---|
| 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 |

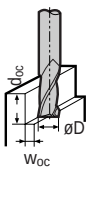



$v_c$ =m/min $f_t$ =mm/tooth

## Recommended conditions

(Shoulder processing) $d_{oc}$ =1,5 x øD
$w_{oc}$ =0,1 x øD

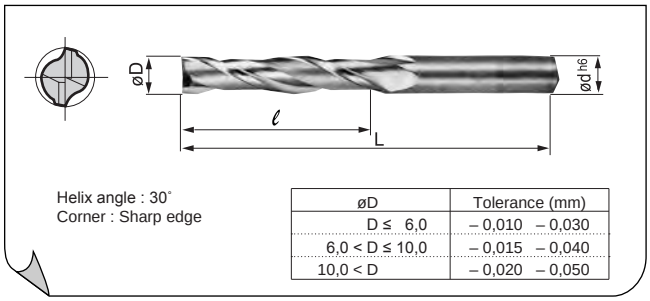
| øD | Material | Carbon steel, Alloy steel (BelowHRC30) | Carbon steel, Alloy steel (BelowHRC40) | Carbon steel, Alloy steel (BelowHRC45) | Cast iron |
|---|---|---|---|---|---|
| 3 ~ 5,9 | $v_c$ | 40-**50**-60 | 30-**40**-50 | 20-**30**-40 | 40-**50**-60 |
| | $f_t$ | 0,014~0,027 | 0,014~0,027 | 0,007~0,014 | 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 |




$v_c$ =m/min $f_t$ =mm/tooth

# Extra Long Spiral Endmills
# ELSM 2000 Type

Carbide grade: A1 (Micrograin)




Helix angle : 30°
Corner : Sharp edge

| 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 |

## ■ Endmills

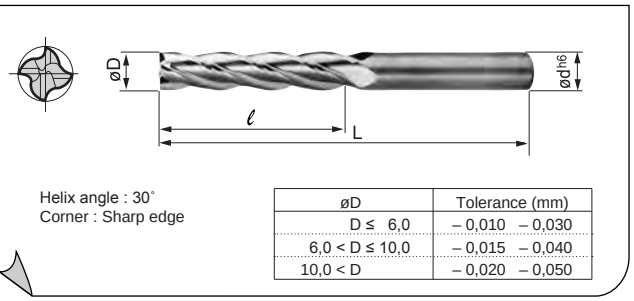
(mm)

| | Cat. No. | Stock | øD | ℓ | L | ød |
|---|---|---|---|---|---|---|
| 2 | **ELSM 2030** | ● | 3,0 | 20 | 55 | 6 |
| | **ELSM 2040** | ● | 4,0 | 25 | 60 | 6 |
| | **ELSM 2050** | ● | 5,0 | 30 | 65 | 6 |
| | **ELSM 2060** | ● | 6,0 | 30 | 65 | 6 |
| | **ELSM 2070** | ● | 7,0 | 40 | 85 | 8 |
| | **ELSM 2080** | ● | 8,0 | 40 | 85 | 8 |
| | **ELSM 2090** | ● | 9,0 | 40 | 85 | 10 |
| | **ELSM 2100** | ● | 10,0 | 50 | 100 | 10 |
| | **ELSM 2110** | ● | 11,0 | 50 | 100 | 12 |
| | **ELSM 2120** | ● | 12,0 | 50 | 100 | 12 |
| | **ELSM 2130** | | 13,0 | 70 | 140 | 16 |
| | **ELSM 2140** | ● | 14,0 | 70 | 140 | 16 |
| | **ELSM 2150** | ❍ | 15,0 | 70 | 140 | 16 |
| | **ELSM 2160** | ❍ | 16,0 | 70 | 140 | 16 |
| | **ELSM 2180** | ❍ | 18,0 | 80 | 160 | 20 |
| | **ELSM 2200** | ● | 20,0 | 85 | 165 | 20 |
| | **ELSM 2220** | | 22,0 | 95 | 180 | 25 |
| | **ELSM 2250** | ❍ | 25,0 | 100 | 185 | 25 |

● = Euro stock
❍ = Delivery on request

# Extra Long Spiral Endmills
# ELSM 4000 Type

Carbide grade: A1 (Micrograin)




Helix angle : 30°
Corner : Sharp edge

| 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 |

## ■ Endmills

(mm)

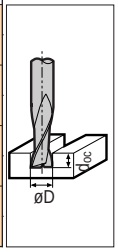
| | Cat. No. | Stock | øD | ℓ | L | ød |
|---|---|---|---|---|---|---|
| 4 | **ELSM 4030** | ● | 3,0 | 20 | 55 | 6 |
| | **ELSM 4040** | ● | 4,0 | 25 | 60 | 6 |
| | **ELSM 4050** | ● | 5,0 | 30 | 65 | 6 |
| | **ELSM 4060** | ● | 6,0 | 30 | 65 | 6 |
| | **ELSM 4070** | ● | 7,0 | 40 | 85 | 8 |
| | **ELSM 4080** | ● | 8,0 | 40 | 85 | 8 |
| | **ELSM 4090** | ● | 9,0 | 40 | 85 | 10 |
| | **ELSM 4100** | ● | 10,0 | 50 | 100 | 10 |
| | **ELSM 4110** | | 11,0 | 50 | 100 | 12 |
| | **ELSM 4120** | ● | 12,0 | 50 | 100 | 12 |
| | **ELSM 4130** | | 13,0 | 70 | 140 | 16 |
| | **ELSM 4140** | ● | 14,0 | 70 | 140 | 16 |
| | **ELSM 4150** | ❍ | 15,0 | 70 | 140 | 16 |
| | **ELSM 4160** | ● | 16,0 | 70 | 140 | 16 |
| | **ELSM 4170** | | 17,0 | 80 | 160 | 20 |
| | **ELSM 4180** | ● | 18,0 | 80 | 160 | 20 |
| | **ELSM 4190** | | 19,0 | 85 | 165 | 20 |
| | **ELSM 4200** | ● | 20,0 | 85 | 165 | 20 |
| | **ELSM 4210** | | 21,0 | 95 | 180 | 25 |
| | **ELSM 4220** | | 22,0 | 95 | 180 | 25 |
| | **ELSM 4230** | | 23,0 | 95 | 180 | 25 |
| | **ELSM 4240** | | 24,0 | 100 | 180 | 25 |
| | **ELSM 4250** | ● | 25,0 | 100 | 180 | 25 |

● = Euro stock
❍ = Delivery on request

## Recommended conditions

(Slotting) øD≥ø3 ; $d_{oc}$ =1,0 x øD

| øD | | Material: Carbon steel, Alloy steel (BelowHRC30) | Carbon steel, Alloy steel (BelowHRC40) | Carbon steel, Alloy steel (BelowHRC45) | Cast iron |
|---|---|---|---|---|---|
| 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 |

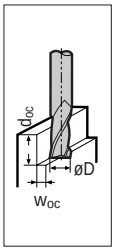



$v_c$ =m/min $f_t$ =mm/tooth

## Recommended conditions

(Shoulder processing) $d_{oc}$ =1,5 x øD
$w_{oc}$ =0,05 x øD

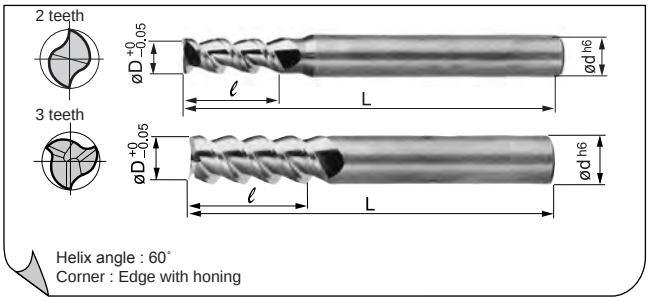
| øD | | Material: Carbon steel, Alloy steel (BelowHRC30) | Carbon steel, Alloy steel (BelowHRC40) | Carbon steel, Alloy steel (BelowHRC45) | Cast iron |
|---|---|---|---|---|---|
| 3 ~ 5,9 | $v_c$ | 40--60 | 30-**40**-50 | 20-**30**-40 | 40-**50**-60 |
| | $f_t$ | 0,009~0,018 | 0,009~0,018 | 0,005~0,009 | 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

Carbide grade: A1 (Micrograin)



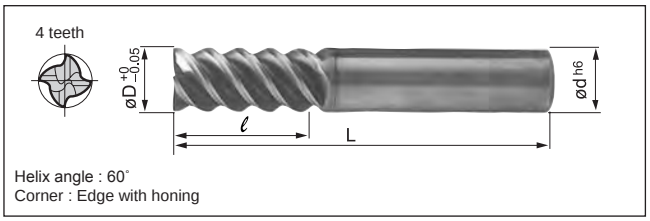

Helix angle : 60°
Corner : Edge with honing

## Endmills

(mm)

| | Cat. No. | Stock | øD | ℓ | L | ød |
|---|---|---|---|---|---|---|
| 2 | **HSM 2020** | | 2,0 | 6 | 40 | 4 |
| | **HSM 2030** | | 3,0 | 8 | 45 | 6 |
| | **HSM 2040** | ❍ | 4,0 | 10 | 45 | 6 |
| | **HSM 2050** | ❍ | 5,0 | 12 | 50 | 6 |
| 3 | **HSM 3030** | ❍ | 3,0 | 12 | 45 | 6 |
| | **HSM 3040** | ❍ | 4,0 | 12 | 45 | 6 |
| | **HSM 3045** | ❍ | 4,5 | 12 | 45 | 6 |
| | **HSM 3050** | ❍ | 5,0 | 12 | 50 | 6 |
| | **HSM 3060** | ❍ | 6,0 | 12 | 50 | 6 |
| | **HSM 3070** | ❍ | 7,0 | 18 | 60 | 8 |
| | **HSM 3080** | ❍ | 8,0 | 18 | 60 | 8 |
| | **HSM 3090** | ❍ | 9,0 | 20 | 65 | 10 |
| | **HSM 3100** | ❍ | 10,0 | 25 | 70 | 10 |
| | **HSM 3110** | ❍ | 11,0 | 25 | 75 | 12 |
| | **HSM 3120** | ❍ | 12,0 | 30 | 75 | 12 |
| | **HSM 3130** | ❍ | 13,0 | 30 | 80 | 16 |
| | **HSM 3140** | ❍ | 14,0 | 30 | 90 | 16 |
| | **HSM 3150** | ❍ | 15,0 | 30 | 95 | 16 |
| | **HSM 3160** | ❍ | 16,0 | 35 | 95 | 16 |
| | **HSM 3180** | ❍ | 18,0 | 40 | 110 | 20 |
| | **HSM 3200** | ❍ | 20,0 | 40 | 110 | 20 |
| 4 | **HSM 4200** | ❍ | 20,0 | 40 | 110 | 20 |
| | **HSM 4320** | | 32,0 | 55 | 130 | 32 |

❍ = Delivery on request

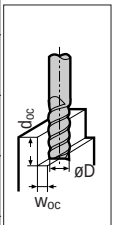



Helix angle : 60°
Corner : Edge with honing

## Recommended conditions

(Shoulder processing) $d_{oc}$ =1,5 x øD
$w_{oc}$ =0,1 x øD

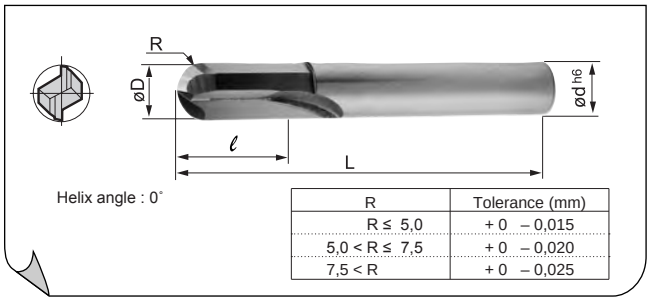
| øD | Material | Carbon steel, Alloy steel (BelowHRC30) | Carbon steel, Alloy steel (BelowHRC40) | Carbon steel, Alloy steel (BelowHRC45) | Cast iron |
|---|---|---|---|---|---|
| 1 ~ 2,9 | $v_c$ | 40-**50**-60 | 30-**40**-50 | 20-**30**-40 | 40-**50**-60 |
| | $f_t$ | 0,009~0,024 | 0,009~0,024 | 0,004~0,011 | 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

# Straight Flute Ball Endmills
# BSM 2000 Type

Carbide grade: A1 (Micrograin)




Helix angle : 0˚

| R | Tolerance (mm) |
|---|---|
| R ≤ 5,0 | + 0 – 0,015 |
| 5,0 < R ≤ 7,5 | + 0 – 0,020 |
| 7,5 < R | + 0 – 0,025 |

## ■ Endmills

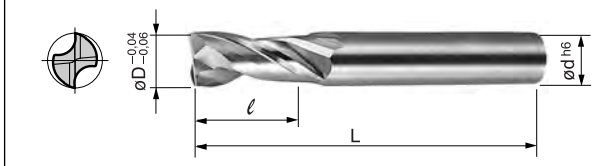
(mm)

| | Cat. No. | Stock | R | øD | ℓ | L | ød |
|---|---|---|---|---|---|---|---|
| 2 | **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
❍ = Delivery on request

# Spiral Endmills for Non-Ferrous Cutting
# ASM 2000 Type

Carbide grade: H1 (Micrograin)




Helix angle : 30˚
Corner : Sharp edge

## ■ Endmills

(mm)

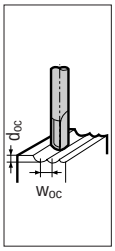
| | Cat. No. | Stock | øD | ℓ | L | ød |
|---|---|---|---|---|---|---|
| 2 | **ASM 2020** | ❍ | 2,0 | 6 | 40 | 4 |
| | **ASM 2030** | ❍ | 3,0 | 10 | 45 | 6 |
| | **ASM 2040** | ❍ | 4,0 | 12 | 45 | 6 |
| | **ASM 2050** | ❍ | 5,0 | 15 | 50 | 6 |
| | **ASM 2060** | ❍ | 6,0 | 15 | 50 | 6 |
| | **ASM 2080** | ❍ | 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 |

❍ = Delivery on request

## Recommended conditions

$d_{oc}$ =0,3 x øD, (Below R1,0 ; 0,2 x øD)
$w_{oc}$ =Max0,7 x øD, (Below R1,0 ; 0,6 x øD)

| R \ Material | | Carbon steel, Alloy steel (BelowHRC30) | Carbon steel, Alloy steel (BelowHRC40) | Carbon steel, Alloy steel (BelowHRC45) | Cast iron |
|---|---|---|---|---|---|
| R0,5 ~ R1,25 | $v_c$ | 40--60 | 30-**40**-50 | 20--40 | 40-**50**-60 |
| | $f_t$ | 0,004~0,010 | 0,004~0,010 | 0,002~0,005 | 0,008~0,015 |
| R1,5 ~ R2,5 | $v_c$ | 40-**50**-60 | 30--50 | 20-**30**-40 | 40--60 |
| | $f_t$ | 0,013~0,025 | 0,013~0,025 | 0,007~0,013 | 0,017~0,042 |
| R3 ~ R6 | $v_c$ | 40-**50**-60 | 30--50 | 20-**30**-40 | 40--60 |
| | $f_t$ | 0,030~0,050 | 0,030~0,050 | 0,017~0,033 | 0,056~0,136 |
| R6,5 ~ R9,5 | $v_c$ | 40-**50**-60 | 30--50 | 20--40 | 40-**50**-60 |
| | $f_t$ | 0,070~0,100 | 0,070~0,100 | 0,040~0,057 | 0,167~0,238 |
| R10 ~ | $v_c$ | 40-**50**-60 | 30-**40**-50 | 20-**30**-40 | 40-**50**-60 |
| | $f_t$ | 0,118~0,167 | 0,118~0,167 | 0,085~0,095 | 0,250~0,350 |

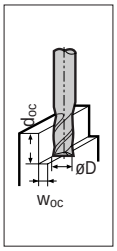



$v_c$ =m/min $f_t$ =mm/tooth

## Recommended conditions

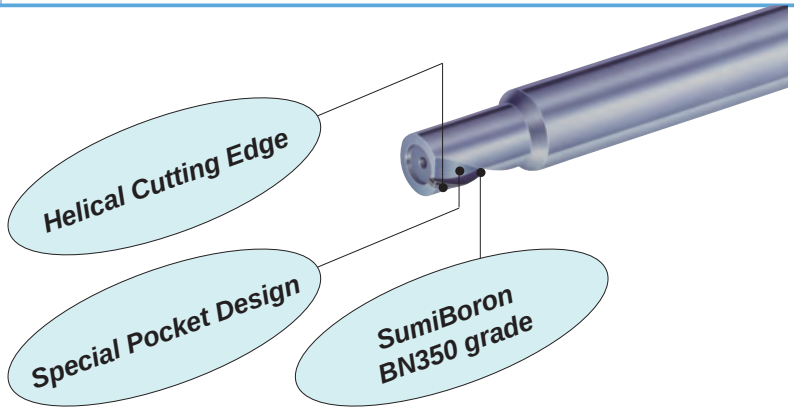
(Shoulder processing) $d_{oc}$ =1,5 x øD
$w_{oc}$ =0,1 x øD

| 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 |

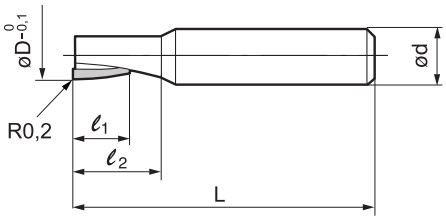



$v_c$ =m/min $f_t$ =mm/tooth






## Endmills BNES Type with 1 Spiral Flute



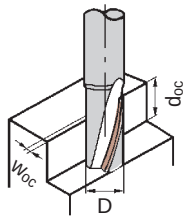

Helix angle : 15°
right-hand cut, right-hand helix

| Cat. No. | Stock | Dimensions (mm) | | | | |
|---|---|---|---|---|---|---|
| | BN350 | øD | ød | $\ell_1$ | $\ell_2$ | 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 |

❍ = Delivery on request

## Recommended Cutting Conditions

Cutting speed: $v_c$ (m/min), Spindle revolutions: n (rpm), Feed per tooth: $f_t$ (mm/tooth), Feed speed: $v_f$ (mm/min)

| Tooling example | ø D | Hardened steel ($H_RC$ 50 ~ 57) $v_c$ = 100 ~ 170 m/min | | | Hardened steel ($H_RC$ 58 ~ 65) $v_c$ = 80 ~ 150 m/min | | |
|---|---|---|---|---|---|---|---|
|  | ø 6 ~ 8 | $w_{oc}$ ≤ 0,1 mm | n = 4000 ~ 9000 | $v_f$ (mm/min) = 240 ~ 540 | $w_{oc}$ ≤ 0,08 mm | n = 3200 ~ 8000 | $v_f$ (mm/min) = 150 ~ 370 |
| | ø 10 ~ 12 | $w_{oc}$ ≤ 0,15 mm | n = 2700 ~ 5400 | $v_f$ (mm/min) = 180 ~ 360 | $w_{oc}$ ≤ 0,12 mm | n = 2100 ~ 4800 | $v_f$ (mm/min) 120 ~ 270 |
| | ø 14 ~ 16 | $w_{oc}$ ≤ 0,2 mm | n = 2000 ~ 3800 | $v_f$ (mm/min) = 140 ~ 260 | $w_{oc}$ ≤ 0,15 mm | n = 1600 ~ 3400 | $v_f$ (mm/min) = 110 ~ 230 |

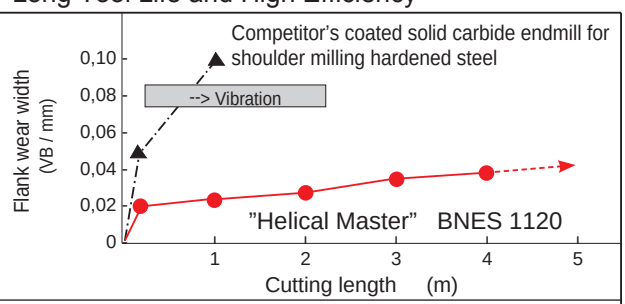


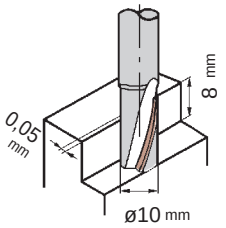
Depth of cut : $d_{oc}$ ≤ D

Recommendation: Dry cutting (Air coolant)
Down-cut milling
Minimise the overhang
Use a rigid machine

## Performance

### ● Long Tool Life and High Efficiency



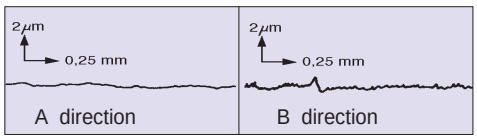

Work material: X155CrVMo12-1
Hardness: $H_RC$ 60

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

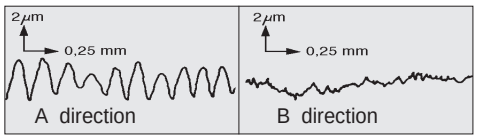
Down-cut milling
Dry cutting

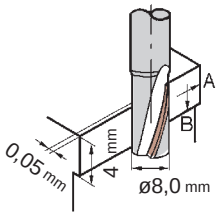
### ● Excellent Surface Roughness

"**Helical Master**" **BNES 1080** ø 8,0




Conventional straight flute CBN endmill, ø 8,0

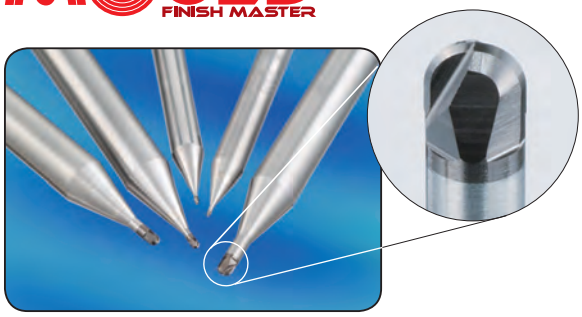



Work material: 15Cr3
Hardness: $H_RC$ 55~58
Cutting data: $v_c$ = 130 m/min
$v_f$ = 310 mm/min

Down-cut milling
Dry cutting

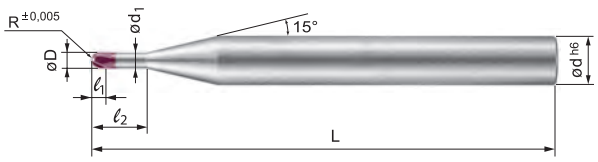
# SUMIBORON "MOULD Finish Master" BNBP



## Characteristics / Application

- High precision machining of hardened steels < HRC70 with long tool life
- Super tough grade SUMIBORON BN350 prevents chipping of the cutting edge
- R accuracy : ±0,005mm

## Endmills




※ Endmill Identification

**BNBP 2 R020 - 012 4**

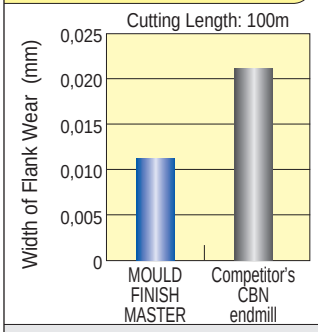
- BNBP 2 : Micro fraise CBN hémisphérique
- R020 : Radius of ball nose
- 012 : Number of teeth
- 4 : Shank Diam.
- Neck length ($\ell_2$)

| | Cat. No. | Stock | Dimensions (mm) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | BN350 | R | øD | L | ød1 | ød | ℓ1 | ℓ2 |
| 4,0 mm (Shank Diam.) | **BNBP 2 R020-012 4** | ● | 0,2 | 0,4 | 50 | 0,37 | 4 | 0,3 | 1,2 |
| | **BNBP 2 R030-015 4** | ● | 0,3 | 0,6 | 50 | 0,57 | 4 | 0,4 | 1,5 |
| | **BNBP 2 R050-025 4** | ● | 0,5 | 1,0 | 50 | 0,97 | 4 | 0,6 | 2,5 |
| | **BNBP 2 R075-040 4** | ● | 0,75 | 1,5 | 50 | 1,47 | 4 | 0,9 | 4,0 |
| | **BNBP 2 R100-055 4** | ● | 1,0 | 2,0 | 50 | 1,97 | 4 | 1,4 | 5,5 |
| 6,0 mm (Shank Diam.) | **BNBP 2 R020-012 6** | ● | 0,2 | 0,4 | 50 | 0,37 | 6 | 0,3 | 1,2 |
| | **BNBP 2 R030-015 6** | ● | 0,3 | 0,6 | 50 | 0,57 | 6 | 0,4 | 1,5 |
| | **BNBP 2 R050-025 6** | ● | 0,5 | 1,0 | 50 | 0,97 | 6 | 0,6 | 2,5 |
| | **BNBP 2 R075-040 6** | ● | 0,75 | 1,5 | 50 | 1,47 | 6 | 0,9 | 4,0 |
| | **BNBP 2 R100-055 6** | ● | 1,0 | 2,0 | 50 | 1,97 | 6 | 1,4 | 5,5 |

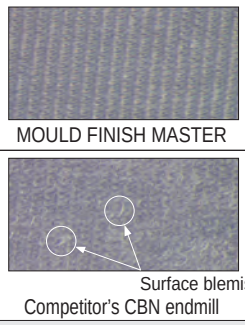
● = Euro stock

## Performance

### Wear Resistance

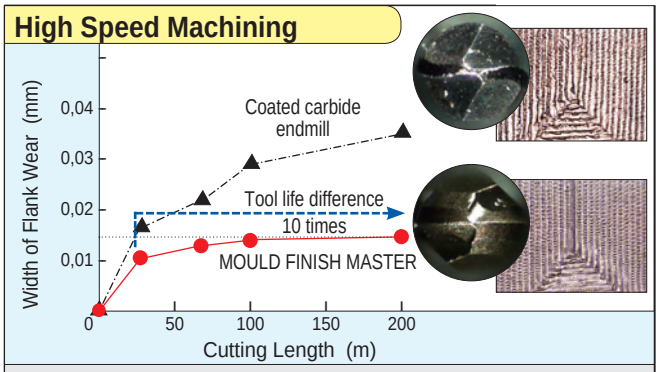



### Machined Surface




R1,0 Ball endmill, Cutting data: Work material: X155CrVMo12-1 ($H_RC60$)
n = 20.000 rpm, $f_t$ = 0,05 mm/tooth ($v_f$ = 2.000mm/min)
$d_{oc}$ = 0,05 mm, $w_{oc}$ = 0,05 mm, Air blast

### High Speed Machining




R1,0 Ball endmill, Cutting data: Work material: X155CrVMo12-1 ($H_RC60$)
n = 40.000 rpm, $f_t$ = 0,05 mm/tooth ($v_f$ = 4.000mm/min)
$d_{oc}$ = 0,05 mm, $w_{oc}$ = 0,05 mm, Oil mist

● Excellent surface finish compared with competitor's CBN and coated carbide endmills

## Recommended Cutting Conditions

Spindle revolutions: n (rpm), Feed rate per tooth: $f_t$ (mm/tooth), Depth of cut: $d_{oc}$ (mm), Wide of cut: $w_{oc}$ (mm)

| Material / Cutting data / Radius (mm) | Pre-hardened steel, Die steel (~ HRC52) | | | | Die steel (~ HRC62) | | | | High speed tool steel (~ HRC70) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | n (rpm) | $f_t$ (mm/tooth) | $d_{oc}$ (mm) | $W_{oc}$ (mm) | n (rpm) | $f_t$ (mm/tooth) | $d_{oc}$ (mm) | $W_{oc}$ (mm) | n (rpm) | $f_t$ (mm/tooth) | $d_{oc}$ (mm) | $W_{oc}$ (mm) |
| R 0,2 | 20.000~50.000 | 0,02 | 0,03 | 0,03 | 20.000~50.000 | 0,02 | 0,01 | 0,02 | 20.000~50.000 | 0,015 | 0,01 | 0,02 |
| R 0,3 | 20.000~50.000 | 0,02 | 0,03 | 0,03 | 20.000~50.000 | 0,02 | 0,01 | 0,02 | 20.000~50.000 | 0,015 | 0,01 | 0,02 |
| R 0,5 | 20.000~50.000 | 0,03 | 0,05 | 0,05 | 20.000~50.000 | 0,03 | 0,03 | 0,04 | 20.000~50.000 | 0,02 | 0,02 | 0,03 |
| R 0,75 | 20.000~50.000 | 0,04 | 0,08 | 0,1 | 20.000~50.000 | 0,04 | 0,05 | 0,05 | 20.000~50.000 | 0,03 | 0,02 | 0,05 |
| R 1,0 | 20.000~50.000 | 0,05 | 0,1 | 0,1 | 17.000~50.000 | 0,05 | 0,05 | 0,05 | 17.000~50.000 | 0,03 | 0,03 | 0,05 |




## Important Notes

(1) For stable machining, a more rigid machine is recommended.
(2) Air blast or oil mist coolant is recommended.
(3) Shorten overhang as much as possible.

# Multi-Drills

K

**K1 ~ K60**






| | | |
|---|---|---|
| Selection Guide | **MULTI-DRILLs** | K 2 - 5 |
| **Solid Type Drills** | **SDP ...** U3/5/7-**HAK** New | K 6 -11 |
| | **MDW ... GS** 2/4 | K12-15 |
| | **MDW ... HGS** 3/5 | K16-17 |
| | **MDS ...** S/M **K-HAK** | K18-19 |
| | **MDS ...** S/M **K** | K20-23 |
| | **MDS ...** S/M **G** | K20-23 |
| Deep Hole Drills | **MDW** | K24-25 |
| for Steels | **MDW ... XHT S** | K26 |
| for Aluminium | **MDW ... XHT A** | K27 |
| Pilot Hole Drills | **MDW ... PHT** | K27 |
| AURORA COAT Drills | **MDW ... NHGS** | K28~29 |
| MINI-Drills | **MLDH ...** L/P New | K30~31 |
| | **MDUS / MDSS** | K32 |
| SUMIDIA Coated Drills | MDS ... **SDC** New | K33 |
| **Brazed Type Drills** | **KDS** | K35 |
| Series | **KDS ... MAK** | K36~37 |
| | **KDS ... LAK** | K38~39 |
| | **KDS ... DAK** | K40~41 |
| | **KDS ... FA** | K42 |
| **Replaceable Head Type Drills** | **SMD** | K43 |
| Drill Holder | **SMDH** | K44 |
| Drill Head for Steels | **SMDT** ...D **MTL** | K45 |
| for Stainless Steels | **SMDT** ...D **MEL** | K46~47 |
| **Insert Type Drills** | **WDX** (2D, 3D, 4D, 5D) | K48~55 |
| Plunge Drills | **PDL** (2D, 3D) New | K56~58 |
| Multi-Function Mills | **PCT** (3D, 5D) New | K56~58 |
| Straight Flute Type **SUMIDIA Drills** | **DAL / DDL / DML** | K59~60 |

# 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 require-ments, providing high efficiency, high precision and cost effectiveness.

## Solid Carbide Type Multi-Drills Selection

| | **SDP ...** | **MDW ...** | | **MDS ...** | | **MDW ... ○○○** | | | **MLDH** | **MDUS / MDSS** | MDS ... |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Type | **...U3/5/7-HAK** (DIN) | **GS** 2/4 | **HGS** 3/5 | S/M **K-HAK** (DIN) | ... S/M **G** | ... **PHT** | ... **XHT** S/A | ... **NHGS** | ... P / L | – | ... **SDC** |
| Page | ⇨ K 6~11 | ⇨ K12~17 | | ⇨ K18~19 | ⇨ K20~23 | ⇨ K24~27 | | ⇨ K28~29 | ⇨ K30~31 | ⇨ K32 | ⇨ K33 |
| | New | | | | | Pilot drill | | | New Pilot drill | | New |
| Application | P M K S | | | K N | | P M K N | | N | P M K | P M K H | N |
| Form | m7 drill DIN type | h8 drill | | m7 drill DIN type | h8 drill, straight | Extra long | | Super Multi-Drill | Long Micro Drill | Mini Multi-Drill | Diamond Coated |
| Length (The ratio to øD) | 3D / 5D / 7D | 2/4D | 3/5D | 3D / 5D | 2,5D / 4D | 3D | 10D ~ 30D | 3D / 5D / 10D | 5 / 12 / 20 / 30 D | 10D | 3D |
| Coolant holes | Yes | No | Yes | Yes | No | Yes | | Yes | Yes | No | No |
| Coating | AlCrTiN | DEX (TiAlCr/TiSi) | | TiAlN | – | TiAlN | – | DLC | TiAlN | TiAlN / ZX | SUMIDIA |
| Diameter range | ø 3,0 ~ ø16,0 | ø 2,0 ~ ø16,0 | ø 4,0 ~ ø16,0 | ø 4,0 ~ ø12,0 | ø 2,0 ~ ø14,0 | ø 4,0 ~ ø 8,0 | ø 3,0 ~ ø 12,0 | ø 3,0 ~ ø 16,0 | ø 0,8 ~ ø 2,0 | ø 0,03 ~ ø 1,0 | ø 2,0 ~ ø 10,0 |



## 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: 0,03 ~ 65mm, Drilling depths L/D: 2 ~ 30)

## Brazed Carbide Type and Insert Type Multi-Drills Selection

| | KDS ... ○○○ ⇨ K35 | | | | SMD ... ⇨ K43 | WDX ...○○ | PDL ...○○ | PCT ...○○ | SUMIDIA (PCD) |
|---|---|---|---|---|---|---|---|---|---|
| Type | MAK | LAK | DAK | FA |  | | | | DAL/DDL/DML |
| Page | ⇨ K36~37 | ⇨ K38~39 | ⇨ K40~41 | ⇨ K42 | SMDT ...D MTL ⇨ K45 | ⇨ K48~55 | ⇨ K56~58 | ⇨ K56~58 | ⇨ K59~60 |
| | | | | |  SMDT ...D MEL ⇨ K46~47 | | | | |
| | | | | |  SMDH ...M-3/5/8 ⇨ K44 | | | | |
| |  | | | |  |  |  | |  |
| Application | P M K S | | | K N | P M K | P M K N | | | N |
| Form | h7 drill | | | h8 drill | SMDT type carbide head | Indexable insert drill | Straight type insert drill | Insert mill | Straight type, Step type |
| Length (The ratio to øD) | 3D | 5D | 7D | 10D | 3D / 5D / 8D | 2D / 3D / 4D / 5D | 2D / 3D | 3D / 5D | 3D / 5D |
| Coolant holes | Yes | | | Yes | Yes | Yes | | | No |
| Coating | TiAlN | | | – | TiAlN | WDXT type insert | | | – |
| Diameter range | ø 9,5 ~ ø 40,5 | | | ø 8,0 ~ ø 30,5 | ø 12,0 ~ ø 30,5 | ø 13,0 ~ ø 65,0 | ø 16,0 ~ ø 40,0 | | ø 5,0 ~ ø 12,0 |

# Selection Guide

## ● According to Drill Types / Applications

| Application | General ⟷ Special | | |
|---|---|---|---|
| Solid Type – "Super Multi-Drill" MDS / MDW Type | m7 DIN Type "Super Multi-Drill"<br>**SDP...U HAK Type**<br>AlCrTiN coated general purpose drill with coolant holes<br>New<br>øD : 3,0 ~ 16mm<br>L/D: 3, 5, 7<br>⇨ K6 ~ 11 | "Super Multi-Drill"<br>**MDW...GS Type**<br>DEX (TiAlCr/TiSi) coated general purpose drill without coolant holes<br>øD : 2,0 ~ 16mm<br>L/D: ~ 2, ~ 4<br>⇨ K14 ~ 15 | "Super Multi-Drill"<br>**MDW...HGS Type**<br>DEX (TiAlCr/TiSi) coated general purpose drill with coolant holes<br>øD : 4,0 ~ 16mm<br>L/D: ~ 3, ~ 5<br>⇨ K16 ~17 |
| | m7 DIN Type "Super Multi-Drill"<br>**MDS...K-HAK Type**<br>TiAlN coated general purpose drill with coolant holes<br>øD : 2,0 ~ 12mm<br>L/D: ~ 2, ~ 4<br>⇨ K18 ~ 19 | "Super Multi-Drill"<br>**MDS...G Type**<br>For Cast Iron & Aluminum<br>øD : 2,8 ~ 20mm<br>L/D: ~ 3<br>⇨ K20 ~ 23 | "Super Multi-Drill"<br>**MDS...D Type**<br>Hardened Steel Exotic Metals<br>øD : 1,0 ~ 16,1mm<br>L/D: ~ 3<br>(Stock in Japan) |
| Brazed Type – "Super Multi-Drill" KDS Type | "Super Multi-Drill"<br>**KDS... MAK Type**<br>General Purpose Drill<br>øD : 12 ~ 26mm<br>L/D: ~ 3<br>⇨ K36 ~ 37 | Long Type "Super Multi-Drill"<br>**KDS... LAK Type**<br>Deep Hole Drilling<br>øD : 12 ~ 26mm<br>L/D: ~ 5<br>⇨ K38 ~ 39 | — |
| | — | Long Type "Super Multi-Drill"<br>**KDS... DAK Type**<br>Good Chip Removal<br>øD : 9 ~ 22mm<br>L/D: ~ 7<br>⇨ K40 ~ 41 | Extra Long Typ "Super Multi-Drill"<br>**KDS... FA Type**<br>For Cast Irons and Aluminium Alloys<br>Delivery on request<br>øD : 9 ~ 22mm<br>L/D: ~ 7<br>⇨ K42 |

## ■ Recommended Cutting Conditions by Work Materials

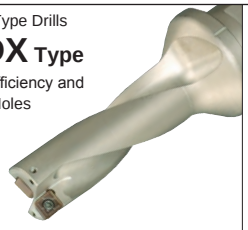
| Drill | | Steel | Stainless Steel | Cast Iron | Non-ferrous Metalls |
|---|---|---|---|---|---|
| Solid Type | SDP...U HAK<br>MDW...GS/HGS | 50 – 120 / 0,2 – 0,35 | 15 – 70 / 0,1 – 0,2 | 50 – 110 / 0,2 – 0,35 | — |
| | MDS...G | — | — | 25 – 80 / 0,25 – ② 0,4 | 80 – 200 / 0,25 – ② 0,45 |
| Brazed Type | KDS...AK<br>(MAK/LAK/DAK) | 50 – 90 / 0,15 – 0,35 | 35 – 50 / 0,15 – 0,25 | 60 – 100 / 0,2 – 0,35 | — |
| | KDS...FA | — | — | 30 – 70 / 0,2 – 0,5 | 60 – 150 / 0,2 – 0,5 |

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

## ● According to Drill Types / Applications

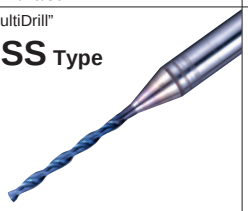
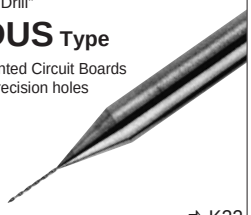
| Application | General ⟷ Special |
|---|---|

### Indexable Drills

| | | |
|---|---|---|
| Insert Type Drills<br>**WDX Type**<br>High Efficiency and Deep Holes<br>  <br>øD : 13,0 ~ 65,0mm<br>L/D: 2, 3, 4, 5<br>➪ K48 ~ 55 | Replaceable Head Type Drills<br>**SMD Type**<br>  <br>øD : 13,5 ~ 30,5mm<br>L/D: 3, 5, 8<br>➪ K43 ~ 47 | "Multi-Function" Types<br>**PDL & PCT**<br>Plunge Drills and Plunge Mills<br>  <br><br>øD : 16,0 ~ 40,0mm<br>L/D: 2, 3, 5<br>➪ K56 ~ 58 |

| Application | Deep Hole | Very Small Hole | Precision Hole |
|---|---|---|---|

### Special Purpose Drills

| | | |
|---|---|---|
| "Super Long Multi-Drill"<br>**MDW...XHT Type**<br>New General Purpose Deep Hole Drill<br>  <br>øD :4,0 ~ 12,0mm<br>L/D: 10/15/20/25/30<br>➪ K24 ~ 27 | "Long Micro Drill"<br>**MLDH... P/L Type**<br>"P" type for pilot hole<br>  <br><br>øD : 0,8 ~ 2,0mm<br>L/D: 5/12/20/30<br>➪ K30 ~ 31 | AURORA-Coat Drill<br>**MDW...NHGS Type**<br>For Aluminium Alloy<br>  <br>øD : 3,0 ~ 16,0mm<br>L/D: 3 / 5 / 10<br>➪ K28 ~ 29 |
| — | "Mini-MultiDrill"<br>**MDSS Type**<br>  <br>øD : 0,20 ~ 1,00mm<br>L/D: 10<br>➪ K32 | "SUMI-DIA" coaed Drill<br>**MDS...SDC Type**<br>For Aluminium & CFRP*<br>  <br><br>CFRP* (Carbon FibreReinforced Plastic)<br>øD : 2 ~ 10mm<br>L/D: ~ 3<br>➪ K33 |
| — | "Micro Drill"<br>**MDUS Type**<br>For Printed Circuit Boards<br>High precision holes<br>  <br>øD : 0,05 ~ 0,19mm<br>L/D: ~ 8<br>➪ K32 | PCD Brazed Drill<br>**SumiDia Drill**<br>  <br>øD : 5 ~ 12mm<br>L/D: ~ 3<br>➪ K59 ~ 60 |

## ■ Recommended Cutting Conditions by Work Materials

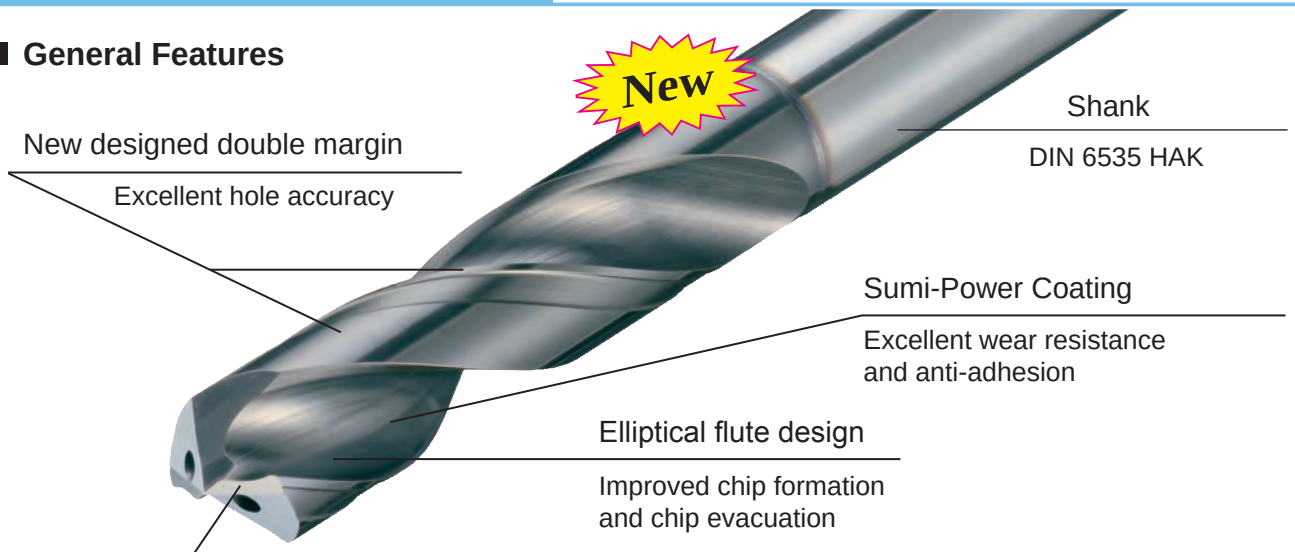
| Drill \ Work | Steel | Stainless Steel | Cast Iron | Non-ferrous Metalls |
|---|---|---|---|---|
| **SMD** (ø20) | 50 ▬ 120<br>0,12 ├──┤ 0,35 | 50 ▬ 90<br>0,1 ├──┤ 0,25 | 50 ▬ 100<br>0,2 ├──┤ 0,45 ② | 100 ▬ 180<br>0,2 ├──┤ 0,4 ② |
| **WDX** (ø18) | 100 ▬ 220<br>0,15 ├──┤ 0,25 | 80 ▬ 180<br>0,06 ├──┤ 0,18 | 120 ▬ 200<br>0,1 ├──┤ 0,32 | 100 ▬ 200<br>0,1 ├──┤ 0,25 |
| **MDW...XHT** (ø5) | 80 ▬ 120<br>0,15 ├──┤ 0,25 | 30 ▬ 60<br>0,08 ├──┤ 0,15 | 50 ▬ 90<br>0,15 ├──┤ 0,3 | 80 ▬ 160<br>0,12 ├──┤ 0,35 |
| **SumiDia Drill** | — | — | — | 80 ▬ 200<br>0,05 ├──┤ 0,2 |

▬ Cutting speed $v_c$ (m/min)
├──┤ Feed f (mm/rev)

# SDP Type (DIN)



## General Features



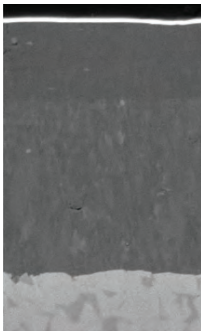



### Stock Size

Ø3,0 ~ Ø12,0
Increment 0,1mm

Ø12,1 ~ Ø16,0
Standard diameter

### Coating Structure



Improved anti-adhesion AlCrTiN lubricant layer coating with high Al content improves friction condition.

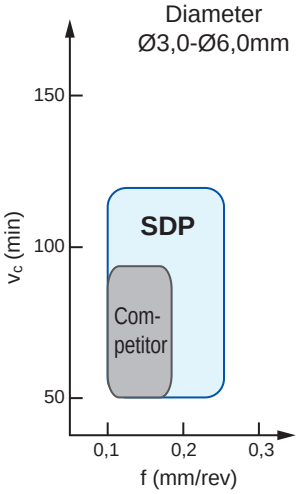
High wear resistance
Tough and hard AlCrTiN super multilayer

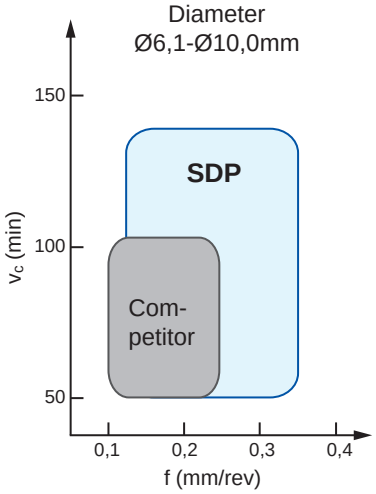
Substrate

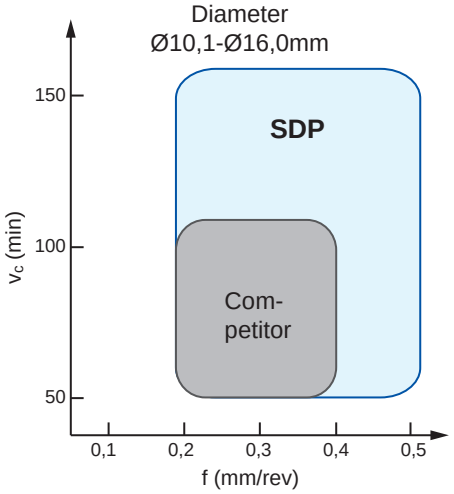
## Advantages

- The specific and optimum solution for a wide range of application conditions
- Top performance parameters, maximum feed and stable long tool life
- Double margin design for high-precision holes
- Good balance of high wear resistance and toughness
- Curved cutting edge - ideal for removing chips
- Reliable and high productivity performance

## Application Range



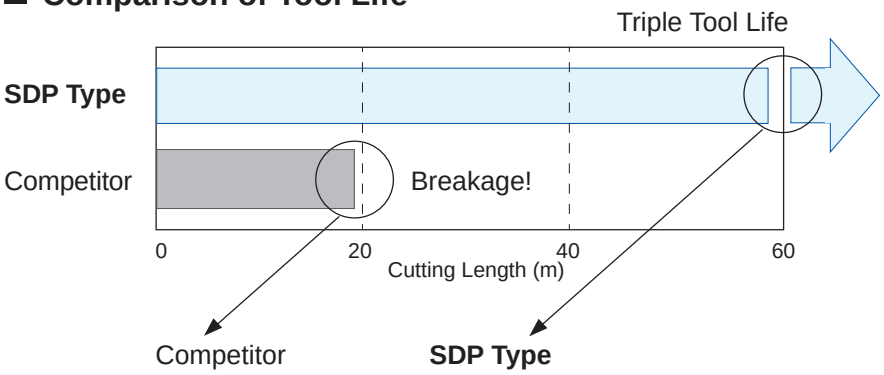
## Maximum Feed Rate Result

| Feed Rate (mm/rev) | 0,30 | 0,40 | 0,50 | 0,55 | 0,60 | 0,65 | 0,70 | 0,75 | 0,80 |
|---|---|---|---|---|---|---|---|---|---|
| **SDP Type** | OK | OK | OK | OK | OK | OK | OK | OK | |
| Competitor | OK | Breakage! | | | | | | | |

Internal test conditions

| | |
|---|---|
| Drill: | Ø 4, L/D=5 |
| Work Material: | Carbon Steel (C50) |
| Cutting Data: | $v_c$=80m/rev, $a_p$=18mm |

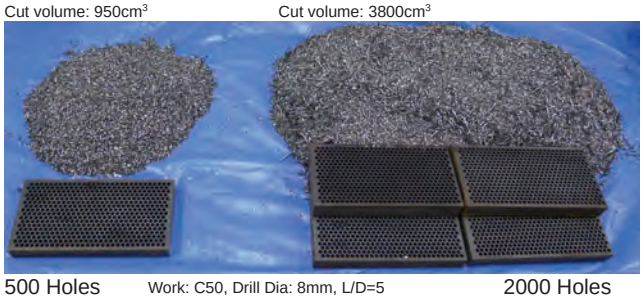
## Comparison of Tool Life




| | |
|---|---|
| Drill: | Ø 8, L/D=5 |
| Work Material: | Carbon Steel (C50) |
| Cutting Data: | $v_c$=80m/min, f=0,15mm/rev, $a_p$=38mm, Through hole, Internal coolant |

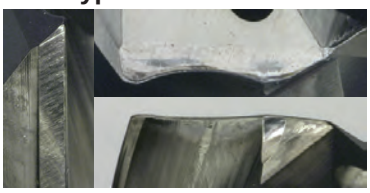
Competitor — Cut volume: 950cm³

SDP Type — Cut volume: 3800cm³

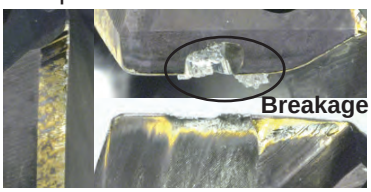


500 Holes — Work: C50, Drill Dia: 8mm, L/D=5 — 2000 Holes

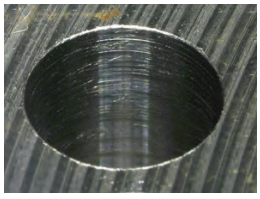
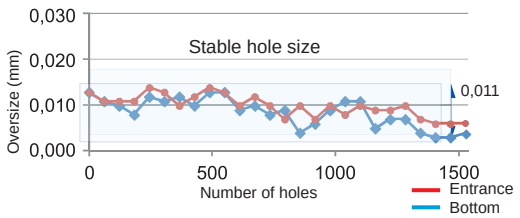
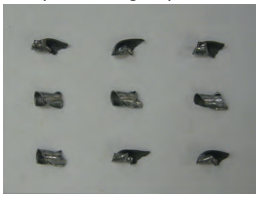
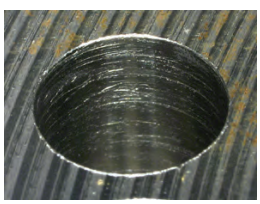
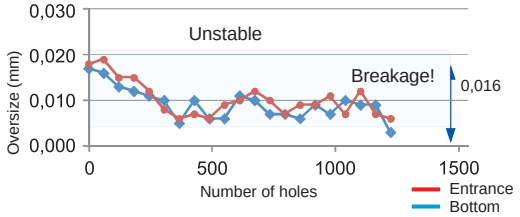
**SDP Type**



Competitor




## Excellent Hole Accuracy

| | Hole Accuracy | Chip Shape |
|---|---|---|
| **SDP Type** |   | Compact cutting chips  |
| Competitor |   | Longer cutting chips  |

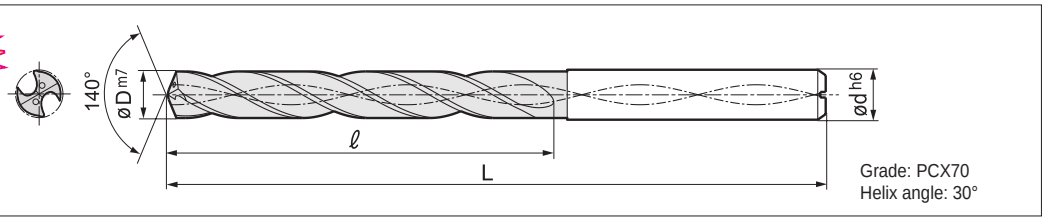




| | |
|---|---|
| Drill: | Ø 8, L/D=5 |
| Workpiece: | Carbon Steel (C50) |
| Cutting Data: | $v_c$=80m/min, f=0,25mm/rev, $a_p$=24mm, Blind-hole, Internal coolant |

## ■ Solid Carbide Drill with Internal Coolant Supply, ØD: 3,0 ~ 7,5mm, 3D / 5D /7D

New




Grade: PCX70
Helix angle: 30°

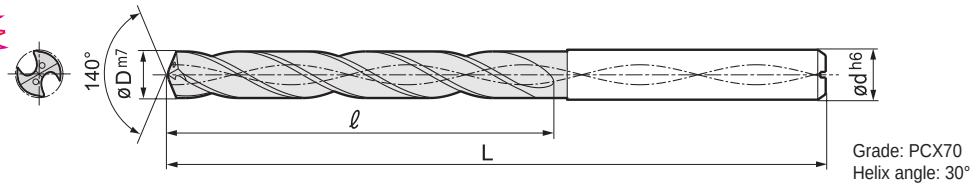
| ØD (mm) | Shank ød (mm) | Cat. No. (L/D) 3, 5, 7 | 3D Type | | | 5D Type | | | 7D Type | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Stock | Dimensions (mm) | | Stock | Dimensions (mm) | | Stock | Dimensions (mm) | |
| | | | 3 | L | ℓ | 5 | L | ℓ | 7 | L | ℓ |
| 3,0 | 6 | SDP 0300 U □ HAK | ● | 62 | 20 | ● | 66 | 28 | ● | 70 | 32 |
| 3,1 | | SDP 0310 U □ HAK | ● | | | ● | | | ● | | |
| 3,2 | | SDP 0320 U □ HAK | ● | | | ● | | | ● | | |
| 3,25 | | SDP 0325 U □ HAK | ● | | | ● | | | ❑ | | |
| 3,3 | | SDP 0330 U □ HAK | ● | | | ● | | | ● | | |
| 3,4 | | SDP 0340 U □ HAK | ● | | | ● | | | ● | 75 | 36,5 |
| 3,5 | | SDP 0350 U □ HAK | ● | | | ● | | | ● | | |
| 3,6 | | SDP 0360 U □ HAK | ● | | | ● | | | ● | | |
| 3,7 | | SDP 0370 U □ HAK | ● | | | ● | | | ● | | |
| 3,8 | | SDP 0380 U □ HAK | ● | | 24 | ● | 74 | 36 | ● | | 38,5 |
| 3,9 | | SDP 0390 U □ HAK | ● | | | ● | | | ● | | |
| 4,0 | | SDP 0400 U □ HAK | ● | | | ● | | | ● | | |
| 4,1 | | SDP 0410 U □ HAK | ● | | | ● | | | ● | | |
| 4,2 | | SDP 0420 U □ HAK | ● | | | ● | | | ● | | |
| 4,3 | | SDP 0430 U □ HAK | ● | 66 | | ● | | | ● | 85 | 47 |
| 4,4 | | SDP 0440 U □ HAK | ● | | | ● | | | ● | | |
| 4,5 | | SDP 0450 U □ HAK | ● | | | ● | | | ● | | |
| 4,6 | | SDP 0460 U □ HAK | ● | | | ● | | | ● | | |
| 4,65 | | SDP 0465 U □ HAK | ● | | | ● | | | ● | | |
| 4,7 | | SDP 0470 U □ HAK | ● | | | ● | | | ● | | |
| 4,8 | | SDP 0480 U □ HAK | ● | | 28 | ● | 82 | 44 | ● | 90 | 52 |
| 4,9 | | SDP 0490 U □ HAK | ● | | | ● | | | ● | | |
| 5,0 | | SDP 0500 U □ HAK | ● | | | ● | | | ● | | |
| 5,1 | | SDP 0510 U □ HAK | ● | | | ● | | | ● | | |
| 5,2 | | SDP 0520 U □ HAK | ● | | | ● | | | ● | | |
| 5,3 | | SDP 0530 U □ HAK | ● | | | ● | | | ● | | |
| 5,4 | | SDP 0540 U □ HAK | ● | | | ● | | | ● | 97 | 59 |
| 5,5 | | SDP 0550 U □ HAK | ● | | | ● | | | ● | | |
| 5,55 | | SDP 0555 U □ HAK | ● | | | ● | | | ❑ | | |
| 5,6 | | SDP 0560 U □ HAK | ● | | | ● | | | ❑ | | |
| 5,7 | | SDP 0570 U □ HAK | ● | | | ● | | | ● | | |
| 5,8 | | SDP 0580 U □ HAK | ● | | | ● | | | ● | | |
| 5,9 | | SDP 0590 U □ HAK | ● | | | ● | | | ● | | |
| 6,0 | | SDP 0600 U □ HAK | ● | | | ● | | | ● | | |
| 6,1 | 8 | SDP 0610 U □ HAK | ● | 79 | 34 | ● | 91 | 53 | ❑ | 106 | 68 |
| 6,2 | | SDP 0620 U □ HAK | ● | | | ● | | | ● | | |
| 6,3 | | SDP 0630 U □ HAK | ● | | | ● | | | ● | | |
| 6,4 | | SDP 0640 U □ HAK | ● | | | ● | | | ❑ | | |
| 6,5 | | SDP 0650 U □ HAK | ● | | | ● | | | ● | | |
| 6,6 | | SDP 0660 U □ HAK | ● | | | ● | | | ● | | |
| 6,7 | | SDP 0670 U □ HAK | ● | | | ● | | | ● | | |
| 6,8 | | SDP 0680 U □ HAK | ● | | | ● | | | ● | | |
| 6,9 | | SDP 0690 U □ HAK | ● | | | ● | | | ● | 116 | 78 |
| 7,0 | | SDP 0700 U □ HAK | ● | | | ● | | | ● | | |
| 7,1 | | SDP 0710 U □ HAK | ● | | 40 | ● | | | ● | | |
| 7,2 | | SDP 0720 U □ HAK | ● | | | ● | | | ● | | |
| 7,3 | | SDP 0730 U □ HAK | ● | | | ● | | | ❑ | | |
| 7,4 | | SDP 0740 U □ HAK | ● | | | ● | | | ❑ | | |
| 7,5 | | SDP 0750 U □ HAK | ● | | | ● | | | ● | | |

● = Euro stock
❑ = Delivery on request

※ Remarks:
❑ Non-Stock Items will be required minimum order quantity for 30 pcs.

## ■ Solid Carbide Drill with Internal Coolant Supply, ØD: 7,6 ~ 12,5mm, 3D / 5D / 7D

New




Grade: PCX70
Helix angle: 30°

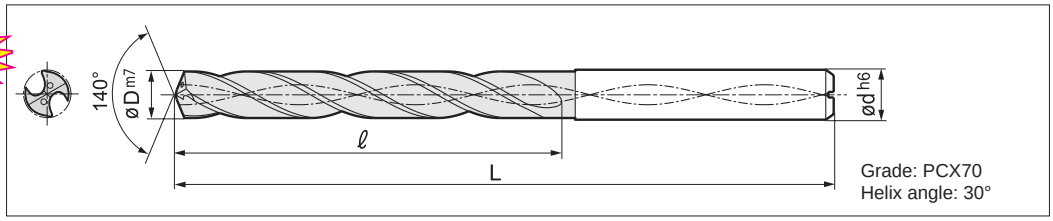
| ØD (mm) | Shank ød (mm) | Cat. No. (L/D) 3, 5, 7 | 3D Type | | | 5D Type | | | 7D Type | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Stock | Dimensions (mm) | | Stock | Dimensions (mm) | | Stock | Dimensions (mm) | |
| | | | 3 | L | ℓ | 5 | L | ℓ | 7 | L | ℓ |
| 7,6 | 8 | SDP 0760 U □ HAK | ● | 79 | 40 | ● | 91 | 53 | ● | 116 | 78 |
| 7,7 | | SDP 0770 U □ HAK | ● | | | ● | | | ● | | |
| 7,8 | | SDP 0780 U □ HAK | ● | | | ● | | | ● | | |
| 7,9 | | SDP 0790 U □ HAK | ● | | | ● | | | ● | | |
| 8,0 | | SDP 0800 U □ HAK | ● | | | ● | | | ● | | |
| 8,1 | 10 | SDP 0810 U □ HAK | ● | 89 | 47 | ● | 103 | 61 | ● | 131 | 89 |
| 8,2 | | SDP 0820 U □ HAK | ● | | | ● | | | ● | | |
| 8,3 | | SDP 0830 U □ HAK | ● | | | ● | | | ❑ | | |
| 8,4 | | SDP 0840 U □ HAK | ● | | | ● | | | ● | | |
| 8,5 | | SDP 0850 U □ HAK | ● | | | ● | | | ● | | |
| 8,6 | | SDP 0860 U □ HAK | ● | | | ● | | | ● | | |
| 8,7 | | SDP 0870 U □ HAK | ● | | | ● | | | ● | | |
| 8,8 | | SDP 0880 U □ HAK | ● | | | ● | | | ● | | |
| 8,9 | | SDP 0890 U □ HAK | ● | | | ● | | | ❑ | | |
| 9,0 | | SDP 0900 U □ HAK | ● | | | ● | | | ● | | |
| 9,1 | | SDP 0910 U □ HAK | ● | | | ● | | | ● | 139 | 97 |
| 9,2 | | SDP 0920 U □ HAK | ● | | | ● | | | ● | | |
| 9,25 | | SDP 0925 U □ HAK | ● | | | ● | | | ❑ | | |
| 9,3 | | SDP 0930 U □ HAK | ● | | | ● | | | ● | | |
| 9,4 | | SDP 0940 U □ HAK | ● | | | ● | | | ● | | |
| 9,5 | | SDP 0950 U □ HAK | ● | | | ● | | | ● | | |
| 9,6 | | SDP 0960 U □ HAK | ● | | | ● | | | ❑ | | |
| 9,7 | | SDP 0970 U □ HAK | ● | | | ● | | | ● | | |
| 9,8 | | SDP 0980 U □ HAK | ● | | | ● | | | ● | | |
| 9,9 | | SDP 0990 U □ HAK | ● | | | ● | | | ● | | |
| 10,0 | | SDP 1000 U □ HAK | ● | | | ● | | | ● | | |
| 10,1 | 12 | SDP 1010 U □ HAK | ● | 102 | 55 | ● | 118 | 71 | ❑ | 155 | 108 |
| 10,2 | | SDP 1020 U □ HAK | ● | | | ● | | | ● | | |
| 10,3 | | SDP 1030 U □ HAK | ● | | | ● | | | ❑ | | |
| 10,4 | | SDP 1040 U □ HAK | ● | | | ● | | | ❑ | | |
| 10,5 | | SDP 1050 U □ HAK | ● | | | ● | | | ● | | |
| 10,6 | | SDP 1060 U □ HAK | ● | | | ● | | | ❑ | | |
| 10,7 | | SDP 1070 U □ HAK | ● | | | ● | | | ❑ | | |
| 10,8 | | SDP 1080 U □ HAK | ● | | | ● | | | ● | | |
| 10,9 | | SDP 1090 U □ HAK | ● | | | ● | | | ❑ | | |
| 11,0 | | SDP 1100 U □ HAK | ● | | | ● | | | ● | | |
| 11,1 | | SDP 1110 U □ HAK | ● | | | ● | | | ❑ | 163 | 116 |
| 11,2 | | SDP 1120 U □ HAK | ● | | | ● | | | ● | | |
| 11,3 | | SDP 1130 U □ HAK | ● | | | ● | | | ❑ | | |
| 11,4 | | SDP 1140 U □ HAK | ● | | | ● | | | ❑ | | |
| 11,5 | | SDP 1150 U □ HAK | ● | | | ● | | | ● | | |
| 11,6 | | SDP 1160 U □ HAK | ● | | | ● | | | ❑ | | |
| 11,7 | | SDP 1170 U □ HAK | ● | | | ● | | | ❑ | | |
| 11,8 | | SDP 1180 U □ HAK | ● | | | ● | | | ● | | |
| 11,9 | | SDP 1190 U □ HAK | ● | | | ● | | | ❑ | | |
| 12,0 | | SDP 1200 U □ HAK | ● | | | ● | | | ● | | |
| 12,1 | 14 | SDP 1210 U □ HAK | ❑ | 107 | 60 | ❑ | 124 | 77 | ❑ | 182 | 135 |
| 12,2 | | SDP 1220 U □ HAK | ● | | | ● | | | ❑ | | |
| 12,3 | | SDP 1230 U □ HAK | ❑ | | | ❑ | | | ❑ | | |
| 12,4 | | SDP 1240 U □ HAK | ❑ | | | ❑ | | | ❑ | | |
| 12,5 | | SDP 1250 U □ HAK | ● | | | ● | | | ❑ | | |

※ Remarks:
❑ Non-Stock Items will be required minimum order quantity for 30 pcs.

● = Euro stock
❑ = Delivery on request

## ■ Solid Carbide Drill with Internal Coolant Supply, ØD: 12,1 ~ 16,0mm, 3D / 5D / 7D

New




Grade: PCX70
Helix angle: 30°

| ØD (mm) | Shank Ød (mm) | Cat. No. (L/D) 3, 5, 7 | 3D Type | | | 5D Type | | | 7D Type | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Stock | Dimensions (mm) | | Stock | Dimensions (mm) | | Stock | Dimensions (mm) | |
| | | | 3 | L | ℓ | 5 | L | ℓ | 7 | L | ℓ |
| 12,6 | 14 | SDP 1260 U □ HAK | ❑ | 107 | 60 | ❑ | 124 | 77 | ❑ | 182 | 135 |
| 12,7 | | SDP 1270 U □ HAK | ❑ | | | ❑ | | | ❑ | | |
| 12,8 | | SDP 1280 U □ HAK | ❑ | | | ❑ | | | ❑ | | |
| 12,9 | | SDP 1290 U □ HAK | ❑ | | | ❑ | | | ❑ | | |
| 13,0 | | SDP 1300 U □ HAK | ● | | | ● | | | ❑ | | |
| 13,1 | | SDP 1310 U □ HAK | ❑ | | | ❑ | | | ❑ | | |
| 13,2 | | SDP 1320 U □ HAK | ❑ | | | ❑ | | | ❑ | | |
| 13,3 | | SDP 1330 U □ HAK | ❑ | | | ❑ | | | ❑ | | |
| 13,4 | | SDP 1340 U □ HAK | ❑ | | | ❑ | | | ❑ | | |
| 13,5 | | SDP 1350 U □ HAK | ● | | | ● | | | ❑ | | |
| 13,6 | | SDP 1360 U □ HAK | ❑ | | | ❑ | | | ❑ | | |
| 13,7 | | SDP 1370 U □ HAK | ● | | | ● | | | ❑ | | |
| 13,8 | | SDP 1380 U □ HAK | ❑ | | | ❑ | | | ❑ | | |
| 13,9 | | SDP 1390 U □ HAK | ❑ | | | ❑ | | | ❑ | | |
| 14,0 | | SDP 1400 U □ HAK | ● | | | ● | | | ❑ | | |
| 14,1 | 16 | SDP 1410 U □ HAK | ❑ | 115 | 65 | ❑ | 133 | 83 | ❑ | 204 | 154 |
| 14,2 | | SDP 1420 U □ HAK | ● | | | ● | | | ❑ | | |
| 14,3 | | SDP 1430 U □ HAK | ❑ | | | ❑ | | | ❑ | | |
| 14,4 | | SDP 1440 U □ HAK | ❑ | | | ❑ | | | ❑ | | |
| 14,5 | | SDP 1450 U □ HAK | ● | | | ● | | | ❑ | | |
| 14,6 | | SDP 1460 U □ HAK | ❑ | | | ❑ | | | ❑ | | |
| 14,7 | | SDP 1470 U □ HAK | ● | | | ● | | | ❑ | | |
| 14,8 | | SDP 1480 U □ HAK | ❑ | | | ❑ | | | ❑ | | |
| 14,9 | | SDP 1490 U □ HAK | ❑ | | | ❑ | | | ❑ | | |
| 15,0 | | SDP 1500 U □ HAK | ● | | | ● | | | ❑ | | |
| 15,1 | | SDP 1510 U □ HAK | ❑ | | | ❑ | | | ❑ | | |
| 15,2 | | SDP 1520 U □ HAK | ● | | | ● | | | ❑ | | |
| 15,3 | | SDP 1530 U □ HAK | ❑ | | | ❑ | | | ❑ | | |
| 15,4 | | SDP 1540 U □ HAK | ❑ | | | ❑ | | | ❑ | | |
| 15,5 | | SDP 1550 U □ HAK | ● | | | ● | | | ❑ | | |
| 15,6 | | SDP 1560 U □ HAK | ❑ | | | ❑ | | | ❑ | | |
| 15,7 | | SDP 1570 U □ HAK | ● | | | ● | | | ❑ | | |
| 15,8 | | SDP 1580 U □ HAK | ❑ | | | ❑ | | | ❑ | | |
| 15,9 | | SDP 1590 U □ HAK | ❑ | | | ❑ | | | ❑ | | |
| 16,0 | | SDP 1600 U □ HAK | ● | | | ● | | | ❑ | | |

● = Euro stock
❑ = Delivery on request

※ Remarks:
❑ Non-Stock Items will be required minimum order quantity for 30 pcs.

## Recommended Cutting Conditions

| Material Group | | | | | | SDP_____U_HAK PCX70 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ISO 513 | Work Material | Type/ Structure | $R_m$ N/mm² | Hardness HB30 | Fitness | ØD: 3,0 - 6,0 | | ØD: 6,1 - 10,0 | | ØD: 10,1 - 16,0 | |
| | | | | | | $v_c$=m/min | Feed rate (mm/rev) | $v_c$=m/min | Feed rate (mm/rev) | $v_c$=m/min | Feed rate (mm/rev) |
| P | Carbon steel Cast steel | free cutting steel construction steel case-hardened steel heat-treatable steel spring steel | 420 | 125 | ◉ | 50 - **80** - 120 | 0,15 - **0,20** - 0,31 | 70 - **110** - 140 | 0,20 - **0,25** - 0,42 | 80 - **120** - 160 | 0,25 - **0,30** - 0,53 |
| | | | 650 | 190 | ◉ | 50 - **80** - 120 | 0,15 - **0,20** - 0,31 | 70 - **110** - 140 | 0,20 - **0,25** - 0,42 | 80 - **120** - 160 | 0,25 - **0,30** - 0,53 |
| | | | 850 | 250 | ◉ | 50 - **80** - 120 | 0,15 - **0,20** - 0,31 | 70 - **110** - 140 | 0,20 - **0,25** - 0,42 | 80 - **120** - 160 | 0,25 - **0,30** - 0,53 |
| | | | 750 | 270 | ◉ | 50 - **80** - 120 | 0,15 - **0,20** - 0,31 | 70 - **110** - 140 | 0,20 - **0,25** - 0,42 | 80 - **120** - 160 | 0,25 - **0,30** - 0,50 |
| | | | 1000 | 300 | ◉ | 10 - **20** - 30 | 0,05 - **0,06** - 0,11 | 15 - **22** - 30 | 0,08 - **0,09** - 0,14 | 20 - **28** - 35 | 0,08 - **0,09** - 0,16 |
| | Low alloy steel Cast steel | case-hardened steel heat-treatable steel bearing steel nitriding steel cold work steel | 600 | 180 | ◉ | 50 - **70** - 90 | 0,10 - **0,14** - 0,24 | 60 - **80** - 110 | 0,15 - **0,20** - 0,32 | 70 - **100** - 120 | 0,20 - **0,25** - 0,40 |
| | | | 930 | 275 | ◉ | 45 - **65** - 85 | 0,10 - **0,14** - 0,24 | 60 - **80** - 110 | 0,15 - **0,22** - 0,34 | 65 - **95** - 120 | 0,20 - **0,25** - 0,37 |
| | | | 1000 | 300 | ◎ | 40 - **60** - 80 | 0,10 - **0,15** - 0,26 | 60 - **80** - 110 | 0,15 - **0,20** - 0,32 | 60 - **90** - 120 | 0,20 - **0,25** - 0,37 |
| | | | 1200 | 350 | ◉ | 35 - **55** - 75 | 0,10 - **0,15** - 0,26 | 55 - **75** - 110 | 0,15 - **0,22** - 0,32 | 55 - **80** - 110 | 0,20 - **0,27** - 0,38 |
| | High alloy steel | tool steel hot work steel | 680 | 200 | ◎ | 30 - **40** - 50 | 0,10 - **0,15** - 0,25 | 30 - **40** - 50 | 0,12 - **0,20** - 0,28 | 30 - **40** - 50 | 0,12 - **0,20** - 0,32 |
| | | | 1100 | 325 | ◎ | 20 - **30** - 40 | 0,10 - **0,12** - 0,23 | 20 - **30** - 40 | 0,12 - **0,15** - 0,27 | 20 - **30** - 40 | 0,14 - **0,18** - 0,32 |
| M | Stainless steel Cast steel | martensitic/ferritic | 680 | 200 | ◎ | 40 - **55** - 70 | 0,08 - **0,10** - 0,21 | 40 - **60** - 75 | 0,10 - **0,12** - 0,25 | 50 - **70** - 80 | 0,10 - **0,12** - 0,25 |
| | | martensitic | 820 | 240 | ○ | 30 - **45** - 60 | 0,08 - **0,10** - 0,20 | 40 - **60** - 70 | 0,10 - **0,12** - 0,24 | 50 - **60** - 80 | 0,10 - **0,12** - 0,24 |
| | | austenitic | 600 | 180 | ○ | 30 - **45** - 60 | 0,08 - **0,10** - 0,20 | 40 - **60** - 70 | 0,10 - **0,12** - 0,24 | 50 - **60** - 80 | 0,10 - **0,12** - 0,24 |
| | | Duplex | 740 | 230 | ○ | 30 - **45** - 60 | 0,06 - **0,08** - 0,18 | 40 - **60** - 70 | 0,08 - **0,10** - 0,23 | 50 - **60** - 80 | 0,10 - **0,10** - 0,23 |
| K | Cast iron GG | ferritic/pearlitic | | 180 | ◉ | 50 - **70** - 90 | 0,15 - **0,20** - 0,36 | 60 - **80** - 100 | 0,20 - **0,25** - 0,40 | 70 - **100** - 120 | 0,25 - **0,30** - 0,42 |
| | | pearlitic | | 260 | ◉ | 40 - **60** - 80 | 0,15 - **0,20** - 0,36 | 50 - **70** - 90 | 0,20 - **0,25** - 0,40 | 60 - **80** - 100 | 0,25 - **0,30** - 0,42 |
| | Cast iron GGG | ferritic | | 160 | ◉ | 50 - **70** - 90 | 0,15 - **0,18** - 0,31 | 60 - **80** - 100 | 0,20 - **0,25** - 0,40 | 70 - **100** - 120 | 0,25 - **0,30** - 0,42 |
| | | pearlitic | | 250 | ◉ | 40 - **60** - 80 | 0,15 - **0,18** - 0,31 | 50 - **70** - 90 | 0,20 - **0,25** - 0,40 | 70 - **80** - 100 | 0,25 - **0,30** - 0,42 |
| S | Heat resisting alloys | Fe-based | | | ◎ | 10 - **20** - 30 | 0,08 - **0,09** - 0,13 | 15 - **22** - 32 | 0,08 - **0,10** - 0,15 | 20 - **28** - 35 | 0,10 - **0,12** - 0,19 |
| | | Ni / Co-based | | | ◎ | 10 - **20** - 30 | 0,08 - **0,09** - 0,13 | 15 - **22** - 32 | 0,08 - **0,10** - 0,15 | 20 - **28** - 35 | 0,10 - **0,12** - 0,19 |
| | Titanium Titanium alloys | pure Titanium | 430 | | | | | | | | |
| | | Ti-Basis | | | ◎ | 10 - **20** - 30 | 0,05 - **0,06** - 0,12 | 15 - **22** - 32 | 0,08 - **0,09** - 0,17 | 20 - **28** - 35 | 0,08 - **0,09** - 0,17 |
| N | Aluminium Al-wrought alloys | pure aluminium | | | | | | | | | |
| | | wrought alloys | | | | | | | | | |
| | Aluminium Cast alloys | Si ≤ 12% | | | | | | | | | |
| | | Si ≥ 12% | | | ○ | 70 - **90** - 100 | 0,15 - **0,20** - 0,25 | 80 - **100** - 120 | 0,20 - **0,25** - 0,30 | 100 - **120** - 140 | 0,25 - **0,30** - 0,35 |
| | | Al - Mg alloys | | | | | | | | | |
| | Zinc die-cast | Zn alloys | | | | | | | | | |
| | Copper alloys | Copper | | | | | | | | | |
| | | Brass | | | ◎ | 80 - **100** - 120 | 0,15 - **0,20** - 0,25 | 110 - **130** - 180 | 0,20 - **0,25** - 0,30 | 160 - **180** - 200 | 0,25 - **0,30** - 0,35 |
| | | Bronze | | | | | | | | | |
| H | Hardened steel | 45 HRC | | | ◎ | 10 - **20** - 30 | 0,08 - **0,09** - 0,10 | 15 - **22** - 32 | 0,08 - **0,10** - 0,12 | 20 - **28** - 35 | 0,12 - **0,15** - 0,20 |
| | | 55 HRC | | | | | | | | | |
| | | 60 HRC | | | | | | | | | |
| | | > 60 HRC | | | | | | | | | |

◉ Preferred choice ◎ Suitable ○ Possible

## SDP-Identification

**SDP** **0800** **U** **3** **HAK** PCX70

- **SDP**: **S**umi-**D**rill **P**ower Type
- **0800**: Drill Diameter 8,0mm
- **U**: Universal
- **3**: Drilling Depth 3D/5D/7D
- **HAK**: DIN 6535 Form HAK
- PCX70: Grade

# DEX Coating

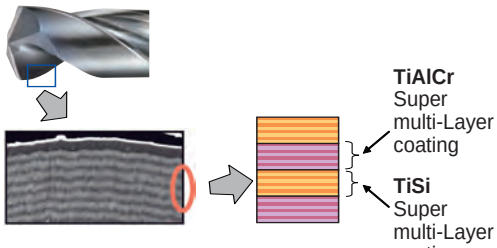


## General Features

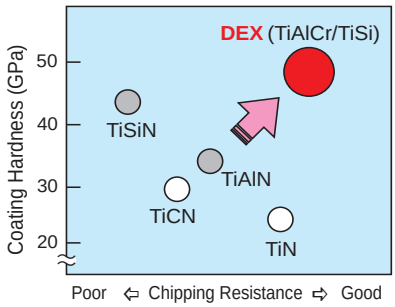
- Sumitomo Electric Hardmetal's next-generation drill coating utilises nano-coating technology to provide more than double the tool life of conventional coatings.
- Silicon and chrome improve usure, heat, and adhesion resistance.
- New super multi-layered structure offers significantly improved chip resistance (coating strength).

## Characteristics

- Coating Design
  World's first combined super multi-layered coating is made from alternate layers of super multilayered substrates.




- Characteristics of Films




## DEX Coat Application Examples

- MultiDrill GS Type Drilling Examples

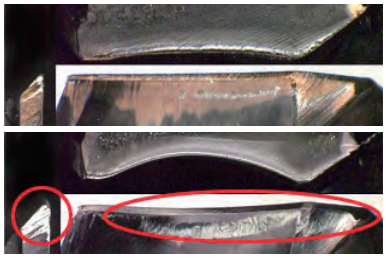
### Comparison of Usure Resistance

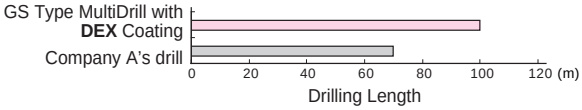
Edge Usure Comparison for 70m Drilling

*Shoulder and rake face feature improved usure resistance enabling long tool life.*

**DEX** Coating MultiDrill GS Type

Concurrent A Dril






| | |
|---|---|
| Tool: | MDW 0800 GS4 |
| Work Material: | C50 (HB200) |
| Cutting Conditions: | $v_c$ =70m/min, f=0,25mm/rev, $d_{oc}$ =32mm<br>External coolant (Water soluble) |

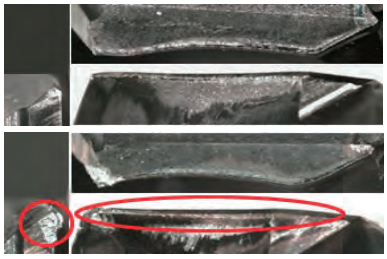
### Comparison of Adhesion Resistance

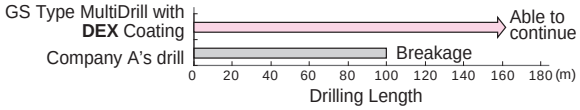
Edge Usure Comparison for 100m Drilling

*Offers significantly improved fracture resistance to counter problems caused by shoulder and flute adhesion in soft steel drilling.*

**DEX** Coating MultiDrill GS Type

Competitor B Dril





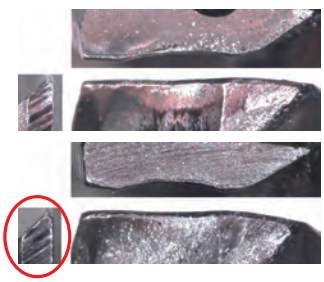

| | |
|---|---|
| Tool: | MDW 0600 GS4 |
| Work Material: | 15CrMo5 (HB120) |
| Cutting Conditions: | $v_c$ =60m/min, f=0,18mm/rev, $d_{oc}$ =18mm<br>External coolant (Water soluble) |

- Long MultiDrill XHT Type Drilling Examples

*Reduced margin usure during deep hole MQL drilling increases number of regrinds.*

**DEX** Coating

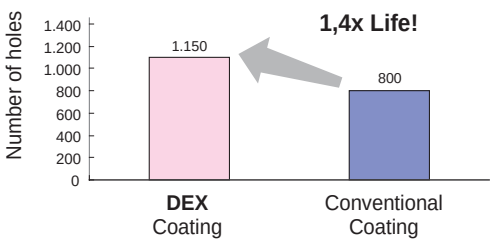
Conventional Coating



| | |
|---|---|
| Tool: | MDW 0497 XHT20 (ø4,97 L/D=29) |
| Work Material: | 42CrMo4 (HB275) Crank Shaft |
| Cutting Conditions: | $v_c$=70m/min, f=0,23mm/rev, $d_{oc}$ =75mm<br>MQL |

- MultiDrill SMD Type Drilling Examples

*Offers longer tool life with SEC MultiDrills as well.*




| | |
|---|---|
| Tool: | SMDH 210 M (ø21,0) |
| Work Material: | 36Mn5 (HB350) Construction Mashine Componemt |
| Cutting Conditions: | $v_c$=60m/min, f=0,25mm/rev, $d_{oc}$ =25mm<br>Water soluble Coolant |

# SUPER MULTI-DRILLS
# GS / HGS Type



## General Features

Super MultiDrill GS and HGS types are solid carbide drills that employ a new flute design and wide chip pocket to achieve excellent chip management and evacuation.
DEX coating enables stable and long tool life over a wide range of work materials and applications.

## Characteristics and Applications

- **Long tool life**
  New cutting edge design and special DEX coating provide long tool life with a wide variety of work materials.
- **Stable chip evacuation**
  New flute shape significantly improves chip management and evacuation.
- **Quiet cutting and stable cutting resistance**
  Stable drilling with little wobble even in small machine applications.
- **Environmentally-friendly**
  Compatible with the MQL (Minimum Quantity Lubrication) system.

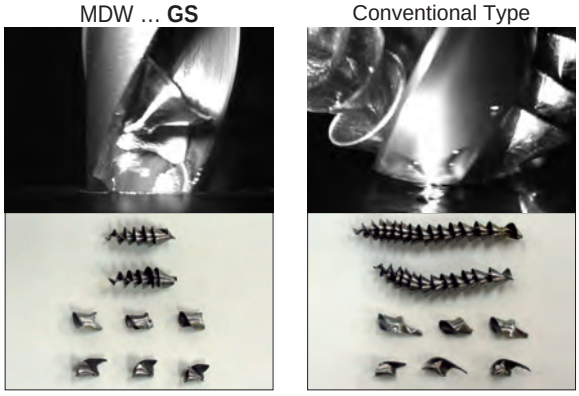
## Series

| Coolant supply | Type | Diameter range (mm) | Hole depth (L/D) |
|---|---|---|---|
| External (GS Type) | MDW □□□□GS2 | ø2,0~ø16,0 | ~ 2 |
| | MDW □□□□GS4 | | ~ 4 |
| Internal (HGS Type) | MDW □□□□HGS3 | ø4,0~ø16,0 | ~ 3 |
| | MDW □□□□HGS5 | | ~ 5 |

## Performance

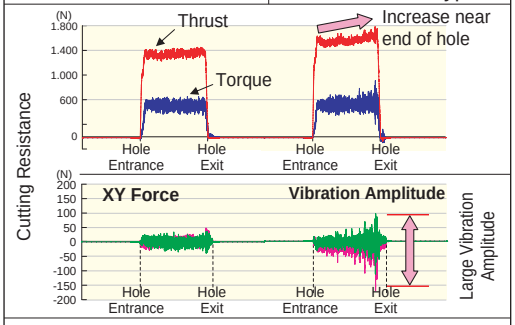
### Chip Management

MDW ... **GS** | Conventional Type



### Performance Comparison

MDW ... **GS** | Conventional Type



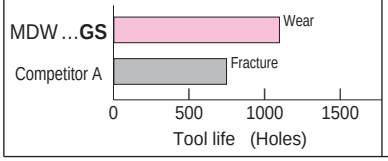

*GS type provides stable drill behaviour throughout the drilling process.*

Tool: MDW 0800 GS4
Work Material: C50 (HB200)
Cutting Conditions: $v_c$=80m/min, f=0,25mm/rev, $d_{oc}$=24mm
External Coolant (Water Soluble)

## Application Examples

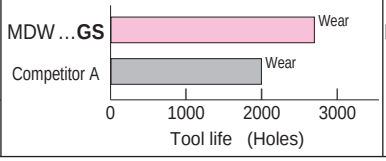
● Automotive Component
C43 (HB250)

Drill: MDW 0970 GS4 (ø9,7mm)
Cutting data: $v_c$ = 80 m/min, f = 0,25 mm/rev
$d_{oc}$ = 25 mm
External Coolant (Water Soluble)



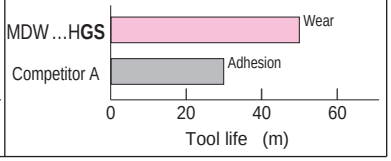

● Boron Steel Machine Component
(HRC30)

Drill: MDW 0980 GS2 (ø9,8mm)
Cutting data: $v_c$ = 70 m/min, f = 0,15 mm/rev
$d_{oc}$ = 7 mm
External Coolant (Water Soluble)




● Machine Component
USt.42-2

Drill: MDW 0800 HGS8 (ø8,0mm)
Cutting data: $v_c$ = 80 m/min, f = 0,25 mm/rev
$d_{oc}$ = 64 mm
Internal Coolant (Water Soluble)

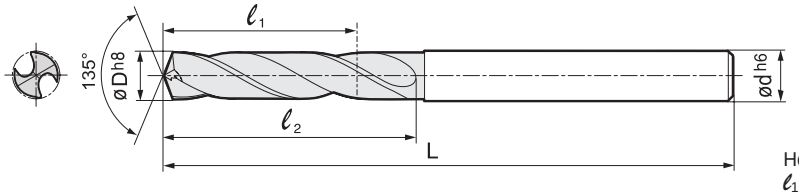


# MDW ... GS Type

## Without Coolant Holes (2D/4D)

"Super Multi-Layer" DEX (TiAlCr/TiSi) Coated Solid Carbide Drills






Helix angle: 30°
$\ell_1$ = Effective drilling length

### ● Diameter ø2,0~6,0mm

(mm)

| Dimensions | | Cat. No. | Short Type (2D) | | | | Long Type (4D) | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Stock | Dimensions | | | Stock | Dimensions | | |
| øD | ød | 2, 4 ↘ | 2 | L | $\ell_1$ | $\ell_2$ | 4 | L | $\ell_1$ | $\ell_2$ |
| **2,0** | 3,0 | MDW 0200 GS□ | ❍ | 45,4 | 6,0 | 8,4 | ❍ | 49,4 | 13,0 | 15,4 |
| 2,1 | | MDW 0210 GS□ | ❍ | | | | ❍ | | | |
| 2,2 | | MDW 0220 GS□ | ❍ | | | | ❍ | | | |
| 2,3 | | MDW 0230 GS□ | ❍ | | 7,3 | 10,5 | ❍ | | 14,5 | 17,5 |
| 2,4 | | MDW 0240 GS□ | ❍ | | | | ❍ | | | |
| 2,5 | | MDW 0250 GS□ | ❍ | 45,6 | | | ❍ | 49,6 | | |
| 2,6 | 3,0 | MDW 0260 GS□ | ❍ | | | | ❍ | | | |
| 2,7 | | MDW 0270 GS□ | ❍ | | | | ❍ | | | |
| 2,8 | | MDW 0280 GS□ | ❍ | | 9,8 | 13,6 | ❍ | | 16,0 | 19,6 |
| 2,9 | | MDW 0290 GS□ | ❍ | | | | ❍ | | | |
| **3,0** | | MDW 0300 GS□ | ❍ | | | | ❍ | | | |
| 3,1 | | MDW 0310 GS□ | ❍ | | | | ❍ | | | |
| 3,2 | | MDW 0320 GS□ | ❍ | | | | ❍ | | | |
| 3,3 | | MDW 0330 GS□ | ❍ | | 15,5 | 19,7 | ❍ | | 20,5 | 24,7 |
| 3,4 | | MDW 0340 GS□ | ❍ | | | | ❍ | | | |
| 3,5 | | MDW 0350 GS□ | ❍ | 54,8 | | | ❍ | 60,8 | | |
| 3,6 | 4,0 | MDW 0360 GS□ | ❍ | | | | ❍ | | | |
| 3,7 | | MDW 0370 GS□ | ❍ | | | | ❍ | | | |
| 3,8 | | MDW 0380 GS□ | ❍ | | 17,0 | 21,8 | ❍ | | 23,0 | 27,8 |
| 3,9 | | MDW 0390 GS□ | ❍ | | | | ❍ | | | |
| **4,0** | | MDW 0400 GS□ | ❍ | | | | ❍ | | | |
| 4,1 | | MDW 0410 GS□ | ❍ | | | | ❍ | | | |
| 4,2 | | MDW 0420 GS□ | ❍ | | | | ❍ | | | |
| 4,3 | | MDW 0430 GS□ | ❍ | | 18,5 | 23,9 | ❍ | | 25,5 | 31,9 |
| 4,4 | | MDW 0440 GS□ | ❍ | | | | ❍ | | | |
| 4,5 | | MDW 0450 GS□ | ❍ | 62,0 | | | ❍ | 77,0 | | |
| 4,6 | 5,0 | MDW 0460 GS□ | ❍ | | | | ❍ | | | |
| 4,7 | | MDW 0470 GS□ | ❍ | | | | ❍ | | | |
| 4,8 | | MDW 0480 GS□ | ❍ | | 20,0 | 26,0 | ❍ | | 33,0 | 39,0 |
| 4,9 | | MDW 0490 GS□ | ❍ | | | | ❍ | | | |
| **5,0** | | MDW 0500 GS□ | ❍ | | | | ❍ | | | |
| 5,1 | | MDW 0510 GS□ | ❍ | | | | ❍ | | | |
| 5,2 | | MDW 0520 GS□ | ❍ | | | | ❍ | | | |
| 5,3 | | MDW 0530 GS□ | ❍ | | 19,5 | 26,1 | ❍ | | 33,5 | 40,1 |
| 5,4 | | MDW 0540 GS□ | ❍ | | | | ❍ | | | |
| 5,5 | | MDW 0550 GS□ | ❍ | 66,2 | | | ❍ | 82,2 | | |
| 5,6 | 6,0 | MDW 0560 GS□ | ❍ | | | | ❍ | | | |
| 5,7 | | MDW 0570 GS□ | ❍ | | | | ❍ | | | |
| 5,8 | | MDW 0580 GS□ | ❍ | | 21,0 | 28,2 | ❍ | | 35,0 | 42,2 |
| 5,9 | | MDW 0590 GS□ | ❍ | | | | ❍ | | | |
| **6,0** | | MDW 0600 GS□ | ❍ | | | | ❍ | | | |

### ● Diameter ø6,1~10,0mm

(mm)

| Dimensions | | Cat. No. | Short Type (2D) | | | | Long Type (4D) | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Stock | Dimensions | | | Stock | Dimensions | | |
| øD | ød | 2, 4 ↘ | 2 | L | $\ell_1$ | $\ell_2$ | 4 | L | $\ell_1$ | $\ell_2$ |
| 6,1 | | MDW 0610 GS□ | ❍ | | | | ❍ | | | |
| 6,2 | | MDW 0620 GS□ | ❍ | | | | ❍ | | | |
| 6,3 | | MDW 0630 GS□ | ❍ | | 24,5 | 32,3 | ❍ | | 35,5 | 43,3 |
| 6,4 | | MDW 0640 GS□ | ❍ | | | | ❍ | | | |
| 6,5 | 7,0 | MDW 0650 GS□ | ❍ | 74,5 | | | ❍ | 84,3 | | |
| 6,6 | | MDW 0660 GS□ | ❍ | | | | ❍ | | | |
| 6,7 | | MDW 0670 GS□ | ❍ | | | | ❍ | | | |
| 6,8 | | MDW 0680 GS□ | ❍ | | 26,1 | 34,5 | ❍ | | 36,1 | 44,5 |
| 6,9 | | MDW 0690 GS□ | ❍ | | | | ❍ | | | |
| **7,0** | | MDW 0700 GS□ | ❍ | | | | ❍ | | | |
| 7,1 | | MDW 0710 GS□ | ❍ | | | | ❍ | | | |
| 7,2 | | MDW 0720 GS□ | ❍ | | | | ❍ | | | |
| 7,3 | | MDW 0730 GS□ | ❍ | | 25,6 | 34,6 | ❍ | | 37,6 | 46,6 |
| 7,4 | | MDW 0740 GS□ | ❍ | | | | ❍ | | | |
| 7,5 | 8,0 | MDW 0750 GS□ | ❍ | 79,7 | | | ❍ | 91,7 | | |
| 7,6 | | MDW 0760 GS□ | ❍ | | | | ❍ | | | |
| 7,7 | | MDW 0770 GS□ | ❍ | | | | ❍ | | | |
| 7,8 | | MDW 0780 GS□ | ❍ | | 28,1 | 37,7 | ❍ | | 40,1 | 49,7 |
| 7,9 | | MDW 0790 GS□ | ❍ | | | | ❍ | | | |
| **8,0** | | MDW 0800 GS□ | ❍ | | | | ❍ | | | |
| 8,1 | | MDW 0810 GS□ | ❍ | | | | ❍ | | | |
| 8,2 | | MDW 0820 GS□ | ❍ | | | | ❍ | | | |
| 8,3 | | MDW 0830 GS□ | ❍ | | 27,4 | 37,8 | ❍ | | 34,4 | 54,8 |
| 8,4 | | MDW 0840 GS□ | ❍ | | | | ❍ | | | |
| 8,5 | 9,0 | MDW 0850 GS□ | ❍ | 83,9 | | | ❍ | 99,9 | | |
| 8,6 | | MDW 0860 GS□ | ❍ | | | | ❍ | | | |
| 8,7 | | MDW 0870 GS□ | ❍ | | | | ❍ | | | |
| 8,8 | | MDW 0880 GS□ | ❍ | | 29,1 | 39,9 | ❍ | | 46,1 | 56,9 |
| 8,9 | | MDW 0890 GS□ | ❍ | | | | ❍ | | | |
| **9,0** | | MDW 0900 GS□ | ❍ | | | | ❍ | | | |
| 9,1 | | MDW 0910 GS□ | ❍ | | | | ❍ | | | |
| 9,2 | | MDW 0920 GS□ | ❍ | | | | ❍ | | | |
| 9,3 | | MDW 0930 GS□ | ❍ | | 28,6 | 40,0 | ❍ | | 48,6 | 60,0 |
| 9,4 | | MDW 0940 GS□ | ❍ | | | | ❍ | | | |
| 9,5 | 10,0 | MDW 0950 GS□ | ❍ | 89,0 | | | ❍ | 107,0 | | |
| 9,6 | | MDW 0960 GS□ | ❍ | | | | ❍ | | | |
| 9,7 | | MDW 0970 GS□ | ❍ | | | | ❍ | | | |
| 9,8 | | MDW 0980 GS□ | ❍ | | 30,0 | 42,0 | ❍ | | 50,0 | 62,0 |
| 9,9 | | MDW 0990 GS□ | ❍ | | | | ❍ | | | |
| **10,0** | | MDW 1000 GS□ | ❍ | | | | ❍ | | | |

## ■ Recommended Cutting Conditions for Multi-Drills GS Type

| Diameter (mm) | | Soft Steels (~ HB 200) | General Steels (~ HB 300) | Stainless Steels (~ HB 200) | Grey Cast Irons | Ductile Cast Irons |
|---|---|---|---|---|---|---|
| ~ ø 3 | $v_c$ | 30 – **50** – 70 | 30 – **45** – 60 | 10 – **30** – 40 | 40 – **70** – 90 | 35 – **55** – 75 |
| | f | 0,12 – 0,20 | 0,10 – 0,20 | 0,06 – 0,12 | 0,15 – 0,30 | 0,12 – 0,20 |
| ~ ø 5 | $v_c$ | 40 – **70** – 100 | 40 – **60** – 80 | 15 – **40** – 55 | 40 – **70** – 90 | 40 – **60** – 80 |
| | f | 0,15 – 0,25 | 0,15 – 0,25 | 0,08 – 0,15 | 0,15 – 0,30 | 0,15 – 0,25 |
| ~ ø10 | $v_c$ | 50 – **80** – 130 | 50 – **70** – 110 | 15 – **45** – 60 | 50 – **80** – 120 | 50 – **70** – 100 |
| | f | 0,20 – 0,35 | 0,20 – 0,35 | 0,10 – 0,20 | 0,20 – 0,35 | 0,20 – 0,35 |
| ~ ø16 | $v_c$ | 60 – **90** – 140 | 60 – **80** – 120 | 20 – **50** – 60 | 60 – **90** – 120 | 50 – **70** – 100 |
| | f | 0,25 – 0,35 | 0,25 – 0,35 | 0,10 – 0,20 | 0,25 – 0,35 | 0,25 – 0,35 |

( $v_c$ : Cutting Speed (m/min), f : Feed Rate (mm/rev)) (Min – **Standard** – Max)

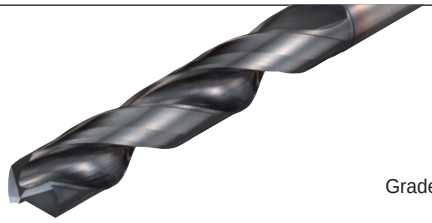




● = Euro stock
○ = Stock item in Japan

## GS Type for General Purpose Drilling of Steels

● GS Type



Grade: ACX70

### ● Diameter ø10,1~13,0mm

(mm)

| Dimensions | | Cat. No. | Short Type (2D) | | | | Long Type (4D) | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Stock | Dimensions | | | Stock | Dimensions | | |
| øD | ød | 2, 4 ↘ | 2 | L | $\ell_1$ | $\ell_2$ | 4 | L | $\ell_1$ | $\ell_2$ |
| 10,1 | 11,0 | MDW 1010 GS□ | ❍ | 95,3 | 30,6 | 43,2 | ❍ | 116,2 | 55,6 | 68,2 |
| 10,2 | | MDW 1020 GS□ | ❍ | | | | ❍ | | | |
| 10,3 | | MDW 1030 GS□ | ❍ | | | | ❍ | | | |
| 10,4 | | MDW 1040 GS□ | ❍ | | | | ❍ | | | |
| 10,5 | | MDW 1050 GS□ | ❍ | | | | ❍ | | | |
| 10,6 | | MDW 1060 GS□ | ❍ | | 34,1 | 47,3 | ❍ | | 57,1 | 70,3 |
| 10,7 | | MDW 1070 GS□ | ❍ | | | | ❍ | | | |
| 10,8 | | MDW 1080 GS□ | ❍ | | | | ❍ | | | |
| 10,9 | | MDW 1090 GS□ | ❍ | | | | ❍ | | | |
| **11,0** | | MDW 1100 GS□ | ❍ | | | | ❍ | | | |
| 11,1 | 12,0 | MDW 1110 GS□ | ❍ | 102,5 | 33,6 | 47,4 | ❍ | 123,5 | 59,6 | 73,4 |
| 11,2 | | MDW 1120 GS□ | ❍ | | | | ❍ | | | |
| 11,3 | | MDW 1130 GS□ | ❍ | | | | ❍ | | | |
| 11,4 | | MDW 1140 GS□ | ❍ | | | | ❍ | | | |
| 11,5 | | MDW 1150 GS□ | ❍ | | | | ❍ | | | |
| 11,6 | | MDW 1160 GS□ | ❍ | | 35,1 | 49,5 | ❍ | | 61,1 | 75,5 |
| 11,7 | | MDW 1170 GS□ | ❍ | | | | ❍ | | | |
| 11,8 | | MDW 1180 GS□ | ❍ | | | | ❍ | | | |
| 11,9 | | MDW 1190 GS□ | ❍ | | | | ❍ | | | |
| **12,0** | | MDW 1200 GS□ | ❍ | | | | ❍ | | | |
| 12,1 | 13,0 | MDW 1210 GS□ | ❍ | 102,7 | 34,6 | 49,6 | ❍ | 139,7 | 63,6 | 78,6 |
| 12,2 | | MDW 1220 GS□ | ❍ | | | | ❍ | | | |
| 12,3 | | MDW 1230 GS□ | ❍ | | | | ❍ | | | |
| 12,4 | | MDW 1240 GS□ | ❍ | | | | ❍ | | | |
| 12,5 | | MDW 1250 GS□ | ❍ | | | | ❍ | | | |
| 12,6 | | MDW 1260 GS□ | ❍ | | 36,1 | 51,7 | ❍ | | 65,1 | 80,7 |
| 12,7 | | MDW 1270 GS□ | ❍ | | | | ❍ | | | |
| 12,8 | | MDW 1280 GS□ | ❍ | | | | ❍ | | | |
| 12,9 | | MDW 1290 GS□ | ❍ | | | | ❍ | | | |
| **13,0** | | MDW 1300 GS□ | ❍ | | | | ❍ | | | |

### ● Diameter ø13,1~16,0mm

(mm)

| Dimensions | | Cat. No. | Short Type (2D) | | | | Long Type (4D) | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Stock | Dimensions | | | Stock | Dimensions | | |
| øD | ød | 2, 4 ↘ | 2 | L | $\ell_1$ | $\ell_2$ | 4 | L | $\ell_1$ | $\ell_2$ |
| 13,1 | 14,0 | MDW 1310 GS□ | ❍ | 107,9 | 36,6 | 52,8 | ❍ | 149,9 | 70,2 | 86,8 |
| 13,2 | | MDW 1320 GS□ | ❍ | | | | ❍ | | | |
| 13,3 | | MDW 1330 GS□ | ❍ | | | | ❍ | | | |
| 13,4 | | MDW 1340 GS□ | ❍ | | | | ❍ | | | |
| 13,5 | | MDW 1350 GS□ | ❍ | | | | ❍ | | | |
| 13,6 | | MDW 1360 GS□ | ❍ | | 38,1 | 54,9 | ❍ | | 72,1 | 88,9 |
| 13,7 | | MDW 1370 GS□ | ❍ | | | | ❍ | | | |
| 13,8 | | MDW 1380 GS□ | ❍ | | | | ❍ | | | |
| 13,9 | | MDW 1390 GS□ | ❍ | | | | ❍ | | | |
| **14,0** | | MDW 1400 GS□ | ❍ | | | | ❍ | | | |
| 14,1 | 15,0 | MDW 1410 GS□ | ❍ | 111,1 | 37,6 | 55,0 | ❍ | 156,1 | 74,6 | 92,0 |
| 14,2 | | MDW 1420 GS□ | ❍ | | | | ❍ | | | |
| 14,3 | | MDW 1430 GS□ | ❍ | | | | ❍ | | | |
| 14,4 | | MDW 1440 GS□ | ❍ | | | | ❍ | | | |
| 14,5 | | MDW 1450 GS□ | ❍ | | | | ❍ | | | |
| 14,6 | | MDW 1460 GS□ | ❍ | | 38,1 | 56,1 | ❍ | | 76,1 | 94,1 |
| 14,7 | | MDW 1470 GS□ | ❍ | | | | ❍ | | | |
| 14,8 | | MDW 1480 GS□ | ❍ | | | | ❍ | | | |
| 14,9 | | MDW 1490 GS□ | ❍ | | | | ❍ | | | |
| **15,0** | | MDW 1500 GS□ | ❍ | | | | ❍ | | | |
| 15,1 | 16,0 | MDW 1510 GS□ | ❍ | 115,5 | 37,6 | 56,2 | ❍ | 169,3 | 78,6 | 97,2 |
| 15,2 | | MDW 1520 GS□ | ❍ | | | | ❍ | | | |
| 15,3 | | MDW 1530 GS□ | ❍ | | | | ❍ | | | |
| 15,4 | | MDW 1540 GS□ | ❍ | | | | ❍ | | | |
| 15,5 | | MDW 1550 GS□ | ❍ | | | | ❍ | | | |
| 15,6 | | MDW 1560 GS□ | ❍ | | 39,1 | 58,3 | ❍ | | 80,1 | 99,3 |
| 15,7 | | MDW 1570 GS□ | ❍ | | | | ❍ | | | |
| 15,8 | | MDW 1580 GS□ | ❍ | | | | ❍ | | | |
| 15,9 | | MDW 1590 GS□ | ❍ | | | | ❍ | | | |
| **16,0** | | MDW 1600 GS□ | ❍ | | | | ❍ | | | |

## ■ How to Order

Non-Stock Items will be required minimum order quantity for 6 pcs.
Please specify the Cat. No. For example, if the diameter of the drill is 10,2 mm, please indicate as follow.

**E.g.**, **MDW 1020 GS 2/4**, ACX70 (Grade)

- **MDW**: SUPER MULTI-DRILLS
- **1020**: Drill diameter **10,2** mm
- **GS**: **GS** type MULTI-DRILLS
- **2/4**: Drilling depth (The ratio to øD): ~2 / ~4

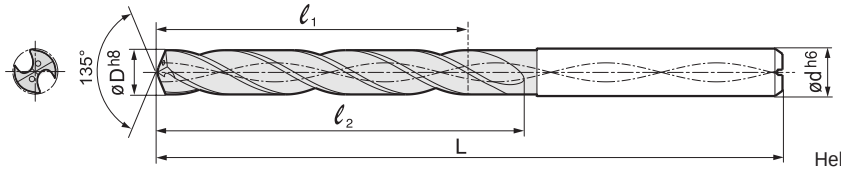
● = Euro stock
❍ = Stock item in Japan

# MDW ... HGS Type

## With Coolant Holes (3D/5D)

"Super Multi-Layer" DEX (TiAlCr/TiSi) Coated Solid Carbide Drills






Helix angle: 30°
$\ell_1$ = Effective drilling length

### ● Diameter ø4,0~7,0mm

(mm)

| Dimensions | | Cat. No. | Short Type (3D) | | | | Long Type (5D) | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Stock | Dimensions | | | Stock | Dimensions | | |
| øD | ød | 3, 5 ↘ | 3 | L | $\ell_1$ | $\ell_2$ | 5 | L | $\ell_1$ | $\ell_2$ |
| **4,0** | 4,0 | MDW 0400 HGS□ | ❍ | 72,8 | 18,5 | 23,3 | ❍ | 86,8 | 32,0 | 36,8 |
| 4,1 | 5,0 | MDW 0410 HGS□ | ❍ | 81,0 | 20,5 | 25,9 | ❍ | 99,0 | 35,5 | 40,9 |
| 4,2 | | MDW 0420 HGS□ | ❍ | | | | ❍ | | | |
| 4,3 | | MDW 0430 HGS□ | ❍ | | | | ❍ | | | |
| 4,4 | | MDW 0440 HGS□ | ❍ | | | | ❍ | | | |
| 4,5 | | MDW 0450 HGS□ | ❍ | | | | ❍ | | | |
| 4,6 | | MDW 0460 HGS□ | ❍ | | 22,5 | 28,5 | ❍ | | 39,0 | 45,0 |
| 4,7 | | MDW 0470 HGS□ | ❍ | | | | ❍ | | | |
| 4,8 | | MDW 0480 HGS□ | ❍ | | | | ❍ | | | |
| 4,9 | | MDW 0490 HGS□ | ❍ | | | | ❍ | | | |
| **5,0** | | MDW 0500 HGS□ | ❍ | | | | ❍ | | | |
| 5,1 | 6,0 | MDW 0510 HGS□ | ❍ | 83,2 | 22,0 | 28,6 | ❍ | 101,2 | 38,5 | 45,1 |
| 5,2 | | MDW 0520 HGS□ | ❍ | | | | ❍ | | | |
| 5,3 | | MDW 0530 HGS□ | ❍ | | | | ❍ | | | |
| 5,4 | | MDW 0540 HGS□ | ❍ | | | | ❍ | | | |
| 5,5 | | MDW 0550 HGS□ | ❍ | | | | ❍ | | | |
| 5,6 | | MDW 0560 HGS□ | ❍ | | 24,0 | 31,2 | ❍ | | 42,0 | 49,2 |
| 5,7 | | MDW 0570 HGS□ | ❍ | | | | ❍ | | | |
| 5,8 | | MDW 0580 HGS□ | ❍ | | | | ❍ | | | |
| 5,9 | | MDW 0590 HGS□ | ❍ | | | | ❍ | | | |
| **6,0** | | MDW 0600 HGS□ | ❍ | | | | ❍ | | | |
| 6,1 | 7,0 | MDW 0610 HGS□ | ❍ | 89,5 | 26,0 | 33,8 | ❍ | 110,5 | 45,5 | 53,3 |
| 6,2 | | MDW 0620 HGS□ | ❍ | | | | ❍ | | | |
| 6,3 | | MDW 0630 HGS□ | ❍ | | | | ❍ | | | |
| 6,4 | | MDW 0640 HGS□ | ❍ | | | | ❍ | | | |
| 6,5 | | MDW 0650 HGS□ | ❍ | | | | ❍ | | | |
| 6,6 | | MDW 0660 HGS□ | ❍ | | 28,1 | 36,5 | ❍ | | 49,1 | 57,5 |
| 6,7 | | MDW 0670 HGS□ | ❍ | | | | ❍ | | | |
| 6,8 | | MDW 0680 HGS□ | ❍ | | | | ❍ | | | |
| 6,9 | | MDW 0690 HGS□ | ❍ | | | | ❍ | | | |
| **7,0** | | MDW 0700 HGS□ | ❍ | | | | ❍ | | | |

### ● Diameter ø7,1~10,0mm

(mm)

| Dimensions | | Cat. No. | Short Type (3D) | | | | Long Type (5D) | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Stock | Dimensions | | | Stock | Dimensions | | |
| øD | ød | 3, 5 ↘ | 3 | L | $\ell_1$ | $\ell_2$ | 5 | L | $\ell_1$ | $\ell_2$ |
| 7,1 | 8,0 | MDW 0710 HGS□ | ❍ | 95,7 | 30,1 | 39,1 | ❍ | 119,7 | 52,6 | 61,6 |
| 7,2 | | MDW 0720 HGS□ | ❍ | | | | ❍ | | | |
| 7,3 | | MDW 0730 HGS□ | ❍ | | | | ❍ | | | |
| 7,4 | | MDW 0740 HGS□ | ❍ | | | | ❍ | | | |
| 7,5 | | MDW 0750 HGS□ | ❍ | | | | ❍ | | | |
| 7,6 | | MDW 0760 HGS□ | ❍ | | 32,1 | 41,7 | ❍ | | 56,1 | 65,7 |
| 7,7 | | MDW 0770 HGS□ | ❍ | | | | ❍ | | | |
| 7,8 | | MDW 0780 HGS□ | ❍ | | | | ❍ | | | |
| 7,9 | | MDW 0790 HGS□ | ❍ | | | | ❍ | | | |
| **8,0** | | MDW 0800 HGS□ | ❍ | | | | ❍ | | | |
| 8,1 | 10,0 | MDW 0810 HGS□ | ❍ | 101,9 | 34,1 | 44,3 | ❍ | 128,9 | 59,6 | 69,8 |
| 8,2 | | MDW 0820 HGS□ | ❍ | | | | ❍ | | | |
| 8,3 | | MDW 0830 HGS□ | ❍ | | | | ❍ | | | |
| 8,4 | | MDW 0840 HGS□ | ❍ | | | | ❍ | | | |
| 8,5 | | MDW 0850 HGS□ | ❍ | | | | ❍ | | | |
| 8,6 | | MDW 0860 HGS□ | ❍ | | 36,1 | 46,9 | ❍ | | 63,1 | 73,9 |
| 8,7 | | MDW 0870 HGS□ | ❍ | | | | ❍ | | | |
| 8,8 | | MDW 0880 HGS□ | ❍ | | | | ❍ | | | |
| 8,9 | | MDW 0890 HGS□ | ❍ | | | | ❍ | | | |
| **9,0** | | MDW 0900 HGS□ | ❍ | | | | ❍ | | | |
| 9,1 | 10,0 | MDW 0910 HGS□ | ❍ | 108,0 | 38,1 | 49,5 | ❍ | 138,0 | 66,6 | 78,0 |
| 9,2 | | MDW 0920 HGS□ | ❍ | | | | ❍ | | | |
| 9,3 | | MDW 0930 HGS□ | ❍ | | | | ❍ | | | |
| 9,4 | | MDW 0940 HGS□ | ❍ | | | | ❍ | | | |
| 9,5 | | MDW 0950 HGS□ | ❍ | | | | ❍ | | | |
| 9,6 | | MDW 0960 HGS□ | ❍ | | 40,0 | 52,0 | ❍ | | 70,0 | 82,0 |
| 9,7 | | MDW 0970 HGS□ | ❍ | | | | ❍ | | | |
| 9,8 | | MDW 0980 HGS□ | ❍ | | | | ❍ | | | |
| 9,9 | | MDW 0990 HGS□ | ❍ | | | | ❍ | | | |
| **10,0** | | MDW 1000 HGS□ | ❍ | | | | ❍ | | | |

## ■ Recommended Cutting Conditions for Multi-Drills HGS Type

| Diameter (mm) | | Steels | | Hardened Steels | | Stainless Steels | Grey Cast Irons | Ductile Cast Irons | Titanium Alloys | Inconel |
|---|---|---|---|---|---|---|---|---|---|---|
| | | ( ~ HB200) | ( ~ HB300) | ( ~ HRC45) | ( ~ HRC60) | ( ~ HB200) | | | (Ti-6Al-4V) | (Inconel 718) |
| ~ ø 5 | $v_c$ | 50 – **80** – 120 | 50 – **75** – 100 | 20 – **30** – 40 | 10 – **15** – 20 | 30 – **45** – 60 | 50 – **70** – 90 | 40 – **60** – 80 | 20 – **30** – 40 | 10 – **20** – 30 |
| | f | 0,15 – 0,25 | 0,15 – 0,25 | 0,08 – 0,10 | 0,05 – 0,08 | 0,08 – 0,15 | 0,15 – 0,30 | 0,15 – 0,25 | 0,08 – 0,10 | 0,05 – 0,08 |
| ~ ø10 | $v_c$ | 70 – **120** – 150 | 70 – **100** – 120 | 20 – **30** – 40 | 10 – **15** – 20 | 40 – **60** – 80 | 40 – **60** – 100 | 50 – **70** – 90 | 25 – **30** – 40 | 15 – **25** – 30 |
| | f | 0,20 – 0,35 | 0,20 – 0,35 | 0,10 – 0,15 | 0,06 – 0,10 | 0,10 – 0,20 | 0,20 – 0,35 | 0,20 – 0,35 | 0,08 – 0,12 | 0,08 – 0,10 |
| ~ ø16 | $v_c$ | 80 – **130** – 160 | 80 – **110** – 140 | 20 – **30** – 40 | 10 – **15** – 20 | 50 – **65** – 80 | 70 – **90** – 120 | 40 – **60** – 100 | 25 – **35** – 40 | 20 – **30**– 35 |
| | f | 0,25 – 0,35 | 0,25 – 0,35 | 0,10 – 0,15 | 0,08 – 0,12 | 0,10 – 0,20 | 0,25 – 0,35 | 0,25 – 0,35 | 0,10 – 0,15 | 0,08 – 0,10 |

( $v_c$ : Cutting Speed (m/min), f : Feed Rate (mm/rev)) (Min – **Standard** – Max)

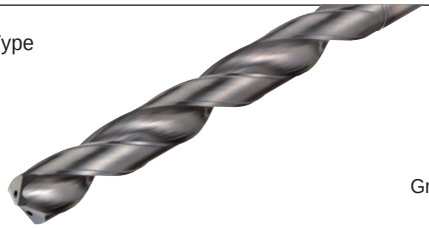




❍ = Stock item in Japan

## HGS Type for General Purpose Drilling of Steels

● HGS Type



Grade: ACX70

### Diameter ø10,1~13,0mm

(mm)

| Dimensions | | Cat. No. | Short Type (3D) | | | | Long Type (5D) | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Stock | Dimensions | | | Stock | Dimensions | | |
| øD | ød | 3, 5 ↘ | 3 | L | $\ell_1$ | $\ell_2$ | 5 | L | $\ell_1$ | $\ell_2$ |
| 10,1 | 11,0 | MDW 1010 HGS□ | | 168,3 | 42,1 | 54,7 | ❍ | 151,3 | 73,6 | 86,2 |
| 10,2 | | MDW 1020 HGS□ | | | | | ❍ | | | |
| 10,3 | | MDW 1030 HGS□ | | | | | ❍ | | | |
| 10,4 | | MDW 1040 HGS□ | | | | | ❍ | | | |
| 10,5 | | MDW 1050 HGS□ | | | | | ❍ | | | |
| 10,6 | | MDW 1060 HGS□ | | | 44,1 | 57,3 | ❍ | | 77,1 | 90,3 |
| 10,7 | | MDW 1070 HGS□ | | | | | ❍ | | | |
| 10,8 | | MDW 1080 HGS□ | | | | | ❍ | | | |
| 10,9 | | MDW 1090 HGS□ | | | | | ❍ | | | |
| **11,0** | | MDW 1100 HGS□ | | | | | ❍ | | | |
| 11,1 | 12,0 | MDW 1110 HGS□ | | 124,5 | 46,1 | 59,9 | ❍ | 160,5 | 80,6 | 94,4 |
| 11,2 | | MDW 1120 HGS□ | | | | | ❍ | | | |
| 11,3 | | MDW 1130 HGS□ | | | | | ❍ | | | |
| 11,4 | | MDW 1140 HGS□ | | | | | ❍ | | | |
| 11,5 | | MDW 1150 HGS□ | | | | | ❍ | | | |
| 11,6 | | MDW 1160 HGS□ | | | 48,1 | 62,5 | ❍ | | 84,1 | 98,5 |
| 11,7 | | MDW 1170 HGS□ | | | | | ❍ | | | |
| 11,8 | | MDW 1180 HGS□ | | | | | ❍ | | | |
| 11,9 | | MDW 1190 HGS□ | | | | | ❍ | | | |
| **12,0** | | MDW 1200 HGS□ | | | | | ❍ | | | |
| 12,1 | 13,0 | MDW 1210 HGS□ | | 130,7 | 50,1 | 65,1 | ❍ | 169,7 | 87,6 | 102,6 |
| 12,2 | | MDW 1220 HGS□ | | | | | ❍ | | | |
| 12,3 | | MDW 1230 HGS□ | | | | | ❍ | | | |
| 12,4 | | MDW 1240 HGS□ | | | | | ❍ | | | |
| 12,5 | | MDW 1250 HGS□ | | | | | ❍ | | | |
| 12,6 | | MDW 1260 HGS□ | | | 52,1 | 67,7 | ❍ | | 191,1 | 206,7 |
| 12,7 | | MDW 1270 HGS□ | | | | | ❍ | | | |
| 12,8 | | MDW 1280 HGS□ | | | | | ❍ | | | |
| 12,9 | | MDW 1290 HGS□ | | | | | ❍ | | | |
| **13,0** | | MDW 1300 HGS□ | | | | | ❍ | | | |

### ● Diameter ø13,1~16,0mm

(mm)

| Dimensions | | Cat. No. | Short Type (3D) | | | | Long Type (5D) | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Stock | Dimensions | | | Stock | Dimensions | | |
| øD | ød | 3, 5 ↘ | 3 | L | $\ell_1$ | $\ell_2$ | 5 | L | $\ell_1$ | $\ell_2$ |
| 13,1 | 14,0 | MDW 1310 HGS□ | ❍ | 136,9 | 54,6 | 70,8 | ❍ | 178,9 | 94,6 | 110,8 |
| 13,2 | | MDW 1320 HGS□ | ❍ | | | | ❍ | | | |
| 13,3 | | MDW 1330 HGS□ | ❍ | | | | ❍ | | | |
| 13,4 | | MDW 1340 HGS□ | ❍ | | | | ❍ | | | |
| 13,5 | | MDW 1350 HGS□ | ❍ | | | | ❍ | | | |
| 13,6 | | MDW 1360 HGS□ | ❍ | | 56,1 | 72,9 | ❍ | | 98,1 | 114,9 |
| 13,7 | | MDW 1370 HGS□ | ❍ | | | | ❍ | | | |
| 13,8 | | MDW 1380 HGS□ | ❍ | | | | ❍ | | | |
| 13,9 | | MDW 1390 HGS□ | ❍ | | | | ❍ | | | |
| **14,0** | | MDW 1400 HGS□ | ❍ | | | | ❍ | | | |
| 14,1 | 15,0 | MDW 1410 HGS□ | ❍ | 141,1 | 58,1 | 75,5 | ❍ | 188,1 | 101,6 | 119,0 |
| 14,2 | | MDW 1420 HGS□ | ❍ | | | | ❍ | | | |
| 14,3 | | MDW 1430 HGS□ | ❍ | | | | ❍ | | | |
| 14,4 | | MDW 1440 HGS□ | ❍ | | | | ❍ | | | |
| 14,5 | | MDW 1450 HGS□ | ❍ | | | | ❍ | | | |
| 14,6 | | MDW 1460 HGS□ | ❍ | | 60,1 | 78,1 | ❍ | | 105,1 | 123,1 |
| 14,7 | | MDW 1470 HGS□ | ❍ | | | | ❍ | | | |
| 14,8 | | MDW 1480 HGS□ | ❍ | | | | ❍ | | | |
| 14,9 | | MDW 1490 HGS□ | ❍ | | | | ❍ | | | |
| **15,0** | | MDW 1500 HGS□ | ❍ | | | | ❍ | | | |
| 15,1 | 16,0 | MDW 1510 HGS□ | ❍ | 149,3 | 62,1 | 80,7 | ❍ | 197,3 | 108,6 | 127,2 |
| 15,2 | | MDW 1520 HGS□ | ❍ | | | | ❍ | | | |
| 15,3 | | MDW 1530 HGS□ | ❍ | | | | ❍ | | | |
| 15,4 | | MDW 1540 HGS□ | ❍ | | | | ❍ | | | |
| 15,5 | | MDW 1550 HGS□ | ❍ | | | | ❍ | | | |
| 15,6 | | MDW 1560 HGS□ | ❍ | | 64,1 | 83,3 | ❍ | | 112,1 | 131,3 |
| 15,7 | | MDW 1570 HGS□ | ❍ | | | | ❍ | | | |
| 15,8 | | MDW 1580 HGS□ | ❍ | | | | ❍ | | | |
| 15,9 | | MDW 1590 HGS□ | ❍ | | | | ❍ | | | |
| **16,0** | | MDW 1600 HGS□ | ❍ | | | | ❍ | | | |

## ■ How to Order

Non-Stock Items will be required minimum order quantity for 6 pcs.
Please specify the Cat. No. For example, if the diameter of the drill is 10,2 mm, please indicate as follow.

**E.g.**, **MDW 1020 HGS 3/5** , ACX70 (Grade)

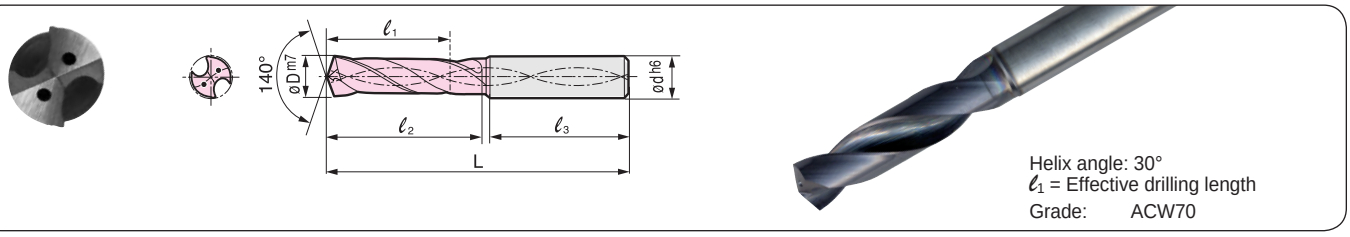
- **MDW**: SUPER MULTI-DRILLS
- **1020**: Drill diameter **10,2** mm
- **HGS**: **HGS** type MULTI-DRILLS with coolant holes
- **3/5**: Drilling depth (The ratio to øD): ~3 / ~5
- ACX70: (Grade)

❍ = Stock item in Japan

# MDS ... SK-HAK Type

## Short Type

TiAlN Coated Solid Carbide Drills to DIN6537 ( ø-Tolerance: m7 )




Helix angle: 30°
$\ell_1$ = Effective drilling length
Grade: ACW70

### ●Diameter ø4,0~8,0mm

| Dimensions (mm) | | | Cat. No. | DIN 6537 K (Short Type) | | | |
|---|---|---|---|---|---|---|---|
| | Shank | | | Stock | Dimensions (mm) | | |
| øD (mm) | ød | $\ell_3$ | | SK-HAK | L | $\ell_1$ | $\ell_2$ |
| **4,0** | 6 | 36 | MDS 040 SKHAK | ● | 66 | 17 | 24 |
| 4,1 | | | MDS 041 SKHAK | ● | | | |
| 4,2 | | | MDS 042 SKHAK | ● | | | |
| 4,3 | | | MDS 043 SKHAK | | | | |
| 4,4 | | | MDS 044 SKHAK | | | | |
| 4,5 | | | MDS 045 SKHAK | ● | | | |
| 4,6 | | | MDS 046 SKHAK | | | | |
| 4,7 | | | MDS 047 SKHAK | | | | |
| 4,8 | 6 | 36 | MDS 048 SKHAK | | 66 | 20 | 28 |
| 4,9 | | | MDS 049 SKHAK | | | | |
| **5,0** | | | MDS 050 SKHAK | ● | | | |
| 5,1 | | | MDS 051 SKHAK | ● | | | |
| 5,2 | | | MDS 052 SKHAK | | | | |
| 5,3 | | | MDS 053 SKHAK | | | | |
| 5,4 | | | MDS 054 SKHAK | | | | |
| 5,5 | | | MDS 055 SKHAK | ● | | | |
| 5,6 | | | MDS 056 SKHAK | | | | |
| 5,7 | | | MDS 057 SKHAK | | | | |
| 5,8 | | | MDS 058 SKHAK | | | | |
| 5,9 | | | MDS 059 SKHAK | | | | |
| **6,0** | | | MDS 060 SKHAK | ● | | | |
| 6,1 | 8 | 36 | MDS 061 SKHAK | | 79 | 24 | 34 |
| 6,2 | | | MDS 062 SKHAK | | | | |
| 6,3 | | | MDS 063 SKHAK | | | | |
| 6,4 | | | MDS 064 SKHAK | | | | |
| 6,5 | | | MDS 065 SKHAK | ● | | | |
| 6,6 | | | MDS 066 SKHAK | | | | |
| 6,7 | | | MDS 067 SKHAK | | | | |
| 6,8 | | | MDS 068 SKHAK | ● | | | |
| 6,9 | | | MDS 069 SKHAK | | | | |
| **7,0** | | | MDS 070 SKHAK | ● | | | |
| 7,1 | 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 ø8,1~12,0mm

| Dimensions (mm) | | | Cat. No. | DIN 6537 K (Short Type) | | | |
|---|---|---|---|---|---|---|---|
| | Shank | | | Stock | Dimensions (mm) | | |
| øD (mm) | ød | $\ell_3$ | | SK-HAK | L | $\ell_1$ | $\ell_2$ |
| 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 ( < HB 200) | Steels (HB 200~300) | Alloy Steels ( > HB 300) | Hardened Steels (HRC 45) | Stainless Steels ( < HB 200) | Ductile Cast Irons | Grey Cast Irons | Titanium Alloys (Ti-6Al-4V) | Inconel (Inconel 718) |
|---|---|---|---|---|---|---|---|---|---|---|
| ~ ø 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 |
| ~ ø10 | $v_c$ | 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 |
| ~ ø16 | $v_c$ | 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 |
| ~ ø20 | $v_c$ | 100 – **150** – 180 | 80 – **130** – 160 | 50 – **90** – 120 | 30 – **45** – 60 | 50 – **80** – 110 | 80 – **110** – 140 | 100 – **150** – 160 | 25 – **35** – 40 | 20 – **30** – 35 |
| | f | 0,30 – 0,40 | 0,25 – 0,40 | 0,15 – 0,30 | 0,15 – 0,25 | 0,15 – 0,30 | 0,25 – 0,40 | 0,25 – 0,40 | 0,10 – 0,15 | 0,08 – 0,10 |

( $v_c$ : Cutting Speed (m/min), f : Feed Rate (mm/rev)) (Min – **Standard** – Max)



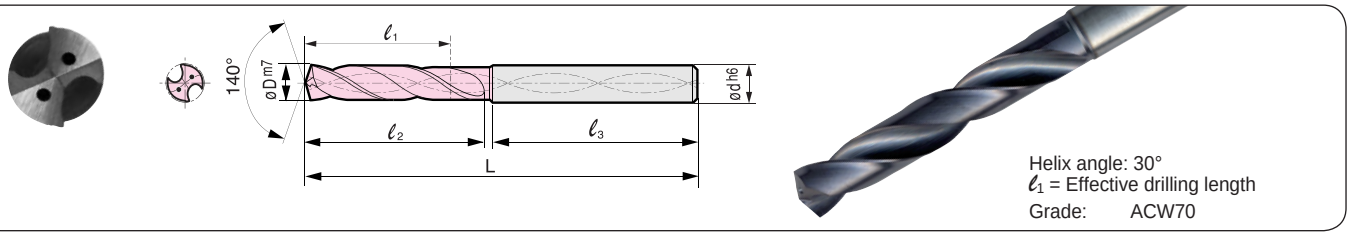


● = Euro stock

# MDS ... MK-HAK Type

## Long Type

TiAlN Coated Solid Carbide Drills to DIN6537 ( ø-Tolerance: m7 )




Helix angle: 30°
$\ell_1$ = Effective drilling length
Grade: ACW70

### ●Diameter ø4,0~8,0mm

| Dimensions (mm) | | | Cat. No. | DIN 6537 L (Long Type) | | | |
|---|---|---|---|---|---|---|---|
| øD (mm) | Shank | | | Stock | Dimensions (mm) | | |
| | ød | $\ell_3$ | | MK-HAK | L | $\ell_1$ | $\ell_2$ |
| **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 ø8,1~12,0mm

| Dimensions (mm) | | | Cat. No. | DIN 6537 L (Long Type) | | | |
|---|---|---|---|---|---|---|---|
| øD (mm) | Shank | | | Stock | Dimensions (mm) | | |
| | ød | $\ell_3$ | | MK-HAK | L | $\ell_1$ | $\ell_2$ |
| 8,1 | 10 | 40 | **MDS 081 MKHAK** | | 103 | 49 | 61 |
| 8,2 | | | **MDS 082 MKHAK** | | | | |
| 8,3 | | | **MDS 083 MKHAK** | | | | |
| 8,4 | | | **MDS 084 MKHAK** | | | | |
| 8,5 | | | **MDS 085 MKHAK** | ● | | | |
| 8,6 | | | **MDS 086 MKHAK** | | | | |
| 8,7 | | | **MDS 087 MKHAK** | | | | |
| 8,8 | | | **MDS 088 MKHAK** | | | | |
| 8,9 | | | **MDS 089 MKHAK** | | | | |
| **9,0** | | | **MDS 090 MKHAK** | ● | | | |
| 9,1 | | | **MDS 091 MKHAK** | | 103 | 49 | 61 |
| 9,2 | | | **MDS 092 MKHAK** | | | | |
| 9,3 | | | **MDS 093 MKHAK** | | | | |
| 9,4 | | | **MDS 094 MKHAK** | | | | |
| 9,5 | | | **MDS 095 MKHAK** | ● | | | |
| 9,6 | | | **MDS 096 MKHAK** | | | | |
| 9,7 | | | **MDS 097 MKHAK** | | | | |
| 9,8 | | | **MDS 098 MKHAK** | | | | |
| 9,9 | | | **MDS 099 MKHAK** | | | | |
| **10,0** | | | **MDS 100 MKHAK** | ● | | | |
| 10,1 | 12 | 45 | **MDS 101 MKHAK** | | 118 | 56 | 71 |
| 10,2 | | | **MDS 102 MKHAK** | ● | | | |
| 10,3 | | | **MDS 103 MKHAK** | | | | |
| 10,4 | | | **MDS 104 MKHAK** | | | | |
| 10,5 | | | **MDS 105 MKHAK** | ● | | | |
| 10,6 | | | **MDS 106 MKHAK** | | | | |
| 10,7 | | | **MDS 107 MKHAK** | | | | |
| 10,8 | | | **MDS 108 MKHAK** | | | | |
| 10,9 | | | **MDS 109 MKHAK** | | | | |
| **11,0** | | | **MDS 110 MKHAK** | ● | | | |
| 11,1 | | | **MDS 111 MKHAK** | | 118 | 56 | 71 |
| 11,2 | | | **MDS 112 MKHAK** | | | | |
| 11,3 | | | **MDS 113 MKHAK** | | | | |
| 11,4 | | | **MDS 114 MKHAK** | | | | |
| 11,5 | | | **MDS 115 MKHAK** | ● | | | |
| 11,6 | | | **MDS 116 MKHAK** | | | | |
| 11,7 | | | **MDS 117 MKHAK** | | | | |
| 11,8 | | | **MDS 118 MKHAK** | | | | |
| 11,9 | | | **MDS 119 MKHAK** | | | | |
| **12,0** | | | **MDS 120 MKHAK** | ● | | | |

## ■ How to Order

Non-Stock Items will be required minimum order quantity for 6 pcs.
Please specify the Cat. No.
For example, if the diameter of the drill is 10,2 mm, please indicate as follow.

**E.g.,** **MDS 102 MK-HAK** , (Grade) ACW70

- **MDS**: **M**ulti-**D**rill **S**olid type
- **102**: Drill diameter **10,2** mm
- **MK-HAK**: Cylindrical shank and spiral coolant holes to: DIN6535 Form HAK
- (Grade): S : 3 ~ 3,5 D; M : ~ 5 D



● = Euro stock

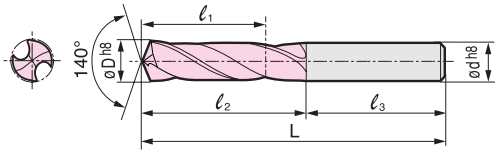
Multi-Drills

# MDS ... SK/SG Type

## Short Type

Cylindrical Solid Carbide Drills without Coolant Holes






Helix angle: 30°
$\ell_1$ = Effective drilling length

### ●Diameter ø2,0~6,0mm

| Dimensions (mm) | | | Cat. No. | Short Type | | | | |
|---|---|---|---|---|---|---|---|---|
| | Shank | | | Stock | | Dimensions (mm) | | |
| øD | ød | $\ell_3$ | SK, SG ↘ | SK | SG | L | $\ell_1$ | $\ell_2$ |
| **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 | | MDS 030 □□ | ▲ | ● | | | |
| 3,1 | 3,1 | 31 | MDS 031 □□ | | | 49 | 14,0 | 18 |
| 3,2 | 3,2 | | MDS 032 □□ | | | | | |
| 3,3 | 3,3 | | MDS 033 □□ | | | | | |
| 3,4 | 3,4 | 32 | MDS 034 □□ | ▲ | | 52 | 15,6 | 20 |
| 3,5 | 3,5 | | MDS 035 □□ | ▲ | ● | | | |
| 3,6 | 3,6 | | MDS 036 □□ | | | | | |
| 3,7 | 3,7 | | MDS 037 □□ | | | | | |
| 3,8 | 3,8 | 33 | MDS 038 □□ | | | 55 | 17,0 | 22 |
| 3,9 | 3,9 | | MDS 039 □□ | | | | | |
| **4,0** | 4,0 | | MDS 040 □□ | ▲ | ● | | | |
| 4,1 | 4,1 | | MDS 041 □□ | | | | | |
| 4,2 | 4,2 | | 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 | | 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 ø6,1~10,0mm

| Dimensions (mm) | | | Cat. No. | Short Type | | | | |
|---|---|---|---|---|---|---|---|---|
| | Shank | | | Stock | | Dimensions (mm) | | |
| øD | ød | $\ell_3$ | SK, SG ↘ | SK | SG | L | $\ell_1$ | $\ell_2$ |
| 6,1 | 6,1 | 39 | MDS 061 □□ | | | 70 | 23,0 | 31 |
| 6,2 | 6,2 | | MDS 062 □□ | | | | | |
| 6,3 | 6,3 | | MDS 063 □□ | | | | | |
| 6,4 | 6,4 | | MDS 064 □□ | | | | | |
| 6,5 | 6,5 | | MDS 065 □□ | ▲ | ● | | | |
| 6,6 | 6,6 | | MDS 066 □□ | | | | | |
| 6,7 | 6,7 | | MDS 067 □□ | | | | | |
| 6,8 | 6,8 | 40 | MDS 068 □□ | ▲ | ● | 74 | 25,0 | 34 |
| 6,9 | 6,9 | | MDS 069 □□ | | | | | |
| **7,0** | 7,0 | | MDS 070 □□ | ▲ | ● | | | |
| 7,1 | 7,1 | | MDS 071 □□ | | | | | |
| 7,2 | 7,2 | | MDS 072 □□ | | | | | |
| 7,3 | 7,3 | | MDS 073 □□ | | | | | |
| 7,4 | 7,4 | | MDS 074 □□ | | | | | |
| 7,5 | 7,5 | | MDS 075 □□ | ▲ | | | | |
| 7,6 | 7,6 | 42 | MDS 076 □□ | | | 79 | 26,8 | 37 |
| 7,7 | 7,7 | | MDS 077 □□ | | | | | |
| 7,8 | 7,8 | | MDS 078 □□ | | | | | |
| 7,9 | 7,9 | | MDS 079 □□ | | | | | |
| **8,0** | 8,0 | | MDS 080 □□ | ▲ | ● | | | |
| 8,1 | 8,1 | | MDS 081 □□ | | | | | |
| 8,2 | 8,2 | | MDS 082 □□ | | | | | |
| 8,3 | 8,3 | | MDS 083 □□ | | | | | |
| 8,4 | 8,4 | | MDS 084 □□ | | | | | |
| 8,5 | 8,5 | | MDS 085 □□ | ▲ | ● | | | |
| 8,6 | 8,6 | 44 | MDS 086 □□ | | | 84 | 28,6 | 40 |
| 8,7 | 8,7 | | MDS 087 □□ | | | | | |
| 8,8 | 8,8 | | MDS 088 □□ | | | | | |
| 8,9 | 8,9 | | MDS 089 □□ | | | | | |
| **9,0** | 9,0 | | MDS 090 □□ | ▲ | ● | | | |
| 9,1 | 9,1 | | MDS 091 □□ | | | | | |
| 9,2 | 9,2 | | MDS 092 □□ | | | | | |
| 9,3 | 9,3 | | MDS 093 □□ | | | | | |
| 9,4 | 9,4 | | MDS 094 □□ | | | | | |
| 9,5 | 9,5 | | MDS 095 □□ | ▲ | | | | |
| 9,6 | 9,6 | 46 | MDS 096 □□ | | | 89 | 30,3 | 43 |
| 9,7 | 9,7 | | MDS 097 □□ | | | | | |
| 9,8 | 9,8 | | MDS 098 □□ | | | | | |
| 9,9 | 9,9 | | MDS 099 □□ | | | | | |
| **10,0** | 10,0 | | MDS 100 □□ | ▲ | ● | | | |

## ■ Recommended Cutting Conditions for K Type Multi-Drills

| Diameter (mm) | | Soft Steels (under HB250) | General Steels, Alloy Steels | Die Steels (about HB250) | Stainless Steels ( < HB200) | Ductile Cast Irons | Grey Cast Irons |
|---|---|---|---|---|---|---|---|
| ~ ø 5 | $v_c$ | 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 |
| ~ ø10 | $v_c$ | 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 |
| ~ ø15 | $v_c$ | 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 |
| ~ ø20 | $v_c$ | 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)





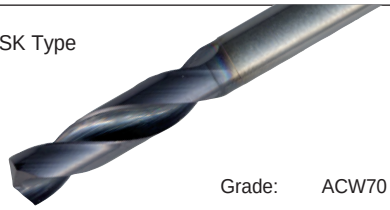


● = Euro stock
▲ = To be replaced by new item

# 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

● SK Type



Grade: ACW70

● SG Type



Grade: A1

## ●Diameter ø10,1~12,0mm

| Dimensions (mm) | | | Cat. No. | Short Type | | | | |
|---|---|---|---|---|---|---|---|---|
| | Shank | | | Stock | | Dimensions (mm) | | |
| øD | ød | $\ell_3$ | SK, SG ↘ | SK | SG | L | $\ell_1$ | $\ell_2$ |
| 10,1 | 10,1 | 46 | MDS 101 □□ | ▲ | | 89 | 30,3 | 43 |
| 10,2 | 10,2 | | MDS 102 □□ | | | | | |
| 10,3 | 10,3 | | MDS 103 □□ | | | | | |
| 10,4 | 10,4 | | MDS 104 □□ | | | | | |
| 10,5 | 10,5 | | MDS 105 □□ | ▲ | | | | |
| 10,6 | 10,6 | | MDS 106 □□ | | | | | |
| 10,7 | 10,7 | 48 | MDS 107 □□ | | | 95 | 32,8 | 47 |
| 10,8 | 10,8 | | MDS 108 □□ | | | | | |
| 10,9 | 10,9 | | MDS 109 □□ | | | | | |
| **11,0** | 11,0 | | MDS 110 □□ | ▲ | ● | | | |
| 11,1 | 11,1 | | MDS 111 □□ | | | | | |
| 11,2 | 11,2 | | MDS 112 □□ | | | | | |
| 11,3 | 11,3 | | MDS 113 □□ | | | | | |
| 11,4 | 11,4 | | MDS 114 □□ | | | | | |
| 11,5 | 11,5 | | MDS 115 □□ | ▲ | | | | |
| 11,6 | 11,6 | | MDS 116 □□ | | | | | |
| 11,7 | 11,7 | | MDS 117 □□ | | | | | |
| 11,8 | 11,8 | | MDS 118 □□ | | | | | |
| 11,9 | 11,9 | 51 | MDS 119 □□ | | | 102 | 35,2 | 51 |
| **12,0** | 12,0 | | MDS 120 □□ | ▲ | ● | | | |

## ●Diameter ø12,1~14,0mm

| Dimensions (mm) | | | Cat. No. | Short Type | | | | |
|---|---|---|---|---|---|---|---|---|
| | Shank | | | Stock | | Dimensions (mm) | | |
| øD | ød | $\ell_3$ | SK, SG ↘ | SK | SG | L | $\ell_1$ | $\ell_2$ |
| 12,1 | 12,1 | 51 | MDS 121 □□ | | | 102 | 35,2 | 51 |
| 12,2 | 12,2 | | MDS 122 □□ | | | | | |
| 12,3 | 12,3 | | MDS 123 □□ | | | | | |
| 12,4 | 12,4 | | MDS 124 □□ | | | | | |
| 12,5 | 12,5 | | MDS 125 □□ | | | | | |
| 12,6 | 12,6 | | MDS 126 □□ | | | | | |
| 12,7 | 12,7 | | MDS 127 □□ | | | | | |
| 12,8 | 12,8 | | MDS 128 □□ | | | | | |
| 12,9 | 12,9 | | MDS 129 □□ | | | | | |
| **13,0** | 13,0 | | MDS 130 □□ | | | | | |
| 13,1 | 13,1 | | MDS 131 □□ | | | | | |
| 13,2 | 13,2 | | MDS 132 □□ | | | | | |
| 13,3 | 13,3 | 53 | MDS 133 □□ | | | 107 | 37,2 | 54 |
| 13,4 | 13,4 | | MDS 134 □□ | | | | | |
| 13,5 | 13,5 | | MDS 135 □□ | | | | | |
| 13,6 | 13,6 | | MDS 136 □□ | | | | | |
| 13,7 | 13,7 | | MDS 137 □□ | | | | | |
| 13,8 | 13,8 | | MDS 138 □□ | | | | | |
| 13,9 | 13,9 | | MDS 139 □□ | | | | | |
| **14,0** | 14,0 | | MDS 140 □□ | | | | | |

## ■ How to Order

Non-Stock Items will be required minimum order quantity for 6 pcs.
Please specify the Cat. No. For example, if the diameter of the drill is 10,2 mm, please indicate as follow.

**E.g.**, **MDS 102 S K** , ACW70 (Grade)

- **M**ulti-**D**rill **S**olid type
- Drill diameter **10,2** mm
- **K** : K-Type drill
- **G** : G-Type drill
- **S** : 2,5 ~ 3D

## ■ 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 |
|---|---|---|---|---|
| ~ ø 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 |
| ~ ø10 | $v_c$ | 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 |
| ~ ø14 | $v_c$ | 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 |
| ~ ø20 | $v_c$ | 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 |



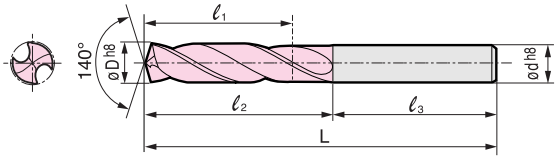
● = Euro stock
▲ = To be replaced by new item

# MDS ... MK/MG Type

## Long Type

Cylindrical Solid Carbide Drills without Coolant Holes






Helix angle: 30°
$\ell_1$ = Effective drilling length

### ●Diameter ø2,0~6,0mm

| Dimensions (mm) | | | Cat. No. | Long Type | | | | |
|---|---|---|---|---|---|---|---|---|
| | Shank | | | Stock | | Dimensions (mm) | | |
| øD | ød | $\ell_3$ | MK, MG ↘ | MK | MG | L | $\ell_1$ | $\ell_2$ |
| **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 | | **MDS 026** □□ | | | | | |
| 2,7 | 2,7 | 30 | **MDS 027** □□ | | | 49,5 | 15,9 | 19,5 |
| 2,8 | 2,8 | | **MDS 028** □□ | | | | | |
| 2,9 | 2,9 | | **MDS 029** □□ | | | | | |
| **3,0** | 3,0 | | **MDS 030** □□ | | | | | |
| 3,1 | 3,1 | 31 | **MDS 031** □□ | | | 52,6 | 17,6 | 21,6 |
| 3,2 | 3,2 | | **MDS 032** □□ | | | | | |
| 3,3 | 3,3 | | **MDS 033** □□ | | | | | |
| 3,4 | 3,4 | 32 | **MDS 034** □□ | | | 56,7 | 20,3 | 24,7 |
| 3,5 | 3,5 | | **MDS 035** □□ | | | | | |
| 3,6 | 3,6 | | **MDS 036** □□ | | | | | |
| 3,7 | 3,7 | | **MDS 037** □□ | | | | | |
| 3,8 | 3,8 | 33 | **MDS 038** □□ | | | 60,8 | 22,8 | 27,8 |
| 3,9 | 3,9 | | **MDS 039** □□ | | | | | |
| **4,0** | 4,0 | | **MDS 040** □□ | | | | | |
| 4,1 | 4,1 | | **MDS 041** □□ | | | | | |
| 4,2 | 4,2 | | **MDS 042** □□ | | | | | |
| 4,3 | 4,3 | 34 | **MDS 043** □□ | | | 65,9 | 26,3 | 31,9 |
| 4,4 | 4,4 | | **MDS 044** □□ | | | | | |
| 4,5 | 4,5 | | **MDS 045** □□ | | | | | |
| 4,6 | 4,6 | | **MDS 046** □□ | | | | | |
| 4,7 | 4,7 | | **MDS 047** □□ | | | | | |
| 4,8 | 4,8 | 36 | **MDS 048** □□ | | | 69,9 | 28,0 | 33,9 |
| 4,9 | 4,9 | | **MDS 049** □□ | | | | | |
| **5,0** | 5,0 | 38 | **MDS 050** □□ | ▲ | ● | 77,0 | 32,4 | 39,0 |
| 5,1 | 5,1 | | **MDS 051** □□ | ▲ | | | | |
| 5,2 | 5,2 | | **MDS 052** □□ | | | | | |
| 5,3 | 5,3 | | **MDS 053** □□ | | | | | |
| 5,4 | 5,4 | | **MDS 054** □□ | | | | | |
| 5,5 | 5,5 | | **MDS 055** □□ | ▲ | ● | | | |
| 5,6 | 5,6 | 40 | **MDS 056** □□ | | | 82,1 | 34,9 | 42,1 |
| 5,7 | 5,7 | | **MDS 057** □□ | | | | | |
| 5,8 | 5,8 | | **MDS 058** □□ | | | | | |
| 5,9 | 5,9 | | **MDS 059** □□ | | | | | |
| **6,0** | 6,0 | | **MDS 060** □□ | ▲ | ● | | | |

### ●Diameter ø6,1~10,0mm

| Dimensions (mm) | | | Cat. No. | Long Type | | | | |
|---|---|---|---|---|---|---|---|---|
| | Shank | | | Stock | | Dimensions (mm) | | |
| øD | ød | $\ell_3$ | MK, MG ↘ | MK | MG | L | $\ell_1$ | $\ell_2$ |
| 6,1 | 6,1 | 40 | **MDS 061** □□ | | | 82,1 | 34,9 | 42,1 |
| 6,2 | 6,2 | | **MDS 062** □□ | | | | | |
| 6,3 | 6,3 | | **MDS 063** □□ | | | | | |
| 6,4 | 6,4 | | **MDS 064** □□ | | | | | |
| 6,5 | 6,5 | | **MDS 065** □□ | ▲ | ● | | | |
| 6,6 | 6,6 | 40 | **MDS 066** □□ | | | 84,2 | 35,8 | 44,2 |
| 6,7 | 6,7 | | **MDS 067** □□ | | | | | |
| 6,8 | 6,8 | | **MDS 068** □□ | ▲ | ● | | | |
| 6,9 | 6,9 | | **MDS 069** □□ | | | | | |
| **7,0** | 7,0 | | **MDS 070** □□ | ▲ | ● | | | |
| 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 | | **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 | | **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 | | **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 | | **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 | | **MDS 094** □□ | | | | | |
| 9,5 | 9,5 | | **MDS 095** □□ | ▲ | ● | | | |
| 9,6 | 9,6 | 45 | **MDS 096** □□ | | | 106,8 | 49,8 | 61,8 |
| 9,7 | 9,7 | | **MDS 097** □□ | | | | | |
| 9,8 | 9,8 | | **MDS 098** □□ | | | | | |
| 9,9 | 9,9 | | **MDS 099** □□ | | | | | |
| **10,0** | 10,0 | | **MDS 100** □□ | ▲ | ● | | | |

## ■ How to Order

Non-Stock Items will be required minimum order quantity for 6 pcs.
Please specify the Cat. No. For example, if the diameter of the drill is 10,2 mm, please indicate as follow.

**E.g.,** **MDS** **102** **MK** , ACW70 (Grade)

- **MDS**: **M**ulti-**D**rill **S**olid type
- **102**: Drill diameter **10,2** mm
- **MK**: **K** : K-Type drill; **G** : G-Type drill; **M** : ~ 4D



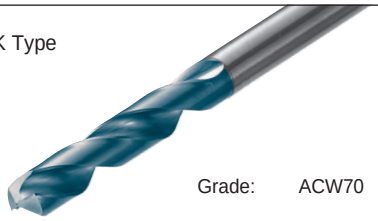


● = Euro stock
▲ = To be replaced by new item

# MDS ... MK/MG Type

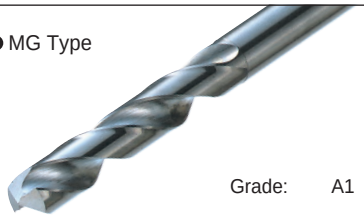
K Type: Coated Multi-Drill for General Purpose Drilling of Steels
G Type: Uncoated Multi-Drill for Cast Irons and Aluminium Alloys

● MK Type



Grade: ACW70

● MG Type



Grade: A1

## ●Diameter ø10,1~12,0mm

| Dimensions (mm) | | | Cat. No. | Long Type | | | | |
|---|---|---|---|---|---|---|---|---|
| | Schaft | | | Stock | | Dimensions (mm) | | |
| øD | ød | $\ell_3$ | MK, MG ↘ | MK | MG | L | $\ell_1$ | $\ell_2$ |
| 10,1 | 10,1 | 46 | **MDS 101 □□** | | | 113,9 | 55,3 | 67,9 |
| 10,2 | 10,2 | | **MDS 102 □□** | | | | | |
| 10,3 | 10,3 | | **MDS 103 □□** | | | | | |
| 10,4 | 10,4 | | **MDS 104 □□** | | | | | |
| 10,5 | 10,5 | | **MDS 105 □□** | ▲ | | | | |
| 10,6 | 10,6 | 46 | **MDS 106 □□** | | | 116,0 | 56,8 | 70,0 |
| 10,7 | 10,7 | | **MDS 107 □□** | | | | | |
| 10,8 | 10,8 | | **MDS 108 □□** | | | | | |
| 10,9 | 10,9 | | **MDS 109 □□** | | | | | |
| **11,0** | 11,0 | | **MDS 110 □□** | ▲ | ● | | | |
| 11,1 | 11,1 | 47 | **MDS 111 □□** | | | 120,2 | 59,4 | 73,2 |
| 11,2 | 11,2 | | **MDS 112 □□** | | | | | |
| 11,3 | 11,3 | | **MDS 113 □□** | | | | | |
| 11,4 | 11,4 | | **MDS 114 □□** | | | | | |
| 11,5 | 11,5 | | **MDS 115 □□** | ▲ | ● | | | |
| 11,6 | 11,6 | 48 | **MDS 116 □□** | | | 123,2 | 60,8 | 75,2 |
| 11,7 | 11,7 | | **MDS 117 □□** | | | | | |
| 11,8 | 11,8 | | **MDS 118 □□** | | | | | |
| 11,9 | 11,9 | | **MDS 119 □□** | | | | | |
| **12,0** | 12,0 | | **MDS 120 □□** | ▲ | ● | | | |

## ●Diameter ø12,1~14,0mm

| Dimensions (mm) | | | Cat. No. | Long Type | | | | |
|---|---|---|---|---|---|---|---|---|
| | Schaft | | | Stock | | Dimensions (mm) | | |
| øD | ød | $\ell_3$ | MK, MG ↘ | MK | MG | L | $\ell_1$ | $\ell_2$ |
| 12,1 | 12,1 | 59 | **MDS 121 □□** | | | 137,3 | 73,3 | 78,3 |
| 12,2 | 12,2 | | **MDS 122 □□** | | | | | |
| 12,3 | 12,3 | | **MDS 123 □□** | | | | | |
| 12,4 | 12,4 | | **MDS 124 □□** | | | | | |
| 12,5 | 12,5 | | **MDS 125 □□** | | | | | |
| 12,6 | 12,6 | 59 | **MDS 126 □□** | | | 139,4 | 84,8 | 80,4 |
| 12,7 | 12,7 | | **MDS 127 □□** | | | | | |
| 12,8 | 12,8 | | **MDS 128 □□** | | | | | |
| 12,9 | 12,9 | | **MDS 129 □□** | | | | | |
| **13,0** | 13,0 | | **MDS 130 □□** | | | | | |
| 13,1 | 13,1 | 60 | **MDS 131 □□** | | | 146,5 | 70,3 | 86,5 |
| 13,2 | 13,2 | | **MDS 132 □□** | | | | | |
| 13,3 | 13,3 | | **MDS 133 □□** | | | | | |
| 13,4 | 13,4 | | **MDS 134 □□** | | | | | |
| 13,5 | 13,5 | | **MDS 135 □□** | | | | | |
| 13,6 | 13,6 | 61 | **MDS 136 □□** | | | 149,6 | 71,8 | 88,6 |
| 13,7 | 13,7 | | **MDS 137 □□** | | | | | |
| 13,8 | 13,8 | | **MDS 138 □□** | | | | | |
| 13,9 | 13,9 | | **MDS 139 □□** | | | | | |
| **14,0** | 14,0 | | **MDS 140 □□** | | | | | |

## ■ Recommended Cutting Conditions for K Type Multi-Drills

( $v_c$ : Cutting Speed (m/min), f : Feed Rate (mm/rev)) (Min – **Standard** – Max)

| Diameter (mm) | | Soft Steels (under HB250) | General Steels, Alloy Steels | Die Steels (about HB250) | Stainless Steels | Ductile Cast Irons | Grey Cast Irons |
|---|---|---|---|---|---|---|---|
| ~ ø 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 |
| ~ ø10 | $v_c$ | 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 |
| ~ ø15 | $v_c$ | 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 |
| ~ ø20 | $v_c$ | 60 – **90** – 120 | 60 – **80** – 120 | 30 – **40** – 60 | 20 – **50** – 70 | 60 – **80** – 100 | 60 – **90** – 120 |
| | f | 0,30 – 0,40 | 0,25 – 0,40 | 0,15 – 0,25 | 0,10 – 0,20 | 0,25 – 0,40 | 0,25 – 0,45 |



## ■ Recommended Cutting Conditions for G Type Multi-Drills

( $v_c$ : Cutting Speed (m/min), f : Feed Rate (mm/rev)) (Min – **Standard** – Max)

| Diameter (mm) | | Ductile Cast Irons | Grey Cast Irons | Aluminium Alloys |
|---|---|---|---|---|
| ~ ø 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 |
| ~ ø10 | $v_c$ | 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 |
| ~ ø14 | $v_c$ | 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 |
| ~ ø20 | $v_c$ | 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 |



● = Euro stock
▲ To be replaced by new item



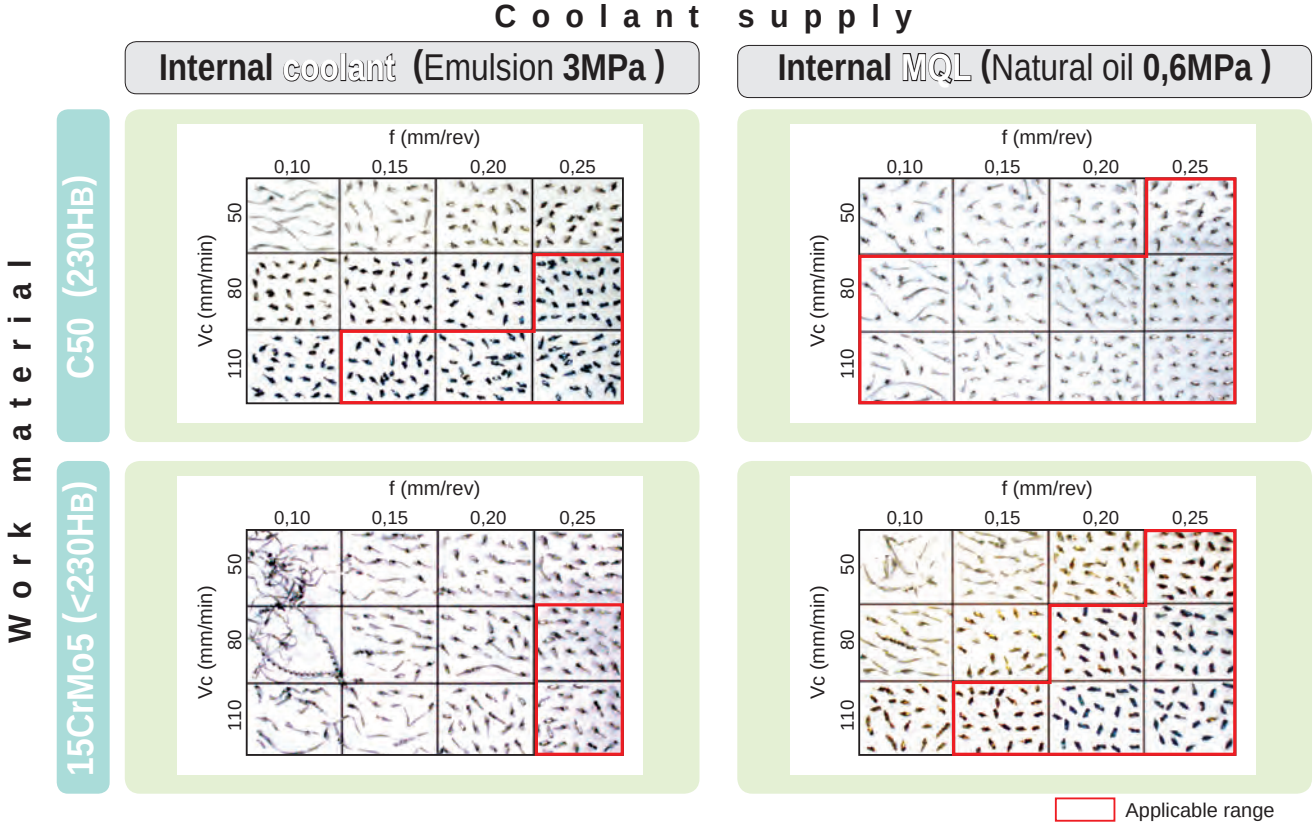
## Features

- 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**

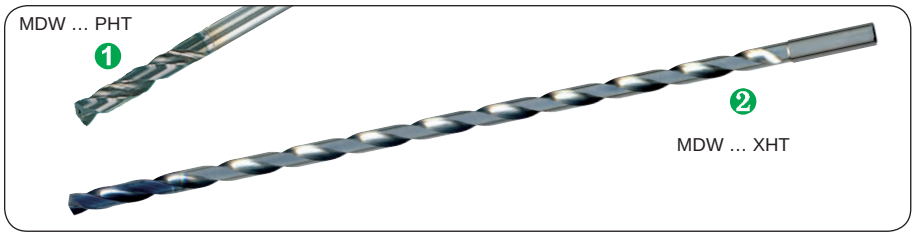


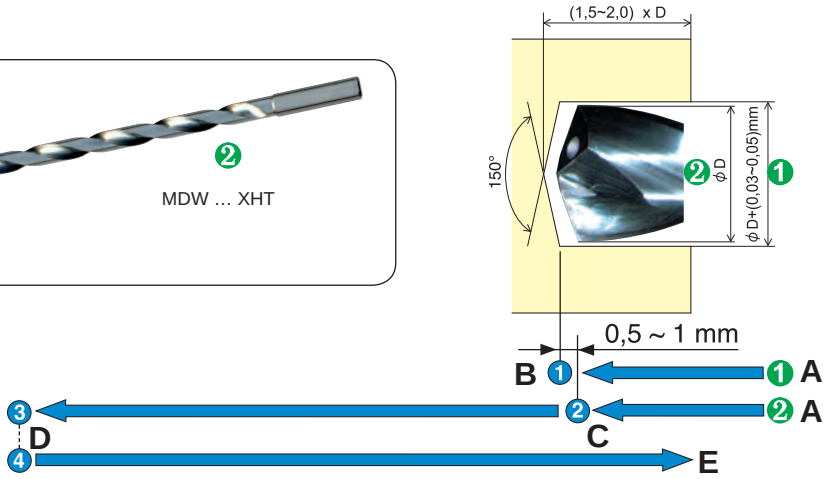

## Recommended Cutting Conditions

Vc: Cutting speed (m/min), f: Feed Rate (mm/rev)

| Drill Ø (mm) \ Work material | | General Steel | Alloy Steel | Stainless Steel | Grey Cast Iron | Ductile Cast Iron | Aluminium Alloy |
|---|---|---|---|---|---|---|---|
| | | ( ~ HB300) | ( ~ HRC45) | ( ~ HB200) | (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 ~ 120 | 60 ~ 80 | 30 ~ 60 | 50 ~ 90 | 50 ~ 90 | 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 ~ 90 | 80 ~ 180 |
| | f | 0,12 ~ 0,25 | 0,12 ~ 0,25 | 0,1 ~ 0,2 | 0,2 ~ 0,35 | 0,15 ~ 0,25 | 0,15 ~ 0,4 |
| | Vc | 80 ~ 120 | 70 ~ 90 | 40 ~ 80 | 60 ~ 100 | 80 ~ 120 | 80 ~ 180 |
| | f | 0,15 ~ 0,3 | 0,12 ~ 0,25 | 0,1 ~ 0,2 | 0,2 ~ 0,35 | 0,15 ~ 0,3 | 0,2 ~ 0,5 |
| | Vc | 80 ~ 120 | 70 ~ 90 | 40 ~ 80 | 60 ~ 100 | 80 ~ 120 | 80 ~ 180 |
| | f | 0,15 ~ 0,3 | 0,12 ~ 0,25 | 0,1 ~ 0,2 | 0,2 ~ 0,35 | 0,15 ~ 0,3 | 0,2 ~ 0,45 |

## Recommended Tooling Strategy




**1 A ⇨ B: Preperation of pilot hole with MDW ...PHT type**
$v_c$= 50-80m/min, f= 0,15-0,25mm/rev, $d_{oc}$:1-2xD

**2 A ⇨ C: Entering into pilot hole with long Multi-Drill (MDW ....XHT type)**
N= 500 rpm, $v_f$ =2000mm/min
At **C** the drill should stay (about. 3 sec.) and increase speed to set recommended cutting conditions.

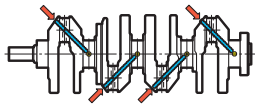
**3 C ⇨ D: Deep hole drilling**
After reaching required number of revolution operation can be started taking into consideration mentioned recommendation for the feed rates. At cross holes and irregular or angled surfaces feed should be reduced.

**4 D ⇨ E: After hole drilling**
Decrease spindle rotation to N=500~700rpm and pull back with high feed rate F= 2000 mm/min.

## Application Examples

### Work piece: Crank shaft (C45E, 1.1191)

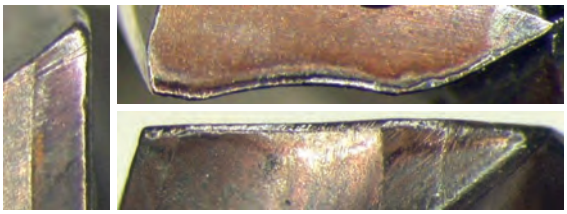
**Machine**
Machine: Horizontal M/C
Coolant: MQL (Synthesized ester)
Air pressure 0,9MPa
Supplying rate 20cc/h



**Process and cutting condition**

1) Pilot hole (ø5,75 x 12mm, Top angle of drill: 150°)
$v_c$ = 80m/min, f = 0,2mm/rev.
2) Deep hole (ø5,70 x 83mm x 4 holes, XHT type)
$v_c$ =100m/min, f = 0,15mm/rev. F = **873**mm/min

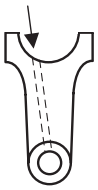
**Tool life 200pcs**



Cutting edge after 66,4m drilling

### Work piece: Connecting rod (C53,1.1213)

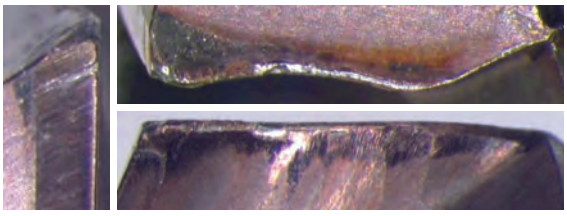
**Machine**
Machine: Vertical M/C (BT40)
Coolant: Internal cooling (Emulsion)
Pump pressure 2,0MPa



**Process and cutting condition**

1) Pilot hole (ø5,85 x 10mm, Top angle of drill: 175°)
$v_c$ = 80m/min, f = 0,05 → 0,15mm/rev.
2) Deep hole (ø5,80 x 130mm, XHT type)
$v_c$ = 90m/min, f = 0,20mm/rev. F = **988**mm/min

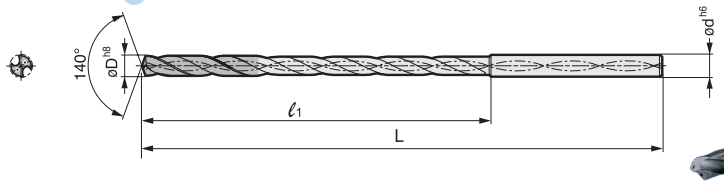
**Tool life 300pcs**

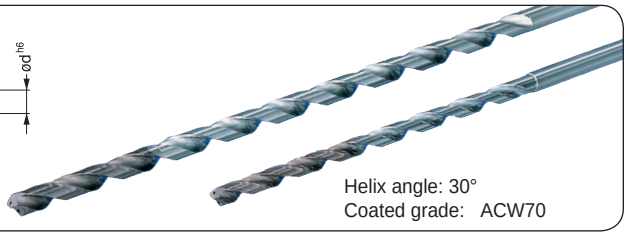


Cutting edge after 39,0m drilling

* Current tooling (with ø5,8 x130mm gun drill)
$v_c$ = 100m/min, f = 0,03mm/rev. F = **164**mm/min.
( Tool life 120pcs )

● MDW ... XHT S ... HAK



Helix angle: 30°
Coated grade: ACW70

## P ●MDW...XHT S Type for Deep Hole Drilling Steels

(mm)

| Dimensions | | Cat. No. | For 10 x D | | | For 15 x D | | | For 20 x D | | | For 25 x D | | | For 30 x D | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Stock | Dimensions | | Stock | Dimensions | | Stock | Dimensions | | Stock | Dimensions | | Stock | Dimensions | |
| øD (mm) | ød (mm) | 10, 15, 20, 25, 30 | 10 | L | $\ell_1$ | 15 | L | $\ell_1$ | 20 | L | $\ell_1$ | 25 | L | $\ell_1$ | 30 | L | $\ell_1$ |
| 3,0 | 4,0 | MDW 030 XHT S□□HAK | ● | 79 | 48 | ● | 94 | 66 | ● | 109 | 81 | ● | 124 | 96 | ● | 139 | 111 |
| 3,5 | | MDW 035 XHT S□□HAK | ● | 82 | 53 | ● | 100 | 72 | ● | 117 | 89 | ● | 135 | 107 | ● | 152 | 124 |
| 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□□HAK5 (*) | ● | 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 | 8,0 | MDW 065 XHT S□□HAK | ● | 125 | 87 | ● | 158 | 120 | ● | 190 | 148 | ● | 223 | 180,5 | ● | 255 | 213 |
| 6,8 | | MDW 068 XHT S□□HAK | ● | 130 | 90 | ● | 164 | 124 | ● | 198 | 158 | ● | 236 | 192 | ● | 266 | 226 |
| 7,0 | | 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 | 10,0 | MDW 085 XHT S□□HAK | ● | 154 | 110 | ● | 197 | 153 | ● | 239 | 195 | ● | 282 | 238 | ● | 324 | 280 |
| 9,0 | | 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 | × | — | — |
| 11,0 | | MDW 110 XHT S□□HAK | ● | 186 | 136 | ● | 241 | 191 | ● | 296 | 246 | ● | 351 | 301 | × | — | — |
| 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 accomodate regrinding!
✎ TiAlN coated carbide grade: ACW70
(*) Cat. No. description: Drill-ø: 5mm, shank-ø: 5 mm, (Eg. for 20xD: MDW 050 XHT S20 HAK5 )

● Euro stock
× Not possible to produce



## ■ How to Order

Non stock items – minimum order 6 pieces
Always specify the catalogue number and drill diameter as shown
- eg drill diameter 5,0mm = MDW 050

E.g.,

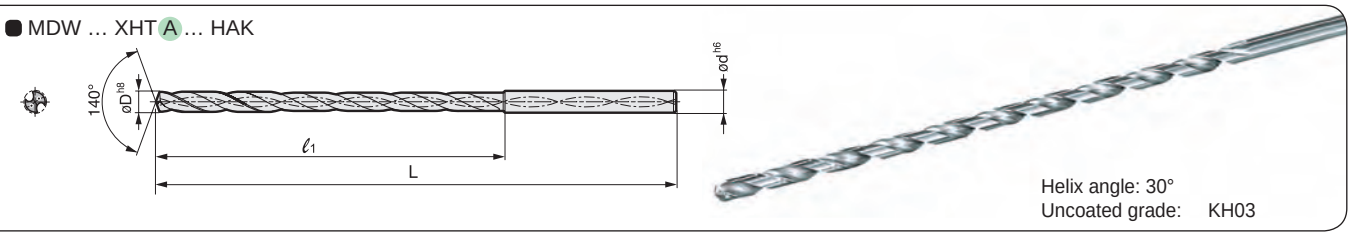
**MDW 050 X H T S 30 HAK** , ACW70 (Grade)

- MDW: Super MULTI-DRILL
- 050: øD=5,0 mm
- X: Extra long type
- H: with spiral coolant holes
- T: Special shape of clearance face
- S: Cutting edges for steel with double margin
- 30: Drilling depth (L/D ratio)
- HAK: Shank type to DIN6535
- ACW70 (Grade)



# Extra Long SUPER MULTI-DRILLs
# MDW ... XHT/PHT Type

● MDW ... XHT A ... HAK




Helix angle: 30°
Uncoated grade: KH03

## N ●MDW...XHT A Type for Aluminium and Copper Alloys

(mm)

| Dimensions | | Cat. No. | For 20 x D | | | For 30 x D | | |
|---|---|---|---|---|---|---|---|---|
| | | | Stock | Dimensions | | Stock | Dimensions | |
| øD (mm) | ød (mm) | 20, 30 | 20 | L | $\ell_1$ | 30 | L | $\ell_1$ |
| 4,0 | 4,0 | MDW 040 XHT A□□ HAK | ● | 127 | 97 | ● | 167 | 137 |
| 5,0 | 6,0 | MDW 050 XHT A□□ HAK | ● | 156 | 118 | ● | 206 | 168 |
| 6,0 | | MDW 060 XHT A□□ HAK | ● | 178 | 138 | ● | 238 | 198 |
| 7,0 | 8,0 | MDW 070 XHT A□□ HAK | ● | 201 | 162 | ● | 271 | 232 |
| 8,0 | | MDW 080 XHT A□□ HAK | ● | 221 | 182 | ● | 301 | 262 |
| 9,0 | 10,0 | MDW 090 XHT A□□ HAK | ● | 249 | 205 | ● | 339 | 295 |
| 10,0 | | MDW 100 XHT A□□ HAK | ● | 267 | 225 | ● | 367 | 325 |

All Long Drill series include an allowance to accomodate regrinding!
Uncoated carbide grade: KH03

● Euro stock

## How to Order

Non stock items – minimum order 6 pieces
Always specify the catalogue number and drill diameter as shown
- eg drill diameter 5,0mm = MDW 050

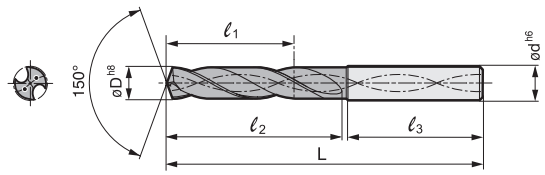
E.g.,

**MDW 050 X H T A 30 HAK** , KH03 (Grade)

- Super MULTI-DRILL
- øD=5,0 mm
- Extra long type
- with spiral coolant holes
- Shank type to DIN6535
- Drilling depth (L/D ratio)
- Cutting edges for Al and Cu alloys
- Special shape of clearance face

## ●MDW...PHT Type for Pilot Hole






Helix angle: 30°
$\ell_1$ = Effective drilling length
Coated grade: ACW70

| Dimensions | | Cat. No. | For Pilot Hole | | | | |
|---|---|---|---|---|---|---|---|
| | | | Stock | Dimensions (mm) | | | |
| øD (mm) | ød (mm) | | | L | $\ell_1$ | $\ell_2$ | $\ell_3$ |
| 3,03 | 4,0 | MDW 0303 PHT | ● | 52 | 9 | 22 | 28 |
| 3,53 | | MDW 0353 PHT | ● | 52 | 9 | 22 | 28 |
| 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 |
| 6,83 | | MDW 0683 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 |

● Euro stock

## How to Order

Non stock items – minimum order 6 pieces
Always specify the catalogue number and drill diameter as shown -
eg. drill diameter 5,03mm = MDW 0503

E.g.,

**MDW 0503 PHT** , ACW70

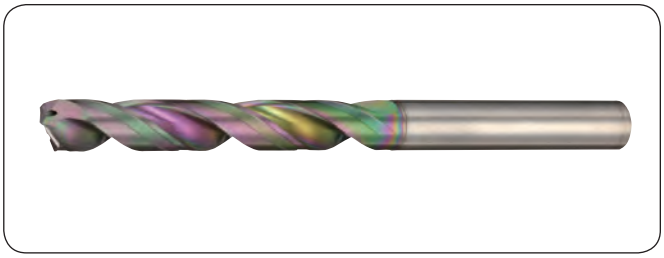
- Super MULTI-DRILL
- øD = 5,03 mm
- Pilot drill with spiral coolant holes
- TiAlN coated grade

# MDW ... NHGS Type

DLC (Diamond Like Carbon) Coated Multi-Drills

## With Coolant Holes (3D/5D/10D)





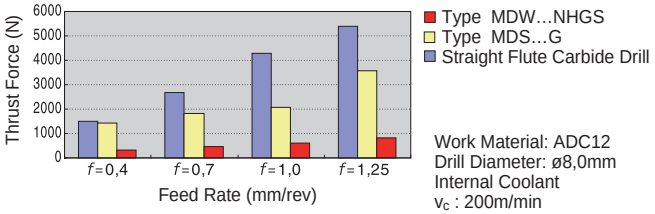
## Characteristics

- **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: ø3,0~ø16,0mm
  total length: 50 times drill diameter (max. 290mm)

## Applicable Work Materials

- Aluminium Die Casting
- Aluminium Alloy
- Aluminium Alloy Casting
- Brass Casting
- Bronze Casting

## Comparison of Cutting Force (Thrust Force)




Work Material: ADC12
Drill Diameter: ø8,0mm
Internal Coolant
$v_c$ : 200m/min

## Recommended Cutting Conditions

| ø D (mm) | | Aluminium Alloy | Aluminium Die Casting | Copper Alloy |
|---|---|---|---|---|
| ~ ø 5 | $v_c$ | 80 ~ 160 | 80 ~ 180 | 80 ~ 160 |
| | f | 0,08 ~ 0,3 | 0,1 ~ 0,3 | 0,08 ~ 0,15 |
| ~ ø10 | $v_c$ | 80 ~ 180 | 80 ~ 200 | 60 ~ 180 |
| | f | 0,1 ~ 0,3 | 0,1 ~ 0,35 | 0,1 ~ 0,2 |
| ~ ø16 | $v_c$ | 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 )

## Diameter ø3,0~8,0mm

(mm)

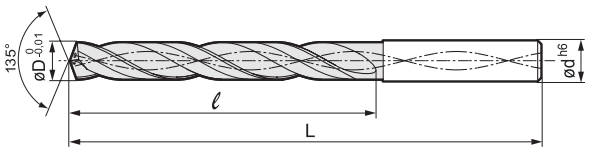
| Dimensions | | Cat. No. | 3D Type | | | 5D Type | | | 10D Type | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Stock | Dimensions | | Stock | Dimensions | | Stock | Dimensions | |
| øD | ød | 3, 5, 10↘ | 3 | L | ℓ | 5 | L | ℓ | 10 | L | ℓ |
| **3,0** | 3,0 | MDW 0300 NHGS□□ | ❍ | 68,6 | 18,1 | ❍ | 78,6 | 28,6 | ❍ | 92,6 | 42,6 |
| 3,1 | | MDW 0310 NHGS□□ | | | | ❍ | | | | | |
| 3,2 | | MDW 0320 NHGS□□ | ❍ | | | ❍ | | | ❍ | | |
| 3,3 | | MDW 0330 NHGS□□ | ❍ | | 20,7 | ❍ | | 32,7 | | | 49,7 |
| 3,4 | | MDW 0340 NHGS□□ | | | | ❍ | | | ❍ | | |
| 3,5 | | MDW 0350 NHGS□□ | ❍ | | | ❍ | | | ❍ | | |
| 3,6 | | MDW 0360 NHGS□□ | | | | ❍ | | | ❍ | | |
| 3,65 | 4,0 | MDW 0365 NHGS□□ | ❍ | 72,8 | | ❍ | 86,8 | | | 106,8 | |
| 3,66 | | MDW 0366 NHGS□□ | | | | ❍ | | | | | |
| 3,7 | | MDW 0370 NHGS□□ | | | 23,3 | ❍ | | 36,8 | | | 56,8 |
| 3,8 | | MDW 0380 NHGS□□ | | | | ❍ | | | | | |
| 3,9 | | MDW 0390 NHGS□□ | | | | ❍ | | | ❍ | | |
| **4,0** | | MDW 0400 NHGS□□ | ❍ | | | ❍ | | | ❍ | | |
| 4,1 | | MDW 0410 NHGS□□ | ❍ | | | ❍ | | | | | |
| 4,2 | | MDW 0420 NHGS□□ | ❍ | | | ❍ | | | | | |
| 4,3 | | MDW 0430 NHGS□□ | | | 25,9 | ❍ | | 40,9 | | | 63,9 |
| 4,4 | | MDW 0440 NHGS□□ | | | | ❍ | | | | | |
| 4,5 | | MDW 0450 NHGS□□ | ❍ | | | ❍ | | | ❍ | | |
| 4,6 | 5,0 | MDW 0460 NHGS□□ | ❍ | 81,0 | | ❍ | 99,0 | | | 125,0 | |
| 4,7 | | MDW 0470 NHGS□□ | | | | ❍ | | | | | |
| 4,8 | | MDW 0480 NHGS□□ | | | 28,5 | ❍ | | 45,0 | | | 71,0 |
| 4,9 | | MDW 0490 NHGS□□ | | | | ❍ | | | ❍ | | |
| **5,0** | | MDW 0500 NHGS□□ | ❍ | | | ❍ | | | ❍ | | |
| 5,1 | | MDW 0510 NHGS□□ | | | | ❍ | | | ❍ | | |
| 5,2 | | MDW 0520 NHGS□□ | ❍ | | | ❍ | | | | | |
| 5,3 | | MDW 0530 NHGS□□ | ❍ | | 28,6 | ❍ | | 45,1 | | | 88,1 |
| 5,4 | | MDW 0540 NHGS□□ | | | | ❍ | | | | | |
| 5,5 | | MDW 0550 NHGS□□ | ❍ | | | ❍ | | | ❍ | | |
| 5,6 | 6,0 | MDW 0560 NHGS□□ | | 83,2 | | ❍ | 101,2 | | | 137,2 | |
| 5,7 | | MDW 0570 NHGS□□ | | | | ❍ | | | | | |
| 5,8 | | MDW 0580 NHGS□□ | | | 31,2 | ❍ | | 49,2 | | | 85,2 |
| 5,9 | | MDW 0590 NHGS□□ | ❍ | | | ❍ | | | | | |
| **6,0** | | MDW 0600 NHGS□□ | ❍ | | | ❍ | | | ❍ | | |
| 6,1 | | MDW 0610 NHGS□□ | | | | ❍ | | | ❍ | | |
| 6,2 | | MDW 0620 NHGS□□ | | | | ❍ | | | | | |
| 6,3 | | MDW 0630 NHGS□□ | | | 33,8 | ❍ | | 53,3 | | | 92,3 |
| 6,4 | | MDW 0640 NHGS□□ | | | | ❍ | | | | | |
| 6,5 | | MDW 0650 NHGS□□ | ❍ | | | ❍ | | | ❍ | | |
| 6,6 | 7,0 | MDW 0660 NHGS□□ | | 89,5 | | ❍ | 110,5 | | | 152,5 | |
| 6,7 | | MDW 0670 NHGS□□ | ❍ | | | ❍ | | | ❍ | | |
| 6,8 | | MDW 0680 NHGS□□ | ❍ | | 36,5 | ❍ | | 57,5 | ❍ | | 99,5 |
| 6,9 | | MDW 0690 NHGS□□ | | | | ❍ | | | | | |
| **7,0** | | MDW 0700 NHGS□□ | ❍ | | | ❍ | | | ❍ | | |
| 7,1 | | MDW 0710 NHGS□□ | | | | ❍ | | | | | |
| 7,2 | | MDW 0720 NHGS□□ | | | | ❍ | | | ❍ | | |
| 7,3 | | MDW 0730 NHGS□□ | | | 39,1 | ❍ | | 61,6 | | | 116,6 |
| 7,35 | | MDW 0735 NHGS□□ | ❍ | | | ❍ | | | | | |
| 7,4 | | MDW 0740 NHGS□□ | ❍ | | | ❍ | | | | | |
| 7,5 | 8,0 | MDW 0750 NHGS□□ | ❍ | 95,7 | | ❍ | 119,7 | | ❍ | 167,7 | |
| 7,6 | | MDW 0760 NHGS□□ | | | | ❍ | | | | | |
| 7,7 | | MDW 0770 NHGS□□ | | | | ❍ | | | | | |
| 7,8 | | MDW 0780 NHGS□□ | ❍ | | 41,7 | ❍ | | 65,7 | ❍ | | 113,7 |
| 7,9 | | MDW 0790 NHGS□□ | | | | ❍ | | | | | |
| **8,0** | | MDW 0800 NHGS□□ | ❍ | | | ❍ | | | ❍ | | |

AURORA Coated NHGS Type, Grade: DL1300

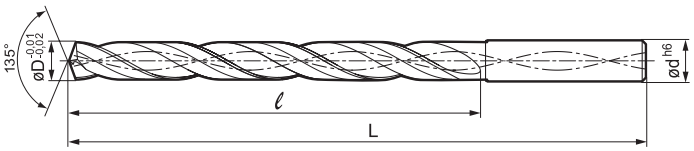
❍ = Stock item in Japan

# AURORA COAT SERIES
# MDW ... NHGS Type

● NHGS 3/5 Type (ø3,0 ~ ø16,0mm)




● NHGS 10 Type (ø3,0 ~ ø16,0mm)




## ●Diameter ø8,1~13,0mm

(mm)

| Dimensions | | Cat. No. | 3D Type | | | 5D Type | | | 10D Type | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Stock | Dimensions | | Stock | Dimensions | | Stock | Dimensions | |
| øD | ød | 3, 5, 10↘ | 3 | L | ℓ | 5 | L | ℓ | 10 | L | ℓ |
| 8,1 | 9,0 | MDW 0810 NHGS□□ | | 101,9 | 44,3 | ❍ | 128,9 | 69,8 | | 182,9 | 118,8 |
| 8,2 | | MDW 0820 NHGS□□ | | | | ❍ | | | | | |
| 8,3 | | MDW 0830 NHGS□□ | | | | ❍ | | | | | |
| 8,4 | | MDW 0840 NHGS□□ | | | | ❍ | | | | | |
| 8,5 | | MDW 0850 NHGS□□ | ❍ | | | ❍ | | | ❍ | | |
| 8,6 | | MDW 0860 NHGS□□ | ❍ | | 46,9 | ❍ | | 73,9 | | | 127,9 |
| 8,7 | | MDW 0870 NHGS□□ | | | | ❍ | | | | | |
| 8,8 | | MDW 0880 NHGS□□ | ❍ | | | ❍ | | | | | |
| 8,9 | | MDW 0890 NHGS□□ | | | | ❍ | | | | | |
| **9,0** | | MDW 0900 NHGS□□ | ❍ | | | ❍ | | | ❍ | | |
| 9,1 | 10,0 | MDW 0910 NHGS□□ | | 108,0 | 49,5 | ❍ | 138,0 | 78,0 | | 198,0 | 135,0 |
| 9,2 | | MDW 0920 NHGS□□ | | | | ❍ | | | | | |
| 9,21 | | MDW 0921 NHGS□□ | ❍ | | | ❍ | | | | | |
| 9,3 | | MDW 0930 NHGS□□ | | | | ❍ | | | | | |
| 9,4 | | MDW 0940 NHGS□□ | ❍ | | | ❍ | | | | | |
| 9,5 | | MDW 0950 NHGS□□ | ❍ | | | ❍ | | | ❍ | | |
| 9,6 | | MDW 0960 NHGS□□ | | | 52,0 | ❍ | | 82,0 | | | 142,0 |
| 9,7 | | MDW 0970 NHGS□□ | | | | ❍ | | | | | |
| 9,8 | | MDW 0980 NHGS□□ | | | | ❍ | | | ❍ | | |
| 9,9 | | MDW 0990 NHGS□□ | | | | ❍ | | | | | |
| **10,0** | | MDW 1000 NHGS□□ | ❍ | | | ❍ | | | ❍ | | |
| 10,1 | 11,0 | MDW 1010 NHGS□□ | ❍ | 168,3 | 54,7 | | 151,3 | 86,2 | | 217,3 | 149,2 |
| 10,2 | | MDW 1020 NHGS□□ | | | | | | | | | |
| 10,3 | | MDW 1030 NHGS□□ | ❍ | | | ❍ | | | | | |
| 10,4 | | MDW 1040 NHGS□□ | | | | ❍ | | | | | |
| 10,5 | | MDW 1050 NHGS□□ | ❍ | | | ❍ | | | ❍ | | |
| 10,6 | | MDW 1060 NHGS□□ | ❍ | | 57,3 | ❍ | | 90,3 | | | 156,3 |
| 10,7 | | MDW 1070 NHGS□□ | | | | | | | | | |
| 10,8 | | MDW 1080 NHGS□□ | | | | | | | | | |
| 10,9 | | MDW 1090 NHGS□□ | | | | | | | | | |
| **11,0** | | MDW 1100 NHGS□□ | ❍ | | | ❍ | | | ❍ | | |
| 11,08 | 12,0 | MDW 1108 NHGS□□ | ❍ | 124,5 | 59,9 | ❍ | 160,5 | 94,4 | | 232,5 | 163,4 |
| 11,1 | | MDW 1110 NHGS□□ | ❍ | | | ❍ | | | | | |
| 11,2 | | MDW 1120 NHGS□□ | ❍ | | | ❍ | | | | | |
| 11,3 | | MDW 1130 NHGS□□ | | | | | | | | | |
| 11,4 | | MDW 1140 NHGS□□ | ❍ | | | ❍ | | | | | |
| 11,5 | | MDW 1150 NHGS□□ | ❍ | | | ❍ | | | ❍ | | |
| 11,6 | | MDW 1160 NHGS□□ | | | 62,5 | | | 98,5 | | | 170,5 |
| 11,7 | | MDW 1170 NHGS□□ | | | | | | | | | |
| 11,8 | | MDW 1180 NHGS□□ | | | | | | | | | |
| 11,9 | | MDW 1190 NHGS□□ | | | | | | | | | |
| **12,0** | | MDW 1200 NHGS□□ | ❍ | | | ❍ | | | ❍ | | |
| 12,1 | 13,0 | MDW 1210 NHGS□□ | ❍ | 130,7 | 65,1 | ❍ | 169,7 | 102,6 | | 247,7 | 177,6 |
| 12,2 | | MDW 1220 NHGS□□ | | | | | | | | | |
| 12,3 | | MDW 1230 NHGS□□ | ❍ | | | ❍ | | | | | |
| 12,4 | | MDW 1240 NHGS□□ | | | | | | | | | |
| 12,5 | | MDW 1250 NHGS□□ | ❍ | | | ❍ | | | ❍ | | |
| 12,6 | | MDW 1260 NHGS□□ | | | 67,7 | | | 206,7 | | | 184,7 |
| 12,7 | | MDW 1270 NHGS□□ | | | | | | | | | |
| 12,8 | | MDW 1280 NHGS□□ | | | | | | | | | |
| 12,9 | | MDW 1290 NHGS□□ | | | | | | | | | |
| 12,96 | | MDW 1296 NHGS□□ | ❍ | | | ❍ | | | | | |
| **13,0** | | MDW 1300 NHGS□□ | ❍ | | | ❍ | | | ❍ | | |

## ●Diameter ø13,1~16,0mm

(mm)

| Dimensions | | Cat. No. | 3D Type | | | 5D Type | | | 10D Type | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Stock | Dimensions | | Stock | Dimensions | | Stock | Dimensions | |
| øD | ød | 3, 5, 10↘ | 3 | L | ℓ | 5 | L | ℓ | 10 | L | ℓ |
| 13,1 | 14,0 | MDW 1310 NHGS□□ | | 136,9 | 70,8 | | 178,9 | 110,8 | | 262,9 | 191,8 |
| 13,2 | | MDW 1320 NHGS□□ | | | | | | | | | |
| 13,3 | | MDW 1330 NHGS□□ | | | | | | | | | |
| 13,4 | | MDW 1340 NHGS□□ | | | | | | | | | |
| 13,5 | | MDW 1350 NHGS□□ | ❍ | | | ❍ | | | | | |
| 13,6 | | MDW 1360 NHGS□□ | | | 72,9 | | | 114,9 | | | 198,9 |
| 13,7 | | MDW 1370 NHGS□□ | | | | | | | | | |
| 13,8 | | MDW 1380 NHGS□□ | | | | | | | | | |
| 13,9 | | MDW 1390 NHGS□□ | | | | | | | | | |
| **14,0** | | MDW 1400 NHGS□□ | ❍ | | | ❍ | | | | | |
| 14,1 | 15,0 | MDW 1410 NHGS□□ | ❍ | 141,1 | 75,5 | ❍ | 188,1 | 119,0 | | 278,1 | 206 |
| 14,2 | | MDW 1420 NHGS□□ | | | | | | | | | |
| 14,3 | | MDW 1430 NHGS□□ | | | | | | | | | |
| 14,4 | | MDW 1440 NHGS□□ | | | | | | | | | |
| 14,5 | | MDW 1450 NHGS□□ | ❍ | | | ❍ | | | | | |
| 14,6 | | MDW 1460 NHGS□□ | | | 78,1 | | | 123,1 | | | 213,1 |
| 14,7 | | MDW 1470 NHGS□□ | | | | | | | | | |
| 14,8 | | MDW 1480 NHGS□□ | | | | | | | | | |
| 14,9 | | MDW 1490 NHGS□□ | ❍ | | | ❍ | | | | | |
| 14,96 | | MDW 1496 NHGS□□ | ❍ | | | ❍ | | | | | |
| **15,0** | | MDW 1500 NHGS□□ | ❍ | | | ❍ | | | | | |
| 15,1 | 16,0 | MDW 1510 NHGS□□ | | 149,3 | 80,7 | | 197,3 | 127,2 | | 293,3 | 220,2 |
| 15,2 | | MDW 1520 NHGS□□ | | | | | | | | | |
| 15,3 | | MDW 1530 NHGS□□ | | | | | | | | | |
| 15,4 | | MDW 1540 NHGS□□ | | | | | | | | | |
| 15,5 | | MDW 1550 NHGS□□ | ❍ | | | ❍ | | | | | |
| 15,6 | | MDW 1560 NHGS□□ | | | 83,3 | | | 131,3 | | | 227,3 |
| 15,7 | | MDW 1570 NHGS□□ | | | | | | | | | |
| 15,8 | | MDW 1580 NHGS□□ | | | | | | | | | |
| 15,9 | | MDW 1590 NHGS□□ | | | | | | | | | |
| **16,0** | | MDW 1600 NHGS□□ | ❍ | | | ❍ | | | | | |

AURORA Coated NHGS Type, Grade: DL1300

## ■ How to Order

Non-Stock Items will be required minimum order quantity for 6 pcs.
Please specify the Cat. No.
For example, if the diameter of the drill is 10,3mm and the ratio to øD is 5, please indicate as follow.

E.g.,

**MDW 1030 NHGS 5** , DL1300 (Grade)

- MDW: Super MULTI-DRILL
- 1030: øD=10,3 mm
- NH: Applicable work materials with spiral coolant holes
- GS: NHGS type Multi-Drills
- 5: Drilling depth (The ratio to øD): ~3 / ~**5** / ~10

❍ = Stock item in Japan

Multi-Drills

# Micro Long Drills
# MLDH ....L/P Type

New



## General Features

Micro Long Drills are oil-hole drills for high efficiency drilling that were developed for drilling deep, small-diameter holes. These next-generation, small-diameter hole drills feature improved strength - often a problem area with small-diameter drills.

## Characteristics and Applications

● Deep-hole drilling
New groove shape ensures good drill rigidity and chip evacuation.
High efficiency drilling to depths of over 20x drill diameter at over $v_f$ = 500mm/min (drill diameter 1,3mm, X12CrS13 equivalent).
Optimal thinning and edge balance for stable chip control.

● Long tool life
Special coating provides long tool life with a wide variety of work materials.
Improved chip evacuation makes it possible to reduce spindle load fluctuation, ensuring stable tool life.

## Series

| Application | Type | Diameter range (mm) | Hole depth (L/D) |
|---|---|---|---|
| Guide Hole Drilling | **MLDH □□□□ P** | ø 0,8 ~ 2,0 | ~ 2 |
| Deep Hole Drilling | **MLDH □□□□ L5** | ø 0,8 ~ 2,0 | ~ 5 |
| | **MLDH □□□□ L12** | ø 0,8 ~ 2,0 | ~ 12 |
| | **MLDH □□□□ L20** | ø 0,8 ~ 2,0 | ~ 20 |
| | **MLDH □□□□ L30** | ø 0,8 ~ 2,0 | ~ 30 |

## Recommended Cutting Conditions

● MLDH .... P / L5

( $v_c$ : Cutting Speed (m/min), f : Feed rate (mm/rev), Min - **Optimum** - Max )

| Drill-ø (mm) | Cutting Cond. | Soft Steel ( ~ HB200) | General Steel (HB200~250) | Alloy Steel (HB250~300) | Stainless Steel ( ~ HB200) | Cast Iron | Aluminium Alloy | Heat-Resistant Steels |
|---|---|---|---|---|---|---|---|---|
| ~ 1,0 | $v_c$ | 40 - **50** - 60 | 40 - **50** - 60 | 40 - **50** - 60 | 20 -**30** - 40 | 40 - **50** - 60 | 50 - **60** - 70 | 5 - **10** - 15 |
| | f | 0,01 - **0,02** - 0,03 | 0,01 - **0,02** - 0,03 | 0,01 - **0,02** - 0,03 | 0,01 - **0,02** - 0,03 | 0,02 - **0,03** - 0,04 | 0,03 - **0,04** - 0,06 | 0,005 - **0,01** - 0,02 |
| ~ 1,5 | $v_c$ | 40 - **50** - 60 | 40 - **50** - 60 | 40 - **50** - 60 | 20 - **30** - 40 | 40 - **50** - 60 | 50 - **60** - 70 | 5 - **10** - 15 |
| | f | 0,04 - **0,08** - 0,12 | 0,04 - **0,08** - 0,12 | 0,04 - **0,08** - 0,12 | 0,02 - **0,05** - 0,10 | 0,04 - **0,08** - 0,12 | 0,05 - **0,10** - 0,15 | 0,01 - **0,03** - 0,05 |
| ~ 2,0 | $v_c$ | 40 - **50** - 60 | 40 - **50** - 60 | 40 - **50** - 60 | 20 - **30** - 40 | 40 - **50** - 60 | 50 - **60** - 70 | 5 - **10** - 15 |
| | f | 0,06 - **0,08** - 0,12 | 0,06 - **0,08** - 0,12 | 0,06 - **0,08** - 0,12 | 0,04 - **0,06** - 0,10 | 0,06 - **0,08** - 0,12 | 0,08 - **0,12** - 0,15 | 0,01 - **0,03** - 0,05 |

● MLDH .... L12 / L20 / L30

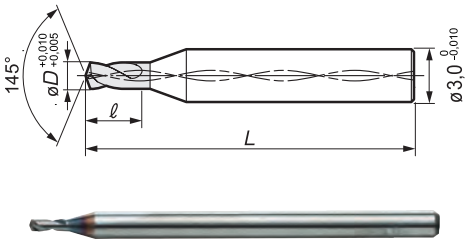
( $v_c$ : Cutting Speed (m/min), f : Feed rate (mm/rev), Min - **Optimum** - Max )

| Drill-ø (mm) | Cutting Cond. | Soft Steel ( ~ HB200) | General Steel (HB200~250) | Alloy Steel (HB250~300) | Stainless Steel ( ~ HB200) | Cast Iron | Aluminium Alloy | Heat-Resistant Steels |
|---|---|---|---|---|---|---|---|---|
| ~ 1,0 | $v_c$ | 40 - **50** - 60 | 40 - **50** - 60 | 40 - **50** - 60 | 20 -**30** - 40 | 40 - **50** - 60 | 50 - **60** - 70 | 5 - **10** - 15 |
| | f | 0,01 - **0,02** - 0,03 | 0,01 - **0,02** - 0,03 | 0,01 - **0,02** - 0,03 | 0,01 - **0,02** - 0,03 | 0,02 - **0,03** - 0,04 | 0,03 - **0,04** - 0,06 | 0,005 - **0,01** - 0,02 |
| ~ 1,5 | $v_c$ | 40 - **50** - 60 | 40 - **50** - 60 | 40 - **50** - 60 | 20 - **30** - 40 | 40 - **50** - 60 | 50 - **60** - 70 | 5 - **10** - 15 |
| | f | 0,03 - **0,05** - 0,07 | 0,03 - **0,05** - 0,07 | 0,03 - **0,05** - 0,07 | 0,02 - **0,04** - 0,07 | 0,04 - **0,07** - 0,10 | 0,05 - **0,08** - 0,12 | 0,01 - **0,02** - 0,03 |
| ~ 2,0 | $v_c$ | 40 - **50** - 60 | 40 - **50** - 60 | 40 - **50** - 60 | 20 - **30** - 40 | 40 - **50** - 60 | 50 - **60** - 70 | 5 - **10** - 15 |
| | f | 0,04 - **0,06** - 0,08 | 0,04 - **0,06** - 0,08 | 0,04 - **0,06** - 0,08 | 0,04 - **0,06** - 0,08 | 0,04 - **0,07** - 0,10 | 0,05 - **0,08** - 0,12 | 0,01 - **0,02** - 0,03 |

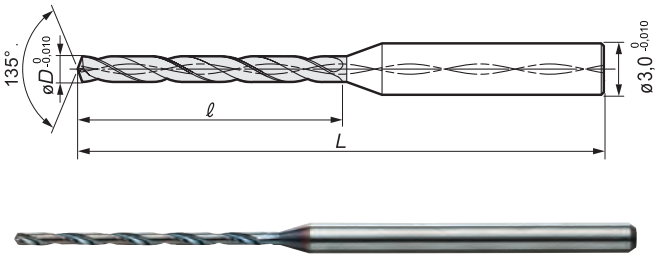
# Micro Long Drills
# MLDH ....L/P Type

## Internal Coolant Supply

● MLDH-P For Pilot Hole Drilling




● MLDH-L For Deep Hole Drilling




## Stock

(mm)

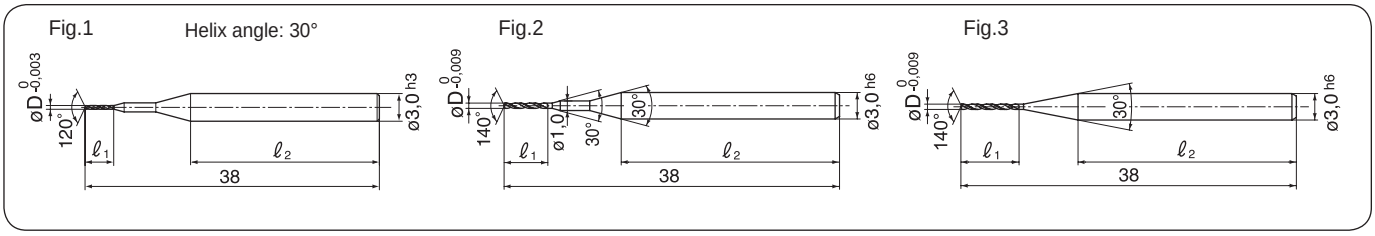
| øD (mm) | P Type for Pilot Hole Drilling | | | | L Type for Deep Hole Drilling | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Cat. No. | Stock | Dimensions | | Cat. No. 5,12,20,30 ↘ | 5x D | | | 12x D | | | 20x D | | | 30x D | | |
| | | | | | | Stock | Dimensions | | Stock | Dimensions | | Stock | Dimensions | | Stock | Dimensions | |
| | | | L | ℓ | | 5 | L | ℓ | 12 | L | ℓ | 20 | L | ℓ | 30 | L | ℓ |
| 0,80 | MLDH 0800P | ○ | 45 | 3,2 | MLDH 0800L□□ | ○ | 50 | 8 | ○ | 55 | 14 | ○ | 60 | 19 | ○ | 70 | 28 |
| 0,81 | 0810P | ○ | | | 0810L□□ | ○ | | 9 | ○ | | | ○ | | 20 | ○ | | |
| 0,82 | MLDH 0820P | ○ | | 3,3 | MLDH 0820L□□ | ○ | | | ○ | | | ○ | | | ○ | | |
| 0,83 | 0830P | ○ | | | 0830L□□ | ○ | | | ○ | | | ○ | | | ○ | | |
| 0,84 | MLDH 0840P | ○ | | 3,4 | MLDH 0840L□□ | ○ | | | ○ | | | ○ | | | ○ | | 29 |
| 0,85 | 0850P | ○ | | | 0850L□□ | ○ | | | ○ | | | ○ | | | ○ | | |
| 0,86 | 0860P | ○ | | | 0860L□□ | ○ | | | ○ | | 15 | ○ | 65 | 21 | ○ | | |
| 0,87 | MLDH 0870P | ○ | | 3,5 | MLDH 0870L□□ | ○ | | | ○ | | | ○ | | | ○ | | 30 |
| 0,88 | 0880P | ○ | | | 0880L□□ | ○ | | | ○ | | | ○ | | | ○ | | |
| 0,89 | MLDH 0890P | ○ | | 3,6 | MLDH 0890L□□ | ○ | | | ○ | | | ○ | | | ○ | | |
| 0,90 | 0900P | ○ | | | 0900L□□ | ○ | | | ○ | | | ○ | | 22 | ○ | 75 | 31 |
| 0,91 | 0910P | ○ | | | 0910L□□ | ○ | | 10 | ○ | | | ○ | | | ○ | | |
| 0,92 | MLDH 0920P | ○ | | 3,7 | MLDH 0920L□□ | ○ | | | ○ | 60 | 16 | ○ | | | ○ | | |
| 0,93 | 0930P | ○ | | | 0930L□□ | ○ | | | ○ | | | ○ | | | ○ | | 32 |
| 0,94 | MLDH 0940P | ○ | | 3,8 | MLDH 0940L□□ | ○ | | | ○ | | | ○ | | 23 | ○ | | |
| 0,95 | 0950P | ○ | | | 0950L□□ | ○ | | | ○ | | | ○ | | | ○ | | |
| 0,96 | 0960P | ○ | | | 0960L□□ | ○ | | | ○ | | | ○ | | | ○ | | 33 |
| 0,97 | MLDH 0970P | ○ | | 3,9 | MLDH 0970L□□ | ○ | | | ○ | | | ○ | | | ○ | | |
| 0,98 | 0980P | ○ | | | 0980L□□ | ○ | | | ○ | | 17 | ○ | | 24 | ○ | | |
| 0,99 | MLDH 0990P | ○ | | 4,0 | MLDH 0990L□□ | ○ | | | ○ | | | ○ | | | ○ | | 34 |
| 1,00 | 1000P | ○ | | | 1000L□□ | ○ | | | ○ | | | ○ | | | ○ | | |
| 1,05 | MLDH 1050P | ○ | | 4,2 | MLDH 1050L□□ | ○ | 55 | 12 | ○ | 65 | 18 | ○ | 70 | 25 | ○ | 80 | 36 |
| 1,10 | MLDH 1100P | ○ | | 4,4 | MLDH 1100L□□ | ○ | | | ○ | | 19 | ○ | | 26 | ○ | | 37 |
| 1,15 | MLDH 1150P | ○ | | 4,6 | MLDH 1150L□□ | ○ | | | ○ | | 20 | ○ | | 28 | ○ | | 39 |
| 1,20 | MLDH 1200P | ○ | | 4,8 | MLDH 1200L□□ | ○ | | | ○ | | | ○ | | 29 | ○ | 85 | 41 |
| 1,25 | MLDH 1250P | ○ | | 5,0 | MLDH 1250L□□ | ○ | | 14 | ○ | | 21 | ○ | | 30 | ○ | | 43 |
| 1,30 | MLDH 1300P | ○ | | 5,2 | MLDH 1300L□□ | ○ | | | ○ | | 22 | ○ | 75 | 31 | ○ | | 44 |
| 1,35 | MLDH 1350P | ○ | | 5,4 | MLDH 1350L□□ | ○ | | | ○ | | 23 | ○ | | 32 | ○ | 90 | 46 |
| 1,40 | MLDH 1400P | ○ | | 5,6 | MLDH 1400L□□ | ○ | | | ○ | 65 | 24 | ○ | | 34 | ○ | | 48 |
| 1,45 | MLDH 1450P | ○ | | 5,8 | MLDH 1450L□□ | ○ | | | ○ | | 25 | ○ | | 35 | ○ | | 49 |
| 1,50 | MLDH 1500P | ○ | | 6,0 | MLDH 1500L□□ | ○ | | 16 | ○ | | 26 | ○ | | 36 | ○ | | 51 |
| 1,55 | MLDH 1550P | ○ | | 6,2 | MLDH 1550L□□ | ○ | | | ○ | | | ○ | 80 | 37 | ○ | 95 | 53 |
| 1,60 | MLDH 1600P | ○ | | 6,4 | MLDH 1600L□□ | ○ | | | ○ | | 27 | ○ | | 38 | ○ | | 54 |
| 1,65 | MLDH 1650P | ○ | 50 | 6,6 | MLDH 1650L□□ | ○ | 60 | 18 | ○ | 70 | 28 | ○ | | 40 | ○ | | 56 |
| 1,70 | MLDH 1700P | ○ | | 6,8 | MLDH 1700L□□ | ○ | | | ○ | | 29 | ○ | | 41 | ○ | | 58 |
| 1,75 | MLDH 1750P | ○ | | 7,0 | MLDH 1750L□□ | ○ | | | ○ | | 30 | ○ | | 42 | ○ | 100 | 60 |
| 1,80 | MLDH 1800P | ○ | | 7,2 | MLDH 1800L□□ | ○ | | | ○ | | 31 | ○ | 85 | 43 | ○ | | 61 |
| 1,85 | MLDH 1850P | ○ | | 7,4 | MLDH 1850L□□ | ○ | | 20 | ○ | | | ○ | | 44 | ○ | | 63 |
| 1,90 | MLDH 1900P | ○ | | 7,6 | MLDH 1900L□□ | ○ | | | ○ | | 32 | ○ | | 46 | ○ | 103 | 65 |
| 1,95 | MLDH 1950P | ○ | | 7,8 | MLDH 1950L□□ | ○ | | | ○ | 75 | 33 | ○ | | 47 | ○ | | 66 |
| 2,00 | MLDH 2000P | ○ | | 8,0 | MLDH 2000L□□ | ○ | | | ○ | | 34 | ○ | 90 | 48 | ○ | | 68 |

Please indicate 5, 12, 20 or 30 in the □□ when ordering.
(Example: MLDH 1000L20)

PVD Coated Grade: ACF40B

○ = Stock item in Japan

# MDUS / MDSS Type




## ●Diameter ø0,03~0,19mm

| øD (mm) | Cat. No. | Stock | Dimensions $\ell_1$ | Dimensions $\ell_2$ | Fig. | Pcs./Packing |
|---|---|---|---|---|---|---|
| 0,030 | MDUS 0030-30C | ❍ | 0,3 | 28 | 1 | 5 |
| 0,035 | MDUS 0035-30C | | 0,4 | | | |
| 0,040 | MDUS 0040-30C | ❍ | | | | |
| 0,045 | MDUS 0045-30C | | 0,5 | | | |
| **0,050** | MDUS 0050-30C | ❍ | | | | |
| 0,055 | MDUS 0055-30C | | 0,6 | | | |
| 0,060 | MDUS 0060-30C | | | | | |
| 0,065 | MDUS 0065-30C | | 0,7 | | | |
| 0,070 | MDUS 0070-30C | | | | | |
| 0,075 | MDUS 0075-30C | | 0,8 | | | |
| 0,080 | MDUS 0080-30C | ❍ | | | | |
| 0,085 | MDUS 0085-30C | | 1,0 | | | |
| 0,090 | MDUS 0090-30C | | | | | |
| 0,095 | MDUS 0095-30C | | | | | |
| **0,100** | MDUS 0100-30C | ❍ | | | | |
| 0,110 | MDUS 0110-30C | | 1,2 | | | 1 |
| 0,120 | MDUS 0120-30C | ❍ | | | | |
| 0,120 | MDUS 0130-30C | | 1,5 | | | |
| 0,140 | MDUS 0140-30C | | | | | |
| 0,150 | MDUS 0150-30C | ❍ | | | | |
| 0,160 | MDUS 0160-30C | | 1,8 | | | |
| 0,170 | MDUS 0170-30C | | | | | |
| 0,180 | MDUS 0180-30C | ❍ | | | | |
| 0,190 | MDUS 0190-30C | | 1,9 | | | |

Grade: ACF40B



## ●Diameter ø0,20~0,59mm

| øD (mm) | Cat. No. | Stock | Dimensions $\ell_1$ | Dimensions $\ell_2$ | Fig. | Pcs./Packing |
|---|---|---|---|---|---|---|
| **0,20** | MDSS 0020 | ❍ | 2,5 | 28 | 2 | 1 |
| 0,21 | MDSS 0021 | ❍ | | | | |
| 0,22 | MDSS 0022 | ❍ | | | | |
| 0,23 | MDSS 0023 | ❍ | | | | |
| 0,24 | MDSS 0024 | ❍ | | | | |
| 0,25 | MDSS 0025 | ❍ | | | | |
| 0,26 | MDSS 0026 | ❍ | | | | |
| 0,27 | MDSS 0027 | ❍ | | | | |
| 0,28 | MDSS 0028 | ❍ | | | | |
| 0,29 | MDSS 0029 | ❍ | | | | |
| **0,30** | MDSS 0030 | ❍ | 3 | | | |
| 0,31 | MDSS 0031 | ❍ | | | | |
| 0,32 | MDSS 0032 | ❍ | | | | |
| 0,33 | MDSS 0033 | ❍ | | | | |
| 0,34 | MDSS 0034 | ❍ | | | | |
| 0,35 | MDSS 0035 | ❍ | 4 | | 3 | |
| 0,36 | MDSS 0036 | ❍ | | | | |
| 0,37 | MDSS 0037 | ❍ | | | | |
| 0,38 | MDSS 0038 | ❍ | | | | |
| 0,39 | MDSS 0039 | ❍ | | | | |
| **0,40** | MDSS 0040 | ❍ | 5 | | | |
| 0,41 | MDSS 0041 | ❍ | | | | |
| 0,42 | MDSS 0042 | ❍ | | | | |
| 0,43 | MDSS 0043 | ❍ | | | | |
| 0,44 | MDSS 0044 | ❍ | | | | |
| 0,45 | MDSS 0045 | ❍ | | | | |
| 0,46 | MDSS 0046 | ❍ | | | | |
| 0,47 | MDSS 0047 | ❍ | | | | |
| 0,48 | MDSS 0048 | ❍ | | | | |
| 0,49 | MDSS 0049 | ❍ | | | | |
| **0,50** | MDSS 0050 | ❍ | 6 | 27 | | |
| 0,51 | MDSS 0051 | ❍ | | | | |
| 0,52 | MDSS 0052 | ❍ | | | | |
| 0,53 | MDSS 0053 | ❍ | | | | |
| 0,54 | MDSS 0054 | ❍ | | | | |
| 0,55 | MDSS 0055 | ❍ | | | | |
| 0,56 | MDSS 0056 | ❍ | | | | |
| 0,57 | MDSS 0057 | ❍ | | | | |
| 0,58 | MDSS 0058 | ❍ | | | | |
| 0,59 | MDSS 0059 | ❍ | | | | |

## ●Diameter ø0,60~1,00mm

| øD (mm) | Cat. No. | Stock | Dimensions $\ell_1$ | Dimensions $\ell_2$ | Fig. | Pcs./Packing |
|---|---|---|---|---|---|---|
| **0,60** | MDSS 0060 | ❍ | 7 | 26 | 3 | 1 |
| 0,61 | MDSS 0061 | ❍ | | | | |
| 0,62 | MDSS 0062 | ❍ | | | | |
| 0,63 | MDSS 0063 | ❍ | | | | |
| 0,64 | MDSS 0064 | ❍ | | | | |
| 0,65 | MDSS 0065 | ❍ | | | | |
| 0,66 | MDSS 0066 | ❍ | | | | |
| 0,67 | MDSS 0067 | ❍ | | | | |
| 0,68 | MDSS 0068 | ❍ | | | | |
| 0,69 | MDSS 0069 | ❍ | | | | |
| **0,70** | MDSS 0070 | ❍ | 9 | 24 | | |
| 0,71 | MDSS 0071 | ❍ | | | | |
| 0,72 | MDSS 0072 | ❍ | | | | |
| 0,73 | MDSS 0073 | ❍ | | | | |
| 0,74 | MDSS 0074 | ❍ | | | | |
| 0,75 | MDSS 0075 | ❍ | | | | |
| 0,76 | MDSS 0076 | ❍ | | | | |
| 0,77 | MDSS 0077 | ❍ | | | | |
| 0,78 | MDSS 0078 | ❍ | | | | |
| 0,79 | MDSS 0079 | ❍ | | | | |
| **0,80** | MDSS 0080 | ❍ | 10 | 23 | | |
| 0,81 | MDSS 0081 | ❍ | | | | |
| 0,82 | MDSS 0082 | ❍ | | | | |
| 0,83 | MDSS 0083 | ❍ | | | | |
| 0,84 | MDSS 0084 | ❍ | | | | |
| 0,85 | MDSS 0085 | ❍ | | | | |
| 0,86 | MDSS 0086 | ❍ | | | | |
| 0,87 | MDSS 0087 | ❍ | | | | |
| 0,88 | MDSS 0088 | ❍ | | | | |
| 0,89 | MDSS 0089 | ❍ | | | | |
| **0,90** | MDSS 0090 | ❍ | 11 | 22 | | |
| 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

## ■ MDSS Recommended Cutting Conditions (Wet)

| Work / Cond. / Drill-ø (mm) | Alloy Steel, Pre-hardened Steel: Spindle (rpm) | Feed rate (mm/min) | Step-feed (mm) | Die Steel, Tempered Steel ($H_RC30$~40): Spindle (rpm) | Feed rate (mm/min) | Step-feed (mm) | Stainless Steel: Spindle (rpm) | Feed rate (mm/min) | Step-feed (mm) |
|---|---|---|---|---|---|---|---|---|---|
| 0,2 | 26500 | 50 | 0,1D | 21200 | 40 | 0,1D | 10600 | 20 | 0,1D |
| 0,3 | 26500 | 80 | | 21200 | 60 | | 10600 | 30 | |
| 0,4 | 25900 | 100 | | 19900 | 80 | | 9500 | 40 | |
| 0,5 | 25500 | 150 | | 19100 | 110 | | 9500 | 50 | |
| 1,0 | 15900 | 240 | 0,2D~0,5D※ | 12700 | 190 | 0,2D~0,5D※ | 5600 | 80 | |

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.





❍ = Stock item in Japan

# SUMIDIA Coated Drills
# SDC Type



## General Features

SUMIDIA Coated SDC type drills for Carbon Fibre Reinforced Plastic (CFRP) employ Sumitomo Electric Hardmetal's proprietary multi-step point angle.
Combined with a diamond coating, this technology improves the quality of machined surfaces and extends tool life.

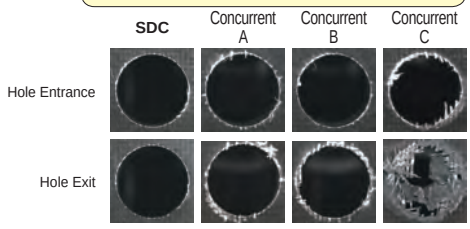
## Characteristics and Applications

- Excellent drilled-hole quality
  - Sharp cutting edge shape reduces delamination of fibre layers and burrs.
  - Continuously changing point angle disperses load placed on cutting edge and prevents breakage.
- Long tool life
  - Use of high-strength diamond coating with excellent adhesion delivers high quality and long tool life.

## Performance

### Comparison of Machined Surface Finish

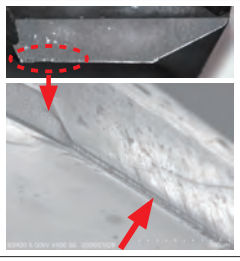
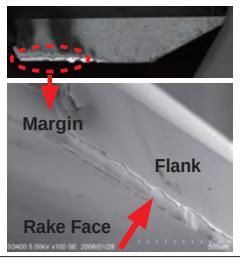
Excellent Machined Face Quality
(Prevents Delamination And Burrs)



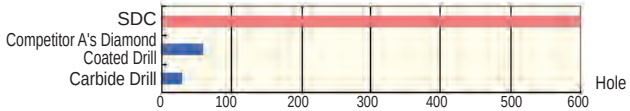

Tool: SUMIDIA coated drill SDC type, øD=6,375
Competitor A B C´s drill øD=6,35 & øD=6,5
Work Material: CFRP
Cutting Conditions: n = 6.000rpm, f=0,1mm/rev, $d_{oc}$ =28mm (Through)
Dry

### Tool Life Comparison

Effects of Diamond Coating

| SDC type (After drilling 600 holes) | Competitor's product (After drilling 50 holes) |
|---|---|
|  |   |
| No delamination Low flank wear | More delamination from cutting edge to flank |

Stable diamond layer adhesion prevents delamination.
Excellent wear resistance enables high-quality drilling with long tool life.




Tool: SUMIDIA coated drill SDC type, øD=6,375
Competitor A B C´s drill øD=6,35 & øD=6,5
Work Material: CFRP
Cutting Conditions: n = 6.000rpm, f=0,1mm/rev, $d_{oc}$ =28mm (Through)
Dry

## Series

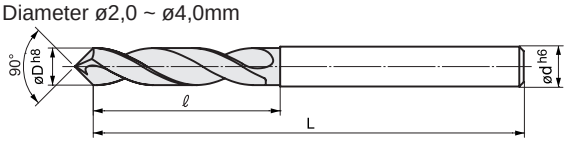
| Type | Diameter Range (mm) | Point angle | Hole Depth ($^{L}/_{D}$) |
|---|---|---|---|
| MDS□□□□□**SDC**3 | ø2,0 ~ ø4,0 | 90° | ~ 3 |
| | ø4,851 ~ ø10,0 | 130° | |

DCX20 Grade
SUMI-DIA Coating

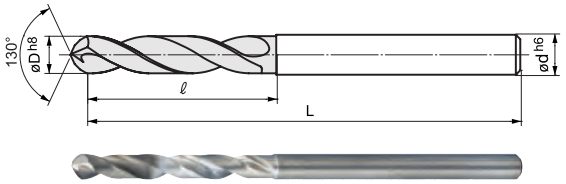
| Structal Steel | Carbon Steel | Alloy Steel | Pre-hardened Steel | Tempered Die Steel | Hardened Steel 45~55 HRC | Hardened Steel 55~60 HRC | Hardened Steel 60~65 HRC | Stainless Steel | Ti Alloy / Heat Resistant Alloy | Cast iron | Al Alloy | Cu Alloy | CFRP * |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | ○ | | ◎ |

* CFRP (Carbon Fibre Reinforced Plastic)

● Diameter ø2,0 ~ ø4,0mm




● Diameter ø4,851 ~ ø10,0mm




## ●Diameter ø2,0~10,0mm

(mm)

| Dimensions øD (mm) | Dimensions ød (mm) | Cat. No. | 3D Type Stock | 3D Type Dimensions L | 3D Type Dimensions ℓ |
|---|---|---|---|---|---|
| **2,0** | 3,0 | **MDS 02000SDC3** | ○ | 49 | 12,5 |
| 2,489 | | **02489SDC3** | ○ | | 15,0 |
| **3,0** | | **03000SDC3** | ○ | | 17,5 |
| 3,3 | 3,3 | **MDS 03300SDC3** | ○ | 60 | 20,0 |
| **4,0** | 4,0 | **04000SDC3** | ○ | | 22,5 |
| 4,851 | 4,851 | **MDS 04851SDC3** | ○ | 76 | 27,5 |
| **5,0** | 5,0 | **05000SDC3** | ○ | | |
| **5,6** | 5,6 | **MDS 05600SDC3** | ○ | 81 | 30,0 |
| **6,0** | 6,0 | **06000SDC3** | ○ | | |
| 6,375 | 6,375 | **MDS 06375SDC3** | ○ | 83 | 32,5 |
| **7,0** | 7,0 | **07000SDC3** | ○ | | 35,0 |
| 7,938 | 7,938 | **MDS 07938SDC3** | ○ | 90 | 40,0 |
| **8,0** | 8,0 | **08000SDC3** | ○ | | |
| **9,0** | 9,0 | **MDS 09000SDC3** | ○ | 98 | 45,0 |
| 9,550 | 9,550 | **MDS 09550SDC3** | ○ | 105 | 50,0 |
| **10,0** | 10,0 | **10000SDC3** | ○ | | |

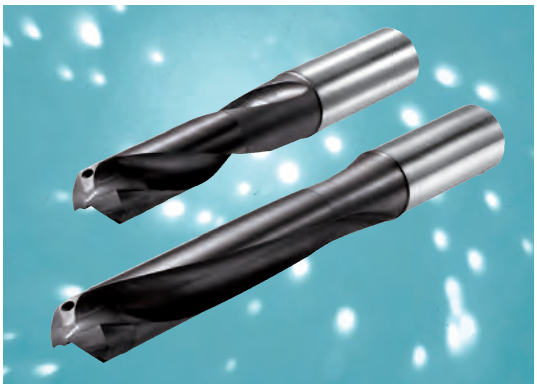
## Recommended Cutting Conditions

| øD | Cond. / Work | CFRP Only (Dry Machining) | Stacked Plates of CFRP, Aluminium Alloys (Dry Machining) |
|---|---|---|---|
| ~ ø 6,0 | $v_c$ | 80 - **120** - 150 | 40 - **60** - 80 |
| | f | 0,05 - **0,08** - 0,10 | 0,05 - **0,05** - 0,10 |
| ~ ø10,0 | $v_c$ | 80 - **100** - 120 | 40 - **60** - 80 |
| | f | 0,05 - **0,08** - 0,10 | 0,05 - **0,05** - 0,10 |

( $v_c$ : Cutting Speed (m/min), f : Feed rate (mm/rev), Min - **Optimum** - Max )

○ = Stock item in Japan

# KDS Type



## Description

The new AK type drill features an extra long carbide drill head, new cutting geometry, coolant holes and ultra hard TiAlN coating for reliable high productivity drilling.

## Advantages

- General purpose drill for steels, stainless steels, cast irons
- High productivity drilling even on deep holes up to 7 x D
- Twice the tool life of conventionally coated drills
- Self centering
- Surface finish and tolerances comparable to solid carbide
- Regrindable extra long carbide head halves drill replacement costs



## Series

| Type | Diameter range (mm) | Hole depth (L/D) | Remark |
|---|---|---|---|
| Short type (MAK Type) | ø9,5~ø40,5 | ~ 3 | First choice general purpose drill |
| Long type (LAK Type) | ø9,5~ø40,5 | ~ 5 | |
| Extra long type (DAK Type) | ø9,5~ø40,5 | ~ 7 | Helix angle: 25° ---> 0° |

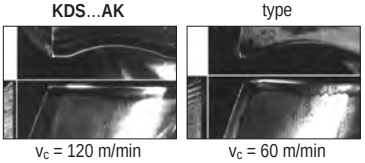
Series

## Performance

**● High efficiency drilling**

Comparison of coating damage when high speed drilling

TiAlN coated **KDS...AK** | TiN coated type



$v_c$ = 120 m/min | $v_c$ = 60 m/min

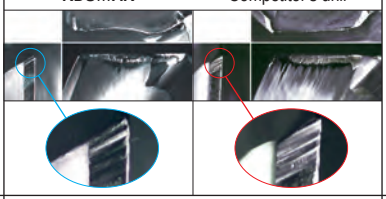
After 30 m cut length (600 holes)

Drill dia.: 18,0 mm
Work material: C50 (HB230)
f = 0,3 mm/rev
$d_{oc}$ = 50 mm

**● Optimized drill geometry**

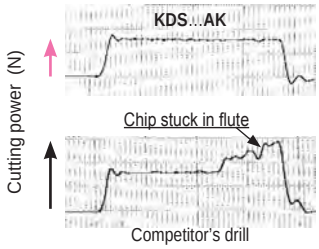
Comparison of damage to drill margin After 40 min. cut length

**KDS...AK** | Competitor's drill



Drill dia.: 18,0 mm
Work material: C50 (HB230)
$v_c$ = 50 m/min
f = 0,25 mm/rev
$d_{oc}$ = 38 mm

**● Comparison of cutting power (chip removal capability)**



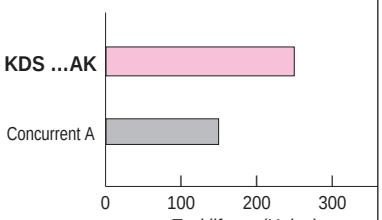

Drill dia.: 18,0 mm
Work material: C50 (HB230)
$v_c$ = 50 m/min
f = 0,3 mm/rev
$d_{oc}$ = 90 mm (L/D=5)

## Application examples

**● Workpiece material**

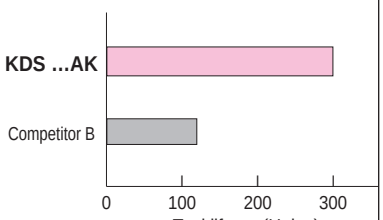
- General steel and alloy steel
- Low carbon steel
- Die steel
- Stainless steel
- Ductile cast iron
- Grey cast iron

**● Automotive parts**
Work material: C50 (HB250)




Drill: KDS 180 LAK (ø18,0mm)
Conditions: $v_c$ = 55 m/min, f = 0,25 mm/rev
$d_{oc}$ = 70 mm

**● Automotive parts**
Work material: 42CrMo4 (HB250)



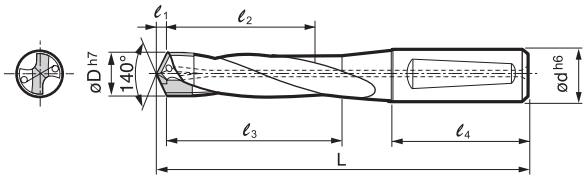

Drill: KDS 250 MAK (ø25,0mm)
Conditions: $v_c$ = 60 m/min, f = 0,25 mm/rev
$d_{oc}$ = 65 mm

# KDS ... MAK Type

## Short Type ( 3 x D )

Brazed Carbide Drills with Coolant Holes






Helix angle: 20°
$\ell_2$ = Effective drilling length

### ●Diameter ø9,5~15,5mm

| Dimensions (mm) | | | | Cat. No. | Short Series (3D) | | | |
|---|---|---|---|---|---|---|---|---|
| øD (mm) | Shank | | Drill Head | | Stock | Dimensions (mm) | | |
| | ød | $\ell_4$ | $\ell_1$ | | MAK | L | $\ell_2$ | $\ell_3$ |
| 9,5~ | | | | **KDS 095 MAK** | | | | |
| 10,0 | 16 | 48 | 1,8 | **KDS 100 MAK** | | 96,8 | 32 | 37 |
| ~10,5 | | | | **KDS 105 MAK** | | | | |
| 10,6~ | | | | **KDS 106 MAK** | | | | |
| 11,0 | 16 | 48 | 2 | **KDS 110 MAK** | | 102,0 | 35 | 40 |
| ~11,5 | | | | **KDS 115 MAK** | | | | |
| 11,6 | | | | **KDS 116 MAK** | | | | |
| 11,7 | | | | **KDS 117 MAK** | | | | |
| 11,8 | | | | **KDS 118 MAK** | | | | |
| 11,9 | | | | **KDS 119 MAK** | | | | |
| **12,0** | 16 | 48 | 2,2 | **KDS 120 MAK** | ● | 107,2 | 38 | 44 |
| 12,1 | | | | **KDS 121 MAK** | | | | |
| 12,2 | | | | **KDS 122 MAK** | | | | |
| 12,3 | | | | **KDS 123 MAK** | | | | |
| 12,4 | | | | **KDS 124 MAK** | | | | |
| 12,5 | | | | **KDS 125 MAK** | ● | | | |
| 12,6 | | | | **KDS 126 MAK** | | | | |
| 12,7 | | | | **KDS 127 MAK** | | | | |
| 12,8 | | | | **KDS 128 MAK** | | | | |
| 12,9 | | | | **KDS 129 MAK** | | | | |
| **13,0** | 16 | 48 | 2,4 | **KDS 130 MAK** | ● | 112,4 | 41 | 47 |
| 13,1 | | | | **KDS 131 MAK** | | | | |
| 13,2 | | | | **KDS 132 MAK** | | | | |
| 13,3 | | | | **KDS 133 MAK** | | | | |
| 13,4 | | | | **KDS 134 MAK** | | | | |
| 13,5 | | | | **KDS 135 MAK** | ● | | | |
| 13,6 | | | | **KDS 136 MAK** | | | | |
| 13,7 | | | | **KDS 137 MAK** | ● | | | |
| 13,8 | | | | **KDS 138 MAK** | | | | |
| 13,9 | | | | **KDS 139 MAK** | | | | |
| **14,0** | 16 | 48 | 2,5 | **KDS 140 MAK** | ● | 117,5 | 44 | 51 |
| 14,1 | | | | **KDS 141 MAK** | | | | |
| 14,2 | | | | **KDS 142 MAK** | | | | |
| 14,3 | | | | **KDS 143 MAK** | | | | |
| 14,4 | | | | **KDS 144 MAK** | | | | |
| 14,5 | | | | **KDS 145 MAK** | ● | | | |
| 14,6 | | | | **KDS 146 MAK** | ● | | | |
| 14,7 | | | | **KDS 147 MAK** | | | | |
| 14,8 | | | | **KDS 148 MAK** | | | | |
| 14,9 | | | | **KDS 149 MAK** | | | | |
| **15,0** | 20 | 50 | 2,7 | **KDS 150 MAK** | ● | 127,7 | 47 | 54 |
| 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 | | Stock | Dimensions (mm) | | |
| | ød | $\ell_4$ | $\ell_1$ | | MAK | L | $\ell_2$ | $\ell_3$ |
| 15,6 | | | | **KDS 156 MAK** | | | | |
| 15,7 | | | | **KDS 157 MAK** | | | | |
| 15,8 | | | | **KDS 158 MAK** | | | | |
| 15,9 | | | | **KDS 159 MAK** | | | | |
| **16,0** | 20 | 50 | 2,9 | **KDS 160 MAK** | ● | 132,9 | 50 | 58 |
| 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** | | | | |
| 16,7 | | | | **KDS 167 MAK** | | | | |
| 16,8 | | | | **KDS 168 MAK** | | | | |
| 16,9 | | | | **KDS 169 MAK** | | | | |
| **17,0** | 20 | 50 | 3,1 | **KDS 170 MAK** | ● | 138,1 | 53 | 61 |
| 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** | | | | |
| 17,7 | | | | **KDS 177 MAK** | ● | | | |
| 17,8 | | | | **KDS 178 MAK** | | | | |
| 17,9 | | | | **KDS 179 MAK** | | | | |
| **18,0** | 20 | 50 | 3,3 | **KDS 180 MAK** | ● | 143,3 | 56 | 65 |
| 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** | | | | |
| 18,7 | | | | **KDS 187 MAK** | ● | | | |
| 18,8 | | | | **KDS 188 MAK** | | | | |
| 18,9 | | | | **KDS 189 MAK** | | | | |
| **19,0** | 25 | 56 | 3,5 | **KDS 190 MAK** | ● | 158,5 | 59 | 68 |
| 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** | | | | |
| 19,7 | | | | **KDS 197 MAK** | | | | |
| 19,8 | 25 | 56 | 3,6 | **KDS 198 MAK** | | 158,6 | 62 | 72 |
| 19,9 | | | | **KDS 199 MAK** | | | | |
| **20,0** | | | | **KDS 200 MAK** | ● | | | |

● = Euro stock

## ■ 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) | Hardened Steels (HRC45) | Stainless Steels (< HB200) | 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.

# 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 ø20,1~24,5mm

| Dimensions (mm) | | | | Cat. No. | Short Series (3D) | | | |
|---|---|---|---|---|---|---|---|---|
| øD (mm) | Shank | | Drill Head | | Stock | Dimensions (mm) | | |
| | ød | $\ell_4$ | $\ell_1$ | | MAK | L | $\ell_2$ | $\ell_3$ |
| 20,1 | 25 | 56 | 3,6 | KDS 201 MAK | | 158,6 | 62 | 72 |
| 20,2 | | | | KDS 202 MAK | | | | |
| 20,3 | | | | KDS 203 MAK | | | | |
| 20,4 | | | | KDS 204 MAK | | | | |
| 20,5 | | | | KDS 205 MAK | ● | | | |
| 20,6 | 25 | 56 | 3,8 | KDS 206 MAK | | 158,8 | 65 | 75 |
| 20,7 | | | | KDS 207 MAK | | | | |
| 20,8 | | | | KDS 208 MAK | | | | |
| 20,9 | | | | KDS 209 MAK | | | | |
| **21,0** | | | | KDS 210 MAK | ● | | | |
| 21,1 | | | | KDS 211 MAK | | | | |
| 21,2 | | | | KDS 212 MAK | | | | |
| 21,3 | | | | KDS 213 MAK | | | | |
| 21,4 | | | | KDS 214 MAK | | | | |
| 21,5 | | | | KDS 215 MAK | ● | | | |
| 21,6 | 25 | 56 | 4,0 | KDS 216 MAK | | 164,0 | 68 | 79 |
| 21,7 | | | | KDS 217 MAK | | | | |
| 21,8 | | | | KDS 218 MAK | | | | |
| 21,9 | | | | KDS 219 MAK | | | | |
| **22,0** | | | | KDS 220 MAK | ● | | | |
| 22,1 | | | | KDS 221 MAK | | | | |
| 22,2 | | | | KDS 222 MAK | | | | |
| 22,3 | | | | KDS 223 MAK | | | | |
| 22,4 | | | | KDS 224 MAK | | | | |
| 22,5 | | | | KDS 225 MAK | ● | | | |
| 22,6 | 25 | 56 | 4,2 | KDS 226 MAK | | 164,2 | 71 | 82 |
| 22,7 | | | | KDS 227 MAK | | | | |
| 22,8 | | | | KDS 228 MAK | | | | |
| 22,9 | | | | KDS 229 MAK | | | | |
| **23,0** | | | | KDS 230 MAK | ● | | | |
| 23,1 | | | | KDS 231 MAK | | | | |
| 23,2 | | | | KDS 232 MAK | | | | |
| 23,3 | | | | KDS 233 MAK | | | | |
| 23,4 | | | | KDS 234 MAK | | | | |
| 23,5 | | | | KDS 235 MAK | | | | |
| 23,6 | 32 | 60 | 4,4 | KDS 236 MAK | | 174,4 | 74 | 86 |
| 23,7 | | | | KDS 237 MAK | | | | |
| 23,8 | | | | KDS 238 MAK | | | | |
| 23,9 | | | | KDS 239 MAK | | | | |
| **24,0** | | | | KDS 240 MAK | ● | | | |
| 24,1 | | | | KDS 241 MAK | | | | |
| 24,2 | | | | KDS 242 MAK | | | | |
| 24,3 | | | | KDS 243 MAK | | | | |
| 24,4 | | | | KDS 244 MAK | | | | |
| 24,5 | | | | KDS 245 MAK | ● | | | |

## ●Diameter ø24,6~40,5mm

| Dimensions (mm) | | | | Cat. No. | Short Series (3D) | | | |
|---|---|---|---|---|---|---|---|---|
| øD (mm) | Shank | | Drill Head | | Stock | Dimensions (mm) | | |
| | ød | $\ell_4$ | $\ell_1$ | | MAK | L | $\ell_2$ | $\ell_3$ |
| 24,6 | 32 | 60 | 4,5 | KDS 246 MAK | | 174,5 | 76 | 88 |
| 24,7 | | | | KDS 247 MAK | | | | |
| 24,8 | | | | KDS 248 MAK | | | | |
| 24,9 | | | | KDS 249 MAK | | | | |
| **25,0** | | | | KDS 250 MAK | ● | | | |
| 25,1 | | | | KDS 251 MAK | | | | |
| 25,2 | | | | KDS 252 MAK | | | | |
| 25,3 | | | | KDS 253 MAK | | | | |
| 25,4 | | | | KDS 254 MAK | | | | |
| 25,5 | | | | KDS 255 MAK | | | | |
| 25,6 | 32 | 60 | 4,7 | KDS 256 MAK | | 179,7 | 79 | 92 |
| 25,7 | | | | KDS 257 MAK | | | | |
| 25,8 | | | | KDS 258 MAK | | | | |
| 25,9 | | | | KDS 259 MAK | | | | |
| **26,0** | | | | KDS 260 MAK | ● | | | |
| 26,1 | | | | KDS 261 MAK | | | | |
| ~26,5 | | | | ~265 MAK | | | | |
| 26,6 | 32 | 60 | 4,9 | KDS 266 MAK | | 179,9 | 81 | 94 |
| ~27,5 | | | | ~275 MAK | | | | |
| 27,6 | 32 | 60 | 5,1 | KDS 276 MAK | | 185,1 | 83 | 97 |
| ~28,5 | | | | ~285 MAK | | | | |
| 28,6 | 32 | 60 | 5,3 | KDS 285 MAK | | 190,3 | 86 | 100 |
| ~29,5 | | | | ~295 MAK | | | | |
| 29,6 | 32 | 60 | 5,5 | KDS 296 MAK | | 190,5 | 89 | 104 |
| ~30,5 | | | | ~305 MAK | | | | |
| 30,6 | 40 | 70 | 5,6 | KDS 306 MAK | | 210,6 | 95 | 112 |
| ~31,5 | | | | ~315 MAK | | | | |
| 31,6 | 40 | 70 | 5,8 | KDS 316 MAK | | 215,8 | 98 | 115 |
| ~32,5 | | | | ~325 MAK | | | | |
| 32,6 | 40 | 70 | 6,0 | KDS 326 MAK | | 221,0 | 101 | 119 |
| ~33,5 | | | | ~335 MAK | | | | |
| 33,6 | 40 | 70 | 6,2 | KDS 336 MAK | | 226,2 | 104 | 122 |
| ~34,5 | | | | ~345 MAK | | | | |
| 34,6 | 40 | 70 | 6,4 | KDS 346 MAK | | 231,4 | 107 | 125 |
| ~35,5 | | | | ~355 MAK | | | | |
| 35,6 | 40 | 70 | 6,6 | KDS 356 MAK | | 231,6 | 110 | 128 |
| ~36,5 | | | | ~365 MAK | | | | |
| 36,6 | 40 | 70 | 6,7 | KDS 366 MAK | | 236,7 | 113 | 132 |
| ~37,5 | | | | ~375 MAK | | | | |
| 37,6 | 40 | 70 | 6,9 | KDS 376 MAK | | 241,9 | 116 | 163 |
| ~38,5 | | | | ~385 MAK | | | | |
| 38,6 | 40 | 70 | 7,1 | KDS 386 MAK | | 247,1 | 119 | 168 |
| ~39,5 | | | | ~395 MAK | | | | |
| 39,6 | 40 | 70 | 7,3 | KDS 396 MAK | | 252,3 | 122 | 173 |
| ~40,5 | | | | ~405 MAK | | | | |

● = Euro stock

## ■ 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 M AK ,** ACW30 (Grade)

**KDS series**: Brazed carbide drill with coolant holes

Drill diameter **10,2** mm

**M** : 3 x D

**AK**: Brazed carbide and TiAlN coated drill

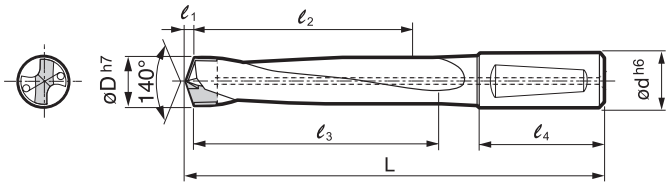


# KDS ... LAK Type

## Long Type ( 5 x D )

Brazed Carbide Drills with Coolant Holes






Helix angle: 20° ---> 6°
$\ell_2$ = Effective drilling length

### ●Diameter ø9,5~15,5mm

| Dimensions (mm) | | | | Cat. No. | Long Series (5D) | | | |
|---|---|---|---|---|---|---|---|---|
| øD (mm) | Shank | | Drill Head | | Stock | Dimensions (mm) | | |
| | ød | $\ell_4$ | $\ell_1$ | | LAK | L | $\ell_2$ | $\ell_3$ |
| 9,5~ | | | | KDS 095 LAK | | | | |
| 10,0 | 16 | 48 | 1,8 | KDS 100 LAK | | 116,8 | 52 | 57 |
| ~10,5 | | | | KDS 105 LAK | | | | |
| 10,6~ | | | | KDS 106 LAK | | | | |
| 11,0 | 16 | 48 | 2 | KDS 110 LAK | | 127,0 | 57 | 63 |
| ~11,5 | | | | KDS 115 LAK | | | | |
| 11,6 | | | | KDS 116 LAK | | | | |
| 11,7 | | | | KDS 117 LAK | | | | |
| 11,8 | | | | KDS 118 LAK | | | | |
| 11,9 | | | | KDS 119 LAK | | | | |
| **12,0** | 16 | 48 | 2,2 | KDS 120 LAK | | 132,2 | 63 | 69 |
| 12,1 | | | | KDS 121 LAK | | | | |
| 12,2 | | | | KDS 122 LAK | | | | |
| 12,3 | | | | KDS 123 LAK | | | | |
| 12,4 | | | | KDS 124 LAK | | | | |
| 12,5 | | | | KDS 125 LAK | | | | |
| 12,6 | | | | KDS 126 LAK | | | | |
| 12,7 | | | | KDS 127 LAK | | | | |
| 12,8 | | | | KDS 128 LAK | | | | |
| 12,9 | | | | KDS 129 LAK | | | | |
| **13,0** | 16 | 48 | 2,4 | KDS 130 LAK | | 142,4 | 67 | 74 |
| 13,1 | | | | KDS 131 LAK | | | | |
| 13,2 | | | | KDS 132 LAK | | | | |
| 13,3 | | | | KDS 133 LAK | | | | |
| 13,4 | | | | KDS 134 LAK | | | | |
| 13,5 | | | | KDS 135 LAK | | | | |
| 13,6 | | | | KDS 136 LAK | | | | |
| 13,7 | | | | KDS 137 LAK | | | | |
| 13,8 | | | | KDS 138 LAK | | | | |
| 13,9 | | | | KDS 139 LAK | | | | |
| **14,0** | 16 | 48 | 2,5 | KDS 140 LAK | | 147,5 | 73 | 80 |
| 14,1 | | | | KDS 141 LAK | | | | |
| 14,2 | | | | KDS 142 LAK | | | | |
| 14,3 | | | | KDS 143 LAK | | | | |
| 14,4 | | | | KDS 144 LAK | | | | |
| 14,5 | | | | KDS 145 LAK | | | | |
| 14,6 | | | | KDS 146 LAK | | | | |
| 14,7 | | | | KDS 147 LAK | | | | |
| 14,8 | | | | KDS 148 LAK | | | | |
| 14,9 | | | | KDS 149 LAK | | | | |
| **15,0** | 20 | 50 | 2,7 | KDS 150 LAK | | 157,7 | 77 | 85 |
| 15,1 | | | | KDS 151 LAK | | | | |
| 15,2 | | | | KDS 152 LAK | | | | |
| 15,3 | | | | KDS 153 LAK | | | | |
| 15,4 | | | | KDS 154 LAK | | | | |
| 15,5 | | | | KDS 155 LAK | | | | |

### ●Diameter ø15,6~20,0mm

| Dimensions (mm) | | | | Cat. No. | Long Series (5D) | | | |
|---|---|---|---|---|---|---|---|---|
| øD (mm) | Shank | | Drill Head | | Stock | Dimensions (mm) | | |
| | ød | $\ell_4$ | $\ell_1$ | | LAK | L | $\ell_2$ | $\ell_3$ |
| 15,6 | | | | KDS 156 LAK | | | | |
| 15,7 | | | | KDS 157 LAK | | | | |
| 15,8 | | | | KDS 158 LAK | | | | |
| 15,9 | | | | KDS 159 LAK | | | | |
| **16,0** | 20 | 50 | 2,9 | KDS 160 LAK | | 167,9 | 83 | 91 |
| 16,1 | | | | KDS 161 LAK | | | | |
| 16,2 | | | | KDS 162 LAK | | | | |
| 16,3 | | | | KDS 163 LAK | | | | |
| 16,4 | | | | KDS 164 LAK | | | | |
| 16,5 | | | | KDS 165 LAK | | | | |
| 16,6 | | | | KDS 166 LAK | | | | |
| 16,7 | | | | KDS 167 LAK | | | | |
| 16,8 | | | | KDS 168 LAK | | | | |
| 16,9 | | | | KDS 169 LAK | | | | |
| **17,0** | 20 | 50 | 3,1 | KDS 170 LAK | | 173,1 | 87 | 96 |
| 17,1 | | | | KDS 171 LAK | | | | |
| 17,2 | | | | KDS 172 LAK | | | | |
| 17,3 | | | | KDS 173 LAK | | | | |
| 17,4 | | | | KDS 174 LAK | | | | |
| 17,5 | | | | KDS 175 LAK | | | | |
| 17,6 | | | | KDS 176 LAK | | | | |
| 17,7 | | | | KDS 177 LAK | | | | |
| 17,8 | | | | KDS 178 LAK | | | | |
| 17,9 | | | | KDS 179 LAK | | | | |
| **18,0** | 20 | 50 | 3,3 | KDS 180 LAK | | 178,3 | 93 | 102 |
| 18,1 | | | | KDS 181 LAK | | | | |
| 18,2 | | | | KDS 182 LAK | | | | |
| 18,3 | | | | KDS 183 LAK | | | | |
| 18,4 | | | | KDS 184 LAK | | | | |
| 18,5 | | | | KDS 185 LAK | | | | |
| 18,6 | | | | KDS 186 LAK | | | | |
| 18,7 | | | | KDS 187 LAK | | | | |
| 18,8 | | | | KDS 188 LAK | | | | |
| 18,9 | | | | KDS 189 LAK | | | | |
| **19,0** | 25 | 56 | 3,5 | KDS 190 LAK | | 193,5 | 97 | 107 |
| 19,1 | | | | KDS 191 LAK | | | | |
| 19,2 | | | | KDS 192 LAK | | | | |
| 19,3 | | | | KDS 193 LAK | | | | |
| 19,4 | | | | KDS 194 LAK | | | | |
| 19,5 | | | | KDS 195 LAK | | | | |
| 19,6 | | | | KDS 196 LAK | | | | |
| 19,7 | | | | KDS 197 LAK | | | | |
| 19,8 | 25 | 56 | 3,6 | KDS 198 LAK | | 198,6 | 103 | 113 |
| 19,9 | | | | KDS 199 LAK | | | | |
| **20,0** | | | | KDS 200 LAK | | | | |

● = Euro stock

## ■ 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) | Hardened Steels (HRC45) | Stainless Steels ( < HB200) | 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.

# 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 ø20,1~24,5mm

| Dimensions (mm) | | | | Cat. No. | Long Series (5D) | | | |
|---|---|---|---|---|---|---|---|---|
| øD (mm) | Shank | | Drill Head | | Stock | Dimensions (mm) | | |
| | ød | $\ell_4$ | $\ell_1$ | | LAK | L | $\ell_2$ | $\ell_3$ |
| 20,1 | 25 | 56 | 3,6 | KDS 201 LAK | | 198,6 | 103 | 113 |
| 20,2 | | | | KDS 202 LAK | | | | |
| 20,3 | | | | KDS 203 LAK | | | | |
| 20,4 | | | | KDS 204 LAK | | | | |
| 20,5 | | | | KDS 205 LAK | | | | |
| 20,6 | 25 | 56 | 3,8 | KDS 206 LAK | | 198,8 | 107 | 118 |
| 20,7 | | | | KDS 207 LAK | | | | |
| 20,8 | | | | KDS 208 LAK | | | | |
| 20,9 | | | | KDS 209 LAK | | | | |
| **21,0** | | | | KDS 210 LAK | | | | |
| 21,1 | | | | KDS 211 LAK | | | | |
| 21,2 | | | | KDS 212 LAK | | | | |
| 21,3 | | | | KDS 213 LAK | | | | |
| 21,4 | | | | KDS 214 LAK | | | | |
| 21,5 | | | | KDS 215 LAK | | | | |
| 21,6 | 25 | 56 | 4,0 | KDS 216 LAK | | 204,0 | 113 | 124 |
| 21,7 | | | | KDS 217 LAK | | | | |
| 21,8 | | | | KDS 218 LAK | | | | |
| 21,9 | | | | KDS 219 LAK | | | | |
| **22,0** | | | | KDS 220 LAK | | | | |
| 22,1 | | | | KDS 221 LAK | | | | |
| 22,2 | | | | KDS 222 LAK | | | | |
| 22,3 | | | | KDS 223 LAK | | | | |
| 22,4 | | | | KDS 224 LAK | | | | |
| 22,5 | | | | KDS 225 LAK | | | | |
| 22,6 | 25 | 56 | 4,2 | KDS 226 LAK | | 214,2 | 117 | 129 |
| 22,7 | | | | KDS 227 LAK | | | | |
| 22,8 | | | | KDS 228 LAK | | | | |
| 22,9 | | | | KDS 229 LAK | | | | |
| **23,0** | | | | KDS 230 LAK | | | | |
| 23,1 | | | | KDS 231 LAK | | | | |
| 23,2 | | | | KDS 232 LAK | | | | |
| 23,3 | | | | KDS 233 LAK | | | | |
| 23,4 | | | | KDS 234 LAK | | | | |
| 23,5 | | | | KDS 235 LAK | | | | |
| 23,6 | 32 | 60 | 4,4 | KDS 236 LAK | | 224,4 | 123 | 135 |
| 23,7 | | | | KDS 237 LAK | | | | |
| 23,8 | | | | KDS 238 LAK | | | | |
| 23,9 | | | | KDS 239 LAK | | | | |
| **24,0** | | | | KDS 240 LAK | | | | |
| 24,1 | | | | KDS 241 LAK | | | | |
| 24,2 | | | | KDS 242 LAK | | | | |
| 24,3 | | | | KDS 243 LAK | | | | |
| 24,4 | | | | KDS 244 LAK | | | | |
| 24,5 | | | | KDS 245 LAK | | | | |

## ●Diameter ø24,6~40,5mm

| Dimensions (mm) | | | | Cat. No. | Long Series (5D) | | | |
|---|---|---|---|---|---|---|---|---|
| øD (mm) | Shank | | Drill Head | | Stock | Dimensions (mm) | | |
| | ød | $\ell_4$ | $\ell_1$ | | LAK | L | $\ell_2$ | $\ell_3$ |
| 24,6 | 32 | 60 | 4,5 | KDS 246 LAK | | 229,5 | 127 | 140 |
| 24,7 | | | | KDS 247 LAK | | | | |
| 24,8 | | | | KDS 248 LAK | | | | |
| 24,9 | | | | KDS 249 LAK | | | | |
| **25,0** | | | | KDS 250 LAK | | | | |
| 25,1 | | | | KDS 251 LAK | | | | |
| 25,2 | | | | KDS 252 LAK | | | | |
| 25,3 | | | | KDS 253 LAK | | | | |
| 25,4 | | | | KDS 254 LAK | | | | |
| 25,5 | | | | KDS 255 LAK | | | | |
| 25,6 | 32 | 60 | 4,7 | KDS 256 LAK | | 234,7 | 133 | 146 |
| 25,7 | | | | KDS 257 LAK | | | | |
| 25,8 | | | | KDS 258 LAK | | | | |
| 25,9 | | | | KDS 259 LAK | | | | |
| **26,0** | | | | KDS 260 LAK | | | | |
| 26,1 | | | | KDS 261 LAK | | | | |
| ~26,5 | | | | ~265 LAK | | | | |
| 26,6 | 32 | 60 | 4,9 | KDS 266 LAK | | 239,9 | 137 | 151 |
| ~27,5 | | | | ~275 LAK | | | | |
| 27,6 | 32 | 60 | 5,1 | KDS 276 LAK | | 245,1 | 143 | 157 |
| ~28,5 | | | | ~285 LAK | | | | |
| 28,6 | 32 | 60 | 5,3 | KDS 285 LAK | | 250,3 | 147 | 162 |
| ~29,5 | | | | ~295 LAK | | | | |
| 29,6 | 32 | 60 | 5,5 | KDS 296 LAK | | 260,5 | 152 | 167 |
| ~30,5 | | | | ~305 LAK | | | | |
| 30,6 | 40 | 70 | 5,6 | KDS 306 LAK | | 280,6 | 166 | 187 |
| ~31,5 | | | | ~315 LAK | | | | |
| 31,6 | 40 | 70 | 5,8 | KDS 316 LAK | | 285,8 | 172 | 190 |
| ~32,5 | | | | ~325 LAK | | | | |
| 32,6 | 40 | 70 | 6,0 | KDS 326 LAK | | 291,0 | 175 | 194 |
| ~33,5 | | | | ~335 LAK | | | | |
| 33,6 | 40 | 70 | 6,2 | KDS 336 LAK | | 296,2 | 177 | 197 |
| ~34,5 | | | | ~345 LAK | | | | |
| 34,6 | 40 | 70 | 6,4 | KDS 346 LAK | | 301,4 | 180 | 200 |
| ~35,5 | | | | ~355 LAK | | | | |
| 35,6 | 40 | 70 | 6,6 | KDS 356 LAK | | 306,6 | 183 | 203 |
| ~36,5 | | | | ~365 LAK | | | | |
| 36,6 | 40 | 70 | 6,7 | KDS 366 LAK | | 311,7 | 188 | 207 |
| ~37,5 | | | | ~375 LAK | | | | |
| 37,6 | 40 | 70 | 6,9 | KDS 376 LAK | | 321,9 | 193 | 243 |
| ~38,5 | | | | ~385 LAK | | | | |
| 38,6 | 40 | 70 | 7,1 | KDS 386 LAK | | 327,1 | 198 | 248 |
| ~39,5 | | | | ~395 LAK | | | | |
| 39,6 | 40 | 70 | 7,3 | KDS 396 LAK | | 332,3 | 203 | 253 |
| ~40,5 | | | | ~405 LAK | | | | |

● = Euro stock

## ■ 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 L AK ,** ACW30 (Grade)

**KDS series**: Brazed carbide drill with coolant holes

Drill diameter **10,2** mm

**L** : 5 x D

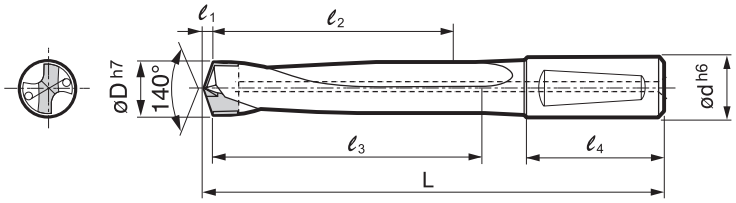
**AK**: Brazed carbide and TiAlN coated drill



# KDS ... DAK Type

## Extra Long Type ( 7 x D ) Brazed Carbide Drills with Coolant Holes






Helix angle: 20° ---> 0°
$\ell_2$ = Effective drilling length

### ●Diameter ø9,5~15,5mm

| Dimensions (mm) | | | | Cat. No. | Extra Long Series (7D) | | | |
|---|---|---|---|---|---|---|---|---|
| øD (mm) | Shank ød | Shank $\ell_4$ | Drill Head $\ell_1$ | | Stock DAK | Dimensions (mm) L | $\ell_2$ | $\ell_3$ |
| 9,5~ | | | | KDS 095 DAK | | | | |
| 10,0 | 16 | 48 | 1,8 | KDS 100 DAK | | 141,8 | 75 | 80 |
| ~10,5 | | | | KDS 105 DAK | | | | |
| 10,6~ | | | | KDS 106 DAK | | | | |
| 11,0 | 16 | 48 | 2 | KDS 110 DAK | | 152,0 | 81 | 87 |
| ~11,5 | | | | 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 ød | Shank $\ell_4$ | Drill Head $\ell_1$ | | Stock DAK | Dimensions (mm) L | $\ell_2$ | $\ell_3$ |
| 15,6 | | | | KDS 156 DAK | | | | |
| 15,7 | | | | KDS 157 DAK | | | | |
| 15,8 | | | | KDS 158 DAK | | | | |
| 15,9 | | | | KDS 159 DAK | | | | |
| **16,0** | 20 | 50 | 2,9 | KDS 160 DAK | ● | 207,9 | 121 | 129 |
| 16,1 | | | | KDS 161 DAK | | | | |
| 16,2 | | | | KDS 162 DAK | | | | |
| 16,3 | | | | KDS 163 DAK | | | | |
| 16,4 | | | | KDS 164 DAK | | | | |
| 16,5 | | | | KDS 165 DAK | | | | |
| 16,6 | | | | KDS 166 DAK | | | | |
| 16,7 | | | | KDS 167 DAK | | | | |
| 16,8 | | | | KDS 168 DAK | | | | |
| 16,9 | | | | KDS 169 DAK | | | | |
| **17,0** | 20 | 50 | 3,1 | KDS 170 DAK | ● | 218,1 | 129 | 138 |
| 17,1 | | | | KDS 171 DAK | | | | |
| 17,2 | | | | KDS 172 DAK | | | | |
| 17,3 | | | | KDS 173 DAK | | | | |
| 17,4 | | | | KDS 174 DAK | | | | |
| 17,5 | | | | KDS 175 DAK | ● | | | |
| 17,6 | | | | KDS 176 DAK | | | | |
| 17,7 | | | | KDS 177 DAK | | | | |
| 17,8 | | | | KDS 178 DAK | | | | |
| 17,9 | | | | KDS 179 DAK | | | | |
| **18,0** | 20 | 50 | 3,3 | KDS 180 DAK | ● | 223,3 | 136 | 145 |
| 18,1 | | | | KDS 181 DAK | | | | |
| 18,2 | | | | KDS 182 DAK | | | | |
| 18,3 | | | | KDS 183 DAK | | | | |
| 18,4 | | | | KDS 184 DAK | | | | |
| 18,5 | | | | KDS 185 DAK | | | | |
| 18,6 | | | | KDS 186 DAK | | | | |
| 18,7 | | | | KDS 187 DAK | | | | |
| 18,8 | | | | KDS 188 DAK | | | | |
| 18,9 | | | | KDS 189 DAK | | | | |
| **19,0** | 25 | 56 | 3,5 | KDS 190 DAK | ● | 243,5 | 144 | 154 |
| 19,1 | | | | KDS 191 DAK | | | | |
| 19,2 | | | | KDS 192 DAK | | | | |
| 19,3 | | | | KDS 193 DAK | | | | |
| 19,4 | | | | KDS 194 DAK | | | | |
| 19,5 | | | | KDS 195 DAK | | | | |
| 19,6 | | | | KDS 196 DAK | | | | |
| 19,7 | | | | KDS 197 DAK | | | | |
| 19,8 | 25 | 56 | 3,6 | KDS 198 DAK | | 248,6 | 151 | 161 |
| 19,9 | | | | KDS 199 DAK | | | | |
| **20,0** | | | | KDS 200 DAK | ● | | | |

● Euro stock

## ■ Recommended Cutting Conditions

( $v_c$ : Cutting Speed (m/min), f : Feed rate (mm/rev)) (Min – **Standard** – Max)

| Diameter (mm) | | Steels (under HB250) | Steels (HB250~320) | Die Steels (about HB250) | Ductile Cast Irons | Remarks |
|---|---|---|---|---|---|---|
| ~ ø15 | | 40 – **65** – 90 | 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:<br><br>RPM: 100~300<br>f: 0,05~0,08 mm/rev |
| | | 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 | | 40 – **65** – 90 | 40 – **60** – 90 | 40 – **50** – 70 | 50 – **70** – 100 | |
| | | 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 | | 40 – **70** – 90 | 40 – **65** – 90 | 40 – **55** – 70 | 50 – **70** – 100 | |
| | | 0,2 – **0,35** – 0,45 | 0,2 – **0,3** – 0,4 | 0,2 – **0,3** – 0,35 | 0,25 – **0,4** – 0,5 | |

# KDS ... DAK Type

TiAlN Coated Brazed Carbide Multi-Drills for General Steels & Ductile Cast Iron



**Specification:**
- Brazed carbide drill TiAlN coated (Grade: ACW30) with coolant holes
- Shank with whistle notch

## ●Diameter ø20,1~24,5mm

| Dimensions (mm) | | | | Cat. No. | Extra Long Series (7D) | | | |
|---|---|---|---|---|---|---|---|---|
| øD (mm) | Shank | | Drill Head | | Stock | Dimensions (mm) | | |
| | ød | $\ell$ | $\ell$ | | DAK | L | $\ell_2$ | $\ell_3$ |
| 20,1 | | | | KDS 201 DAK | | | | |
| 20,2 | | | | KDS 202 DAK | | | | |
| 20,3 | 25 | 56 | 3,6 | KDS 203 DAK | | 248,6 | 151 | 161 |
| 20,4 | | | | KDS 204 DAK | | | | |
| 20,5 | | | | KDS 205 DAK | | | | |
| 20,6 | | | | KDS 206 DAK | | | | |
| 20,7 | | | | KDS 207 DAK | | | | |
| 20,8 | | | | KDS 208 DAK | | | | |
| 20,9 | | | | KDS 209 DAK | | | | |
| **21,0** | 25 | 56 | 3,8 | KDS 210 DAK | ● | 248,8 | 155 | 166 |
| 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 | | | | KDS 216 DAK | | | | |
| 21,7 | | | | KDS 217 DAK | | | | |
| 21,8 | | | | KDS 218 DAK | | | | |
| 21,9 | | | | KDS 219 DAK | | | | |
| **22,0** | 25 | 56 | 4,0 | KDS 220 DAK | ● | 259,0 | 166 | 177 |
| 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 | | | | KDS 226 DAK | | | | |
| 22,7 | | | | KDS 227 DAK | | | | |
| 22,8 | | | | KDS 228 DAK | | | | |
| 22,9 | | | | KDS 229 DAK | | | | |
| **23,0** | 25 | 56 | 4,2 | KDS 230 DAK | | 274,2 | 174 | 186 |
| 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 | | | | KDS 236 DAK | | | | |
| 23,7 | | | | KDS 237 DAK | | | | |
| 23,8 | | | | KDS 238 DAK | | | | |
| 23,9 | | | | KDS 239 DAK | | | | |
| **24,0** | 32 | 60 | 4,4 | KDS 240 DAK | | 284,4 | 178 | 190 |
| 24,1 | | | | KDS 241 DAK | | | | |
| 24,2 | | | | KDS 242 DAK | | | | |
| 24,3 | | | | KDS 243 DAK | | | | |
| 24,4 | | | | KDS 244 DAK | | | | |
| 24,5 | | | | KDS 245 DAK | ● | | | |

## ●Diameter ø24,6~40,5mm

| Dimensions (mm) | | | | Cat. No. | Extra Long Series (7D) | | | |
|---|---|---|---|---|---|---|---|---|
| øD (mm) | Shank | | Drill Head | | Stock | Dimensions (mm) | | |
| | ød | $\ell_4$ | $\ell_1$ | | DAK | L | $\ell_2$ | $\ell_3$ |
| 24,6 | | | | KDS 246 DAK | | | | |
| 24,7 | | | | KDS 247 DAK | | | | |
| 24,8 | | | | KDS 248 DAK | | | | |
| 24,9 | | | | KDS 249 DAK | | | | |
| **25,0** | 32 | 60 | 4,5 | KDS 250 DAK | | 294,5 | 187 | 200 |
| 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 | | | | KDS 256 DAK | | | | |
| 25,7 | | | | KDS 257 DAK | | | | |
| 25,8 | | | | KDS 258 DAK | | | | |
| 25,9 | 32 | 60 | 4,7 | KDS 259 DAK | | 304,7 | 197 | 210 |
| **26,0** | | | | KDS 260 DAK | | | | |
| 26,1 | | | | KDS 261 DAK | | | | |
| ~26,5 | | | | ~265 DAK | | | | |
| 26,6 ~27,5 | 32 | 60 | 4,9 | KDS 266 DAK ~275 DAK | | 309,9 | 201 | 215 |
| 27,6 ~28,5 | 32 | 60 | 5,1 | KDS 276 DAK ~285 DAK | | 315,1 | 206 | 220 |
| 28,6 ~29,5 | 32 | 60 | 5,3 | KDS 285 DAK ~295 DAK | | 325,3 | 215 | 230 |
| 29,6 ~30,5 | 32 | 60 | 5,5 | KDS 296 DAK ~305 DAK | | 335,5 | 225 | 240 |
| 30,6 ~31,5 | 40 | 70 | 5,6 | KDS 306 DAK ~315 DAK | | 350,6 | 229 | 245 |
| 31,6 ~32,5 | 40 | 70 | 5,8 | KDS 316 DAK ~325 DAK | | 360,8 | 234 | 250 |
| 32,6 ~33,5 | 40 | 70 | 6,0 | KDS 326 DAK ~335 DAK | | 371,0 | 243 | 260 |
| 33,6 ~34,5 | 40 | 70 | 6,2 | KDS 336 DAK ~345 DAK | | 381,2 | 253 | 270 |
| 34,6 ~35,5 | 40 | 70 | 6,4 | KDS 346 DAK ~355 DAK | | 391,4 | 257 | 275 |
| 35,6 ~36,5 | 40 | 70 | 6,6 | KDS 356 DAK ~365 DAK | | 396,6 | 262 | 280 |
| 36,6 ~37,5 | 40 | 70 | 6,7 | KDS 366 DAK ~375 DAK | | 406,7 | 271 | 290 |
| 37,6 ~38,5 | 40 | 70 | 6,9 | KDS 376 DAK ~385 DAK | | 416,9 | 292 | 338 |
| 38,6 ~39,5 | 40 | 70 | 7,1 | KDS 386 DAK ~395 DAK | | 422,1 | 296 | 343 |
| 39,6 ~40,5 | 40 | 70 | 7,3 | KDS 396 DAK ~405 DAK | | 427,3 | 300 | 348 |

● = Euro stock

## ■ 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.

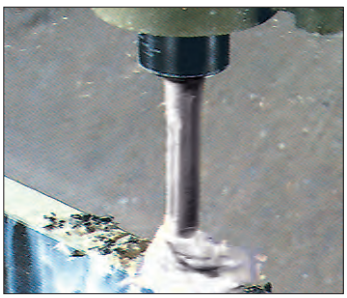
**E.g.,** **KDS 102 D AK** , ACW30 (Grade)

**KDS series**: Brazed carbide drill with coolant holes

Drill diameter **10,2** mm

**AK**: Brazed carbide and TiAlN coated drill

**D** : 7 x D

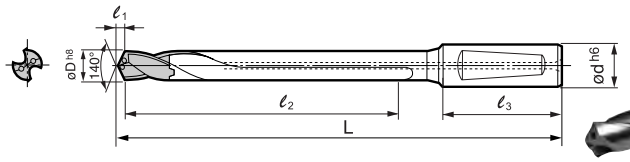


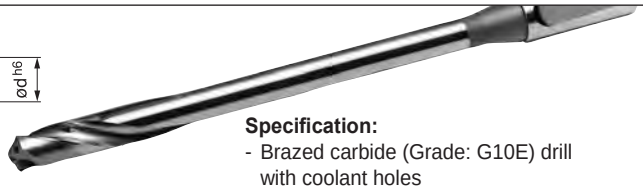
# Brazed Carbide MULTI-DRILLs
# KDS ... FA Type

( Available on Request )

## Extra Long Type (10 x D)

Brazed Carbide Drills with Coolant Holes



Helix angle: 25° ---> 0°
$\ell_2$ = Effective drilling length

**Specification:**
- Brazed carbide (Grade: G10E) drill with coolant holes
- Shank with whistle notch

### ●Diameter ø8.0~15,0mm

| Dimensions (mm) | | | | Cat. No. | Extra Long Series (10D) | | |
|---|---|---|---|---|---|---|---|
| øD (mm) | Shank | | Drill Head | | Stock | Dimensions (mm) | |
| | ød | $\ell_4$ | $\ell_1$ | | FA10 | L | $\ell_2$ |
| 8,0 ~8,5 | 16 | 48 | 1,5 | KDS 080 FA10 ~085 FA10 | | 156,5 | 93 |
| 8,6 ~9,5 | 16 | 48 | 1,6 | KDS 086 FA10 ~095 FA10 | | 171,6 | 104 |
| 9,6 ~10,5 | 16 | 48 | 1,8 | KDS 096 FA10 ~105 FA10 | | 181,8 | 115 |
| 10,6 ~11,5 | 16 | 48 | 2,0 | KDS 106 FA10 ~115 FA10 | | 197,0 | 126 |
| 11,6 ~12,5 | 16 | 48 | 2,2 | KDS 116 FA10 ~125 FA10 | | 207,2 | 137 |
| 12,6 ~13,5 | 16 | 48 | 2,4 | KDS 126 FA10 ~135 FA10 | | 222,4 | 148 |
| 13,6 ~14,5 | 16 | 48 | 2,5 | KDS 136 FA10 ~145 FA10 | | 232,5 | 159 |
| 14,6 ~15,5 | 20 | 50 | 2,7 | KDS 146 FA10 ~155 FA10 | | 247,7 | 170 |
| 15,6 ~16,5 | 20 | 50 | 2,9 | KDS 156 FA10 ~165 FA10 | | 262,9 | 181 |
| 16,6 ~17,5 | 20 | 50 | 3,1 | KDS 166 FA10 ~175 FA10 | | 273,1 | 192 |
| 17,6 ~18,5 | 20 | 50 | 3,3 | KDS 176 FA10 ~185 FA10 | | 288,3 | 203 |
| 18,6 ~19,5 | 25 | 56 | 3,5 | KDS 186 FA10 ~195 FA10 | | 303,5 | 214 |

### ●Diameter ø15,1~19,5mm

| Dimensions (mm) | | | | Cat. No. | Extra Long Series (10D) | | |
|---|---|---|---|---|---|---|---|
| øD (mm) | Shank | | Drill Head | | Stock | Dimensions (mm) | |
| | ød | $\ell_4$ | $\ell_1$ | | FA10 | L | $\ell_2$ |
| 19,6 ~20,5 | 25 | 56 | 3,6 | KDS 196 FA10 ~205 FA10 | | 318,6 | 225 |
| 20,6 ~21,5 | 25 | 56 | 3,8 | KDS 206 FA10 ~215 FA10 | | 328,8 | 236 |
| 21,6 ~22,5 | 25 | 56 | 4,0 | KDS 216 FA10 ~225 FA10 | | 344,0 | 247 |
| 22,6 ~23,5 | 25 | 56 | 4,2 | KDS 226 FA10 ~235 FA10 | | 354,2 | 258 |
| 23,6 ~24,5 | 32 | 60 | 4,4 | KDS 236 FA10 ~245 FA10 | | 374,4 | 269 |
| 24,6 ~25,5 | 32 | 60 | 4,5 | KDS 246 FA10 ~255 FA10 | | 384,5 | 280 |
| 25,6 ~26,5 | 32 | 60 | 4,7 | KDS 256 FA10 ~265 FA10 | | 399,7 | 291 |
| 26,6 ~27,5 | 32 | 60 | 4,9 | KDS 266 FA10 ~275 FA10 | | 409,9 | 302 |
| 27,6 ~28,5 | 32 | 60 | 5,1 | KDS 276 FA10 ~285 FA10 | | 425,1 | 313 |
| 28,6 ~29,5 | 32 | 60 | 5,3 | KDS 286 FA10 ~295 FA10 | | 435,3 | 324 |
| 29,6 ~30,5 | 32 | 60 | 5,5 | KDS 296 FA10 ~305 FA10 | | 450,5 | 335 |

Brazed Carbide Multi-Drills for Cast Irons and Aluminium Alloys



## ■ How to Order

Non-Stock Items will be required minimum order quantity for 6 pcs. Please specify the Cat. No.
For example, if the diameter of the drill is 10,2 mm, please indicate as follow.

**E.g.**, **KDS 102 FA 10** ,G10E (Grade)

**KDS series**: Brazed carbide drill with coolant holes

Drill diameter **10,2** mm

**10**: Effective drilling length

**FA**: Extra long type brazed carbide drill with special flutes (Helix angle: 25° ⇨ 0°)

## ■ Recommended Cutting Conditions

( $v_c$ : Cutting Speed (m/min), f : Feed rate (mm/rev)) (Min – **Standard** – Max)

| Diameter (mm) | | Cast Irons | Aluminium Alloys | Remarks |
|---|---|---|---|---|
| ~ 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.<br><br>Higher feed rates and deep holes require high coolant pressure.<br>Cutting fluid : Water soluble oil<br>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 | |

# SMD Type



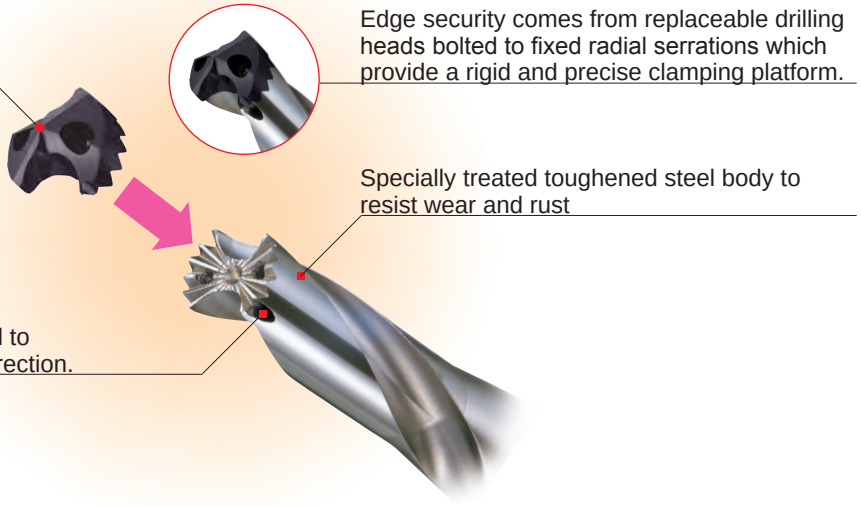
## General Features

Fast accurate and ideal for drilling steels, this newly developed drill from SUMITOMO gives similar hole accuracy to that of regrindable drills renowned within the industry as being the ultimate hole making tool.

## Advantages

- Available in diameters ranging from 12,0~30,5mm
- 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
- 2 different type of head for general and smooth cutting

The newly developed tungsten carbide substrate with it's 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.

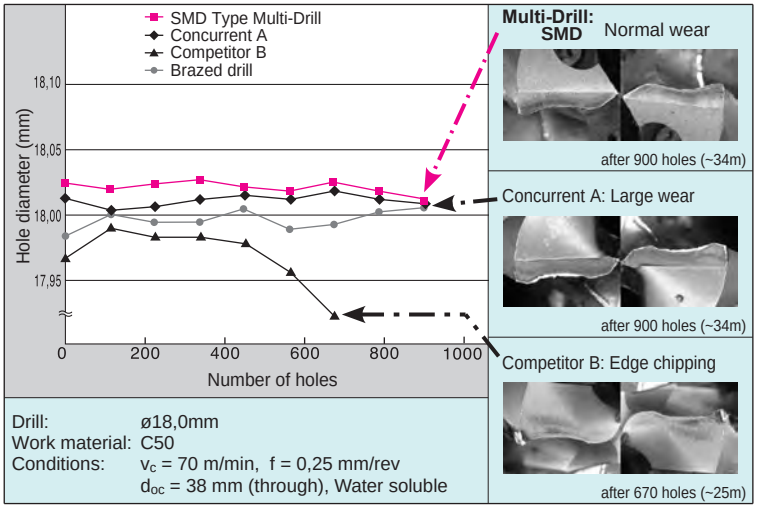


Edge security comes from replaceable drilling heads bolted to fixed radial serrations which provide a rigid and precise clamping platform.

Specially treated toughened steel body to resist wear and rust

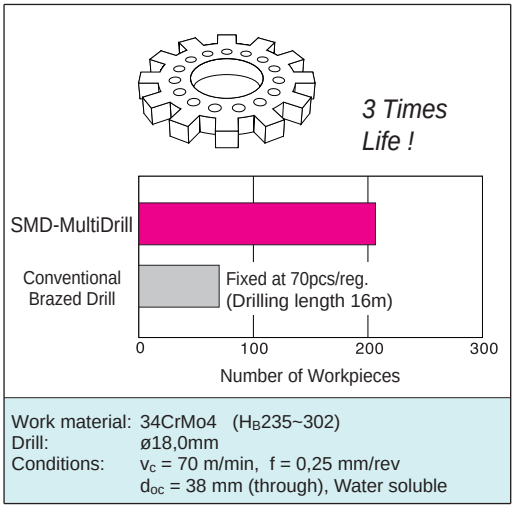
Through coolant holes positioned to optimise coolant pressure and direction.

## Drilling Precision




Drill: ø18,0mm
Work material: C50
Conditions: $v_c$ = 70 m/min, f = 0,25 mm/rev
$d_{oc}$ = 38 mm (through), Water soluble

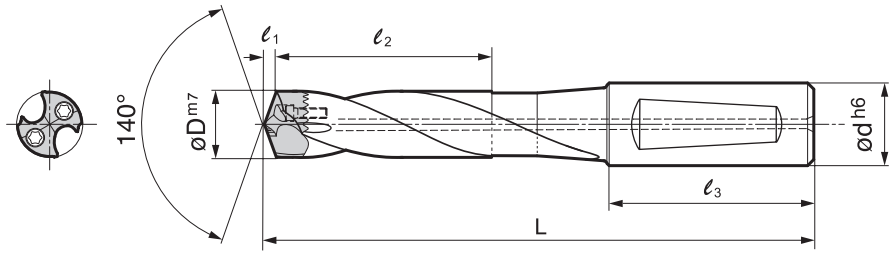
## Application Example




Work material: 34CrMo4 ($H_B$235~302)
Drill: ø18,0mm
Conditions: $v_c$ = 70 m/min, f = 0,25 mm/rev
$d_{oc}$ = 38 mm (through), Water soluble

# SMDH Type

● Holder




$\ell_2$ = Effective drilling length

## ■ Holder

(mm)

| Dimensions (mm) | | | | Cat. No. | Short Series (3D) | | | Long Series (5D) | | | Deep Hole Series (8D) | | | Applicable Drill Head |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Drill Head | | Shank | | | Stock | Dimensions | | Stock | Dimensions | | Stock | Dimensions | | |
| øD | $\ell_1$ | ød | $\ell_3$ | | M3 | L | $\ell_2$ | M5 | L | $\ell_2$ | M8 | L | $\ell_2$ | |
| 12,0 | 2,2 | 16 | 48 | **SMDH 120 □□** | ● | 107,2 | 38,0 | ● | 132,2 | 63,0 | – | – | – | SMDT 1200~1249 D M□L |
| 12,5 | 2,3 | | | **SMDH 125 □□** | ● | 107,3 | 37,8 | ● | 132,3 | 62,8 | – | – | – | SMDT 1250~1299 D M□L |
| 13,0 | 2,4 | | | **SMDH 130 □□** | ● | 112,4 | 40,5 | ● | 142,4 | 67,5 | – | – | – | SMDT 1300~1349 D M□L |
| 14,0 | 2,5 | | | **SMDH 140 □□** | ● | 119,0 | 45,5 | ● | 149,0 | 74,5 | ● | 194,0 | 117,5 | SMDT 1350~1450 D M□L |
| 15,0 | 2,7 | 20 | 50 | **SMDH 150 □□** | ● | 129,2 | 48,0 | ● | 159,2 | 79,0 | ● | 204,2 | 126,0 | SMDT 1451~1550 D M□L |
| 16,0 | 2,9 | | | **SMDH 160 □□** | ● | 134,4 | 51,5 | ● | 169,4 | 84,5 | ● | 214,4 | 133,5 | SMDT 1551~1650 D M□L |
| 17,0 | 3,1 | | | **SMDH 170 □□** | ● | 139,6 | 54,0 | ● | 174,6 | 89,0 | ● | 224,6 | 142,0 | SMDT 1651~1750 D M□L |
| 18,0 | 3,3 | | | **SMDH 180 □□** | ● | 144,8 | 57,5 | ● | 179,8 | 94,5 | ● | 229,8 | 149,5 | SMDT 1751~1850 D M□L |
| 19,0 | 3,5 | 25 | 56 | **SMDH 190 □□** | ● | 160,1 | 60,0 | ● | 195,0 | 99,0 | ● | 255,0 | 158,0 | SMDT 1851~1950 D M□L |
| 20,0 | 3,6 | | | **SMDH 200 □□** | ● | 160,1 | 63,5 | ● | 200,1 | 104,5 | ● | 265,6 | 165,5 | SMDT 1951~2050 D M□L |
| 21,0 | 3,8 | | | **SMDH 210 □□** | ● | 160,3 | 66,0 | ● | 200,3 | 109,0 | ● | 270,3 | 174,0 | SMDT 2051~2150 D M□L |
| 22,0 | 4,0 | | | **SMDH 220 □□** | ● | 165,1 | 69,1 | ● | 205,1 | 114,1 | ● | 275,1 | 181,1 | SMDT 2151~2280 D M□L |
| 23,0 | 4,2 | | | **SMDH 230 □□** | ● | 164,8 | 71,0 | ● | 214,8 | 118,1 | ● | 284,8 | 189,1 | SMDT 2281~2380 D M□L |
| 24,0 | 4,4 | 32 | 60 | **SMDH 240 □□** | ● | 174,6 | 74,2 | ● | 224,6 | 123,2 | ● | 299,6 | 196,2 | SMDT 2381~2480 D M□L |
| 25,0 | 4,6 | | | **SMDH 250 □□** | ● | 174,6 | 75,5 | ● | 229,6 | 127,5 | ● | 304,6 | 204,5 | SMDT 2481~2580 D M□L |
| 26,0 | 4,7 | | | **SMDH 260 □□** | ● | 179,7 | 79,0 | ● | 234,7 | 133,0 | ● | 314,7 | 212,0 | SMDT 2581~2680 D M□L |
| 27,0 | 4,9 | | | **SMDH 270 □□** | ● | 179,9 | 80,5 | ● | 239,9 | 137,5 | ● | 324,9 | 220,5 | SMDT 2681~2780 D M□L |
| 28,0 | 5,1 | | | **SMDH 280 □□** | ● | 185,1 | 83,0 | ● | 245,1 | 143,0 | ● | 330,1 | 228,0 | SMDT 2781~2880 D M□L |
| 29,0 | 5,3 | | | **SMDH 290 □□** | ● | 190,3 | 85,5 | ● | 250,3 | 147,5 | ● | 340,3 | 236,5 | SMDT 2881~2980 D M□L |
| 30,0 | 5,5 | | | **SMDH 300 □□** | ● | 190,5 | 89,0 | ● | 260,5 | 152,0 | ● | 350,5 | 244,0 | SMDT 2981~3080 D M□L |



## ■ Recommended Torque

| Screw | | Applicable Insert |
|---|---|---|
|  | Torque (N·m) | |
| BXD 02208 IP | 0,8 ~ 1,0 | SMDT 1200 ~ 1550 M□L |
| BXD 02509 IP | 0,9 ~ 1,2 | SMDT 1551 ~ 1850 M□L |
| BXD 03011 IP | 1,8 ~ 2,4 | SMDT 1851 ~ 2150 M□L |
| BXD 03512 IP | 2,8 ~ 3,7 | SMDT 2151 ~ 2480 M□L |
| BXD 04014 IP | 4,1 ~ 5,5 | SMDT 2481 ~ 2780 M□L |
| BXD 04515 IP | 5,0 ~ 6,6 | SMDT 2781 ~ 3050 M□L |

## ■ Spare Parts

| Screw | Wrench | Applicable Holder |
|---|---|---|
|  |  | |
| BXD 02208 IP | TRDR 08 IP | SMDH 120 ~ 150 M□ |
| BXD 02509 IP | TRDR 10 IP | SMDH 160 ~ 180 M□ |
| BXD 03011 IP | TRDR 15 IP | SMDH 190 ~ 210 M□ |
| BXD 03512 IP | TRDR 15 IP | SMDH 220 ~ 240 M□ |
| BXD 04014 IP | TRDR 20 IP | SMDH 250 ~ 270 M□ |
| BXD 04515 IP | TRDR 25 IP | SMDH 280 ~ 300 M□ |





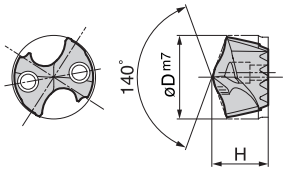
● = Euro stock

# Regrindable Drill Head Insert
# SMDT... D MTL Type

PVD coated grade: **ACX70**

Type MTL








## ■ Drill Head (Insert)

### ● øD: 12,0~15,3mm

| øD (mm) | Cat. No. | Stock | H (mm) |
|---|---|---|---|
| **12,0** | **SMDT 1200 D MTL** | ● | 9,1 |
| 12,1 | **SMDT 1210 D MTL** | ● | 9,1 |
| 12,2 | **SMDT 1220 D MTL** | ● | 9,1 |
| 12,3 | **SMDT 1230 D MTL** | ● | 9,1 |
| 12,4 | **SMDT 1240 D MTL** | ● | 9,1 |
| 12,5 | **SMDT 1250 D MTL** | ● | 9,4 |
| 12,6 | **SMDT 1260 D MTL** | ● | 9,4 |
| 12,7 | **SMDT 1270 D MTL** | ● | 9,4 |
| 12,8 | **SMDT 1280 D MTL** | ● | 9,4 |
| 12,9 | **SMDT 1290 D MTL** | ● | 9,4 |
| **13,0** | **SMDT 1300 D MTL** | ● | 9,7 |
| 13,1 | **SMDT 1310 D MTL** | ● | 9,7 |
| 13,2 | **SMDT 1320 D MTL** | ● | 9,7 |
| 13,3 | **SMDT 1330 D MTL** | ● | 9,7 |
| 13,4 | **SMDT 1340 D MTL** | ● | 9,7 |
| 13,5 | **SMDT 1350 D MTL** | ● | 10,3 |
| 13,6 | **SMDT 1360 D MTL** | ● | 10,3 |
| 13,7 | **SMDT 1370 D MTL** | ● | 10,3 |
| 13,8 | **SMDT 1380 D MTL** | ● | 10,3 |
| 13,9 | **SMDT 1390 D MTL** | ● | 10,3 |
| **14,0** | **SMDT 1400 D MTL** | ● | 10,3 |
| 14,1 | **SMDT 1410 D MTL** | ● | 10,3 |
| 14,2 | **SMDT 1420 D MTL** | ● | 10,3 |
| 14,3 | **SMDT 1430 D MTL** | ● | 10,3 |
| 14,4 | **SMDT 1440 D MTL** | ● | 10,3 |
| 14,5 | **SMDT 1450 D MTL** | ● | 10,3 |
| 14,6 | **SMDT 1460 D MTL** | ● | 10,3 |
| 14,7 | **SMDT 1470 D MTL** | ● | 10,3 |
| 14,8 | **SMDT 1480 D MTL** | ● | 10,3 |
| 14,9 | **SMDT 1490 D MTL** | ● | 10,3 |
| **15,0** | **SMDT 1500 D MTL** | ● | 11,0 |
| 15,1 | **SMDT 1510 D MTL** | ● | 11,0 |
| 15,2 | **SMDT 1520 D MTL** | ● | 11,0 |
| 15,3 | **SMDT 1530 D MTL** | ● | 11,0 |

### ● øD: 15,4~18,7mm

| øD (mm) | Cat. No. | Stock | H (mm) |
|---|---|---|---|
| 15,4 | **SMDT 1540 D MTL** | ● | 11,0 |
| 15,5 | **SMDT 1550 D MTL** | ● | 11,0 |
| 15,6 | **SMDT 1560 D MTL** | ● | 11,0 |
| 15,7 | **SMDT 1570 D MTL** | ● | 11,0 |
| 15,8 | **SMDT 1580 D MTL** | ● | 11,0 |
| 15,9 | **SMDT 1590 D MTL** | ● | 11,0 |
| **16,0** | **SMDT 1600 D MTL** | ● | 11,6 |
| 16,1 | **SMDT 1610 D MTL** | ● | 11,6 |
| 16,2 | **SMDT 1620 D MTL** | ● | 11,6 |
| 16,3 | **SMDT 1630 D MTL** | ● | 11,6 |
| 16,4 | **SMDT 1640 D MTL** | ● | 11,6 |
| 16,5 | **SMDT 1650 D MTL** | ● | 11,6 |
| 16,6 | **SMDT 1660 D MTL** | ● | 11,6 |
| 16,7 | **SMDT 1670 D MTL** | ● | 11,6 |
| 16,8 | **SMDT 1680 D MTL** | ● | 11,6 |
| 16,9 | **SMDT 1690 D MTL** | ● | 11,6 |
| **17,0** | **SMDT 1700 D MTL** | ● | 12,2 |
| 17,1 | **SMDT 1710 D MTL** | ● | 12,2 |
| 17,2 | **SMDT 1720 D MTL** | ● | 12,2 |
| 17,3 | **SMDT 1730 D MTL** | ● | 12,2 |
| 17,4 | **SMDT 1740 D MTL** | ● | 12,2 |
| 17,5 | **SMDT 1750 D MTL** | ● | 12,2 |
| 17,6 | **SMDT 1760 D MTL** | ● | 12,2 |
| 17,7 | **SMDT 1770 D MTL** | ● | 12,2 |
| 17,8 | **SMDT 1780 D MTL** | ● | 12,2 |
| 17,9 | **SMDT 1790 D MTL** | ● | 12,2 |
| **18,0** | **SMDT 1800 D MTL** | ● | 12,9 |
| 18,1 | **SMDT 1810 D MTL** | ● | 12,9 |
| 18,2 | **SMDT 1820 D MTL** | ● | 12,9 |
| 18,3 | **SMDT 1830 D MTL** | ● | 12,9 |
| 18,4 | **SMDT 1840 D MTL** | ● | 12,9 |
| 18,5 | **SMDT 1850 D MTL** | ● | 12,9 |
| 18,6 | **SMDT 1860 D MTL** | ● | 12,9 |
| 18,7 | **SMDT 1870 D MTL** | ● | 12,9 |

### ● øD: 18,8~30,5mm

| øD (mm) | Cat. No. | Stock | H (mm) |
|---|---|---|---|
| 18,8 | **SMDT 1880 D MTL** | ● | 12,9 |
| 18,9 | **SMDT 1890 D MTL** | ● | 12,9 |
| **19,0** | **SMDT 1900 D MTL** | ● | 13,5 |
| 19,1 | **SMDT 1910 D MTL** | ● | 13,5 |
| 19,2 | **SMDT 1920 D MTL** | ● | 13,5 |
| 19,3 | **SMDT 1930 D MTL** | ● | 13,5 |
| 19,4 | **SMDT 1940 D MTL** | ● | 13,5 |
| 19,5 | **SMDT 1950 D MTL** | ● | 13,5 |
| 19,6 | **SMDT 1960 D MTL** | ● | 13,5 |
| 19,7 | **SMDT 1970 D MTL** | ● | 13,5 |
| 19,8 | **SMDT 1980 D MTL** | ● | 13,5 |
| 19,9 | **SMDT 1990 D MTL** | ● | 13,5 |
| **20,0** | **SMDT 2000 D MTL** | ● | 14,1 |
| 20,5 | **SMDT 2050 D MTL** | ● | 14,1 |
| **21,0** | **SMDT 2100 D MTL** | ● | 14,8 |
| 21,5 | **SMDT 2150 D MTL** | ● | 14,8 |
| **22,0** | **SMDT 2200 D MTL** | ● | 15,0 |
| 22,5 | **SMDT 2250 D MTL** | ● | 15,0 |
| **23,0** | **SMDT 2300 D MTL** | ● | 15,1 |
| 23,5 | **SMDT 2350 D MTL** | ● | 15,1 |
| **24,0** | **SMDT 2400 D MTL** | ● | 15,4 |
| 24,5 | **SMDT 2450 D MTL** | ● | 15,4 |
| **25,0** | **SMDT 2500 D MTL** | ● | 15,8 |
| 25,5 | **SMDT 2550 D MTL** | ● | 15,8 |
| **26,0** | **SMDT 2600 D MTL** | ● | 16,4 |
| 26,5 | **SMDT 2650 D MTL** | ● | 16,4 |
| **27,0** | **SMDT 2700 D MTL** | ● | 17,1 |
| 27,5 | **SMDT 2750 D MTL** | ● | 17,1 |
| **28,0** | **SMDT 2800 D MTL** | ● | 17,7 |
| 28,5 | **SMDT 2850 D MTL** | ● | 17,7 |
| **29,0** | **SMDT 2900 D MTL** | ● | 18,3 |
| 29,5 | **SMDT 2950 D MTL** | ● | 18,3 |
| **30,0** | **SMDT 3000 D MTL** | ● | 19,0 |
| 30,5 | **SMDT 3050 D MTL** | ● | 19,0 |

## ■ Recommended Cutting Conditions

### ● For using **3xD** and **5xD** type drills

| Drill Ø (mm) \ Work material | | General steel (HB250~320) | Harden steel (HRC45) | Nodular cast iron |
|---|---|---|---|---|
| ~ 16,0 | $v_c$ | 70 – **100** – 120 | 40 – **60** – 90 | 50 – **60** – 80 |
| | f | 0,15 – **0,2** – 0,3 | 0,1 – **0,15** – 0,2 | 0,2 – **0,25** – 0,3 |
| ~ 20,0 | $v_c$ | 70 – **100** – 120 | 40 – **70** – 90 | 50 – **70** – 90 |
| | f | 0,15 – **0,25** – 0,35 | 0,15 – **0,2** – 0,25 | 0,2 – **0,25** – 0,35 |
| ~ 30,8 | $v_c$ | 70 – **100** – 120 | 40 – **60** – 90 | 50 – **70** – 90 |
| | f | 0,2 – **0,25** – 0,35 | 0,15 – **0,2** – 0,25 | 0,25 – **0,3** – 0,35 |

### ● For using **8xD** type drills

| Drill Ø (mm) \ Work material | | General steel (HB250~320) | Harden steel (HRC45) | Nodular cast iron |
|---|---|---|---|---|
| ~ 16,0 | $v_c$ | 50 – **70** – 80 | 30 – **50** – 70 | 40 – **50** – 70 |
| | f | 0,15 – **0,2** – 0,3 | 0,1 – **0,15** – 0,2 | 0,2 – **0,25** – 0,3 |
| ~ 20,0 | $v_c$ | 50 – **70** – 80 | 30 – **50** – 70 | 40 – **60** – 80 |
| | f | 0,15 – **0,25** – 0,35 | 0,15 – **0,2** – 0,25 | 0,2 – **0,25** – 0,35 |
| ~ 30,8 | $v_c$ | 50 – **70** – 80 | 30 – **50** – 70 | 40 – **60** – 80 |
| | f | 0,2 – **0,25** – 0,35 | 0,15 – **0,2** – 0,25 | 0,25 – **0,3** – 0,35 |

Note: High cutting performance is enhanced when using a high quality machine and rigid set up.

[ $v_c$ : Cutting Speed (m/min), f : Feed rate (mm/rev), Min - **Optimum** - Max ]

● = Euro stock

# SMDT... D MEL Type

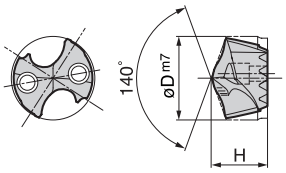
MEL Type for Smooth Cutting

(Soft Steel, Stainless Steel, Grey Cast Iron)

PVD coated grade: **ACX80**

Type MEL








## ■ Drill Head (Insert)

### ● øD: 12,0~15,3mm

| øD (mm) | Cat. No. | Stock | H (mm) |
|---|---|---|---|
| **12,0** | **SMDT 1200 D MEL** | ● | 9,1 |
| 12,1 | **SMDT 1210 D MEL** | ● | 9,1 |
| 12,2 | **SMDT 1220 D MEL** | ● | 9,1 |
| 12,3 | **SMDT 1230 D MEL** | ● | 9,1 |
| 12,4 | **SMDT 1240 D MEL** | ● | 9,1 |
| 12,5 | **SMDT 1250 D MEL** | ● | 9,4 |
| 12,6 | **SMDT 1260 D MEL** | ● | 9,4 |
| 12,7 | **SMDT 1270 D MEL** | ● | 9,4 |
| 12,8 | **SMDT 1280 D MEL** | ● | 9,4 |
| 12,9 | **SMDT 1290 D MEL** | ● | 9,4 |
| **13,0** | **SMDT 1300 D MEL** | ● | 9,7 |
| 13,1 | **SMDT 1310 D MEL** | ● | 9,7 |
| 13,2 | **SMDT 1320 D MEL** | ● | 9,7 |
| 13,3 | **SMDT 1330 D MEL** | ● | 9,7 |
| 13,4 | **SMDT 1340 D MEL** | ● | 9,7 |
| 13,5 | **SMDT 1350 D MEL** | ● | 10,3 |
| 13,6 | **SMDT 1360 D MEL** | ● | 10,3 |
| 13,7 | **SMDT 1370 D MEL** | ● | 10,3 |
| 13,8 | **SMDT 1380 D MEL** | ● | 10,3 |
| 13,9 | **SMDT 1390 D MEL** | ● | 10,3 |
| **14,0** | **SMDT 1400 D MEL** | ● | 10,3 |
| 14,1 | **SMDT 1410 D MEL** | ● | 10,3 |
| 14,2 | **SMDT 1420 D MEL** | ● | 10,3 |
| 14,3 | **SMDT 1430 D MEL** | ● | 10,3 |
| 14,4 | **SMDT 1440 D MEL** | ● | 10,3 |
| 14,5 | **SMDT 1450 D MEL** | ● | 10,3 |
| 14,6 | **SMDT 1460 D MEL** | ● | 10,3 |
| 14,7 | **SMDT 1470 D MEL** | ● | 10,3 |
| 14,8 | **SMDT 1480 D MEL** | ● | 10,3 |
| 14,9 | **SMDT 1490 D MEL** | ● | 10,3 |
| **15,0** | **SMDT 1500 D MEL** | ● | 11,0 |
| 15,1 | **SMDT 1510 D MEL** | ● | 11,0 |
| 15,2 | **SMDT 1520 D MEL** | ● | 11,0 |
| 15,3 | **SMDT 1530 D MEL** | ● | 11,0 |

### ● øD: 15,4~18,7mm

| øD (mm) | Cat. No. | Stock | H (mm) |
|---|---|---|---|
| 15,4 | **SMDT 1540 D MEL** | ● | 11,0 |
| 15,5 | **SMDT 1550 D MEL** | ● | 11,0 |
| 15,6 | **SMDT 1560 D MEL** | ● | 11,0 |
| 15,7 | **SMDT 1570 D MEL** | ● | 11,0 |
| 15,8 | **SMDT 1580 D MEL** | ● | 11,0 |
| 15,9 | **SMDT 1590 D MEL** | ● | 11,0 |
| **16,0** | **SMDT 1600 D MEL** | ● | 11,6 |
| 16,1 | **SMDT 1610 D MEL** | ● | 11,6 |
| 16,2 | **SMDT 1620 D MEL** | ● | 11,6 |
| 16,3 | **SMDT 1630 D MEL** | ● | 11,6 |
| 16,4 | **SMDT 1640 D MEL** | ● | 11,6 |
| 16,5 | **SMDT 1650 D MEL** | ● | 11,6 |
| 16,6 | **SMDT 1660 D MEL** | ● | 11,6 |
| 16,7 | **SMDT 1670 D MEL** | ● | 11,6 |
| 16,8 | **SMDT 1680 D MEL** | ● | 11,6 |
| 16,9 | **SMDT 1690 D MEL** | ● | 11,6 |
| **17,0** | **SMDT 1700 D MEL** | ● | 12,2 |
| 17,1 | **SMDT 1710 D MEL** | ● | 12,2 |
| 17,2 | **SMDT 1720 D MEL** | ● | 12,2 |
| 17,3 | **SMDT 1730 D MEL** | ● | 12,2 |
| 17,4 | **SMDT 1740 D MEL** | ● | 12,2 |
| 17,5 | **SMDT 1750 D MEL** | ● | 12,2 |
| 17,6 | **SMDT 1760 D MEL** | ● | 12,2 |
| 17,7 | **SMDT 1770 D MEL** | ● | 12,2 |
| 17,8 | **SMDT 1780 D MEL** | ● | 12,2 |
| 17,9 | **SMDT 1790 D MEL** | ● | 12,2 |
| **18,0** | **SMDT 1800 D MEL** | ● | 12,9 |
| 18,1 | **SMDT 1810 D MEL** | ● | 12,9 |
| 18,2 | **SMDT 1820 D MEL** | ● | 12,9 |
| 18,3 | **SMDT 1830 D MEL** | ● | 12,9 |
| 18,4 | **SMDT 1840 D MEL** | ● | 12,9 |
| 18,5 | **SMDT 1850 D MEL** | ● | 12,9 |
| 18,6 | **SMDT 1860 D MEL** | ● | 12,9 |
| 18,7 | **SMDT 1870 D MEL** | ● | 12,9 |

### ● øD: 18,8~30,5mm

| øD (mm) | Cat. No. | Stock | H (mm) |
|---|---|---|---|
| 18,8 | **SMDT 1880 D MEL** | ● | 12,9 |
| 18,9 | **SMDT 1890 D MEL** | ● | 12,9 |
| **19,0** | **SMDT 1900 D MEL** | ● | 13,5 |
| 19,1 | **SMDT 1910 D MEL** | ● | 13,5 |
| 19,2 | **SMDT 1920 D MEL** | ● | 13,5 |
| 19,3 | **SMDT 1930 D MEL** | ● | 13,5 |
| 19,4 | **SMDT 1940 D MEL** | ● | 13,5 |
| 19,5 | **SMDT 1950 D MEL** | ● | 13,5 |
| 19,6 | **SMDT 1960 D MEL** | ● | 13,5 |
| 19,7 | **SMDT 1970 D MEL** | ● | 13,5 |
| 19,8 | **SMDT 1980 D MEL** | ● | 13,5 |
| 19,9 | **SMDT 1990 D MEL** | ● | 13,5 |
| **20,0** | **SMDT 2000 D MEL** | ● | 14,1 |
| 20,5 | **SMDT 2050 D MEL** | ● | 14,1 |
| **21,0** | **SMDT 2100 D MEL** | ● | 14,8 |
| 21,5 | **SMDT 2150 D MEL** | ● | 14,8 |
| **22,0** | **SMDT 2200 D MEL** | ● | 15,0 |
| 22,5 | **SMDT 2250 D MEL** | ● | 15,0 |
| **23,0** | **SMDT 2300 D MEL** | ● | 15,1 |
| 23,5 | **SMDT 2350 D MEL** | ● | 15,1 |
| **24,0** | **SMDT 2400 D MEL** | ● | 15,4 |
| 24,5 | **SMDT 2450 D MEL** | ● | 15,4 |
| **25,0** | **SMDT 2500 D MEL** | ● | 15,8 |
| 25,5 | **SMDT 2550 D MEL** | ● | 15,8 |
| **26,0** | **SMDT 2600 D MEL** | ● | 16,4 |
| 26,5 | **SMDT 2650 D MEL** | ● | 16,4 |
| **27,0** | **SMDT 2700 D MEL** | ● | 17,1 |
| 27,5 | **SMDT 2750 D MEL** | ● | 17,1 |
| **28,0** | **SMDT 2800 D MEL** | ● | 17,7 |
| 28,5 | **SMDT 2850 D MEL** | ● | 17,7 |
| **29,0** | **SMDT 2900 D MEL** | ● | 18,3 |
| 29,5 | **SMDT 2950 D MEL** | ● | 18,3 |
| **30,0** | **SMDT 3000 D MEL** | ● | 19,0 |
| 30,5 | **SMDT 3050 D MEL** | ● | 19,0 |

## ■ Recommended Cutting Conditions

### ● For using **3xD** and **5xD** type drills

| Drill Ø (mm) \ Work material | | Soft steel (~HB250) | Stainless steel (~HB200) | Grey cast iron |
|---|---|---|---|---|
| ~ 16,0 | $v_c$ | 80 – **100** – 120 | 50 – **60** – 80 | 50 – **70** – 90 |
| | f | 0,15 – **0,2** – 0,35 | 0,1 – **0,15** – 0,2 | 0,2 – **0,25** – 0,3 |
| ~ 20,0 | $v_c$ | 80 – **100** – 120 | 60 – **70** – 90 | 60 – **80** – 100 |
| | f | 0,15 – **0,25** – 0,35 | 0,15 – **0,2** – 0,25 | 0,25 – **0,3** – 0,35 |
| ~ 30,8 | $v_c$ | 80 – **100** – 120 | 60 – **70** – 90 | 60 – **80** – 100 |
| | f | 0,2 – **0,3** – 0,35 | 0,15 – **0,2** – 0,25 | 0,2 – **0,35** – 0,40 |

Note: High cutting performance is enhanced when using a high quality machine and rigid set up.

### ● For using **8xD** type drills

| Drill Ø (mm) \ Work material | | Soft steel (~HB250) | Stainless steel (~HB200) | Grey cast iron |
|---|---|---|---|---|
| ~ 16,0 | $v_c$ | 50 – **70** – 80 | 40 – **50** – 60 | 40 – **60** – 80 |
| | f | 0,15 – **0,2** – 0,35 | 0,1 – **0,15** – 0,2 | 0,2 – **0,25** – 0,3 |
| ~ 20,0 | $v_c$ | 50 – **70** – 80 | 40 – **60** – 70 | 50 – **70** – 90 |
| | f | 0,15 – **0,25** – 0,35 | 0,15 – **0,2** – 0,25 | 0,25 – **0,3** – 0,35 |
| ~ 30,8 | $v_c$ | 60 – **70** – 80 | 40 – **60** – 70 | 50 – **70** – 90 |
| | f | 0,2 – **0,3** – 0,35 | 0,15 – **0,2** – 0,25 | 0,2 – **0,35** – 0,4 |

[ $v_c$ : Cutting Speed (m/min), f : Feed rate (mm/rev), Min - **Optimum** - Max ]





● = Euro stock

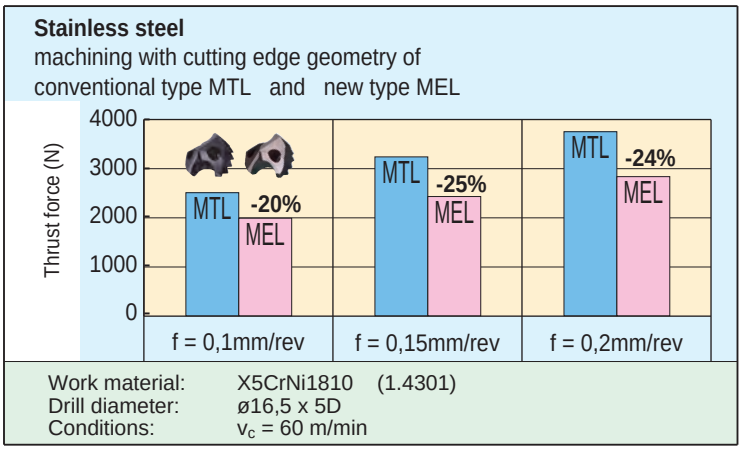


## Advantages

- **Replaceable and regrindable drill head**
- **New design decreases cutting force by 25%**
- **Ideal for stainless steels - soft steels etc**
- **Excellent tool life when drilling cast iron**
- **Improves drilling performance on low powered machines**
- **Increases productivity**

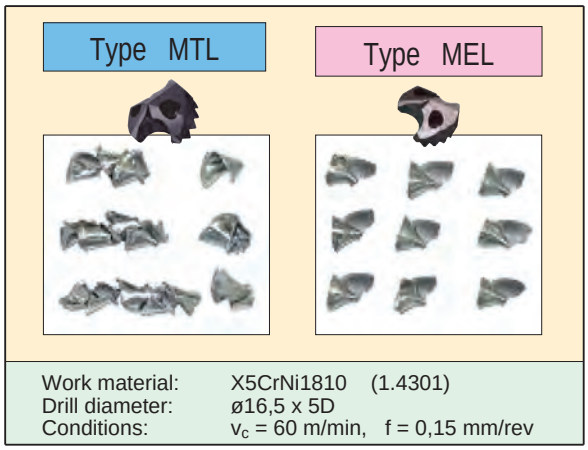
## Performance (Stainless steel machinig)

### Comparison of cutting force




Work material: X5CrNi1810 (1.4301)
Drill diameter: ø16,5 x 5D
Conditions: $v_c$ = 60 m/min

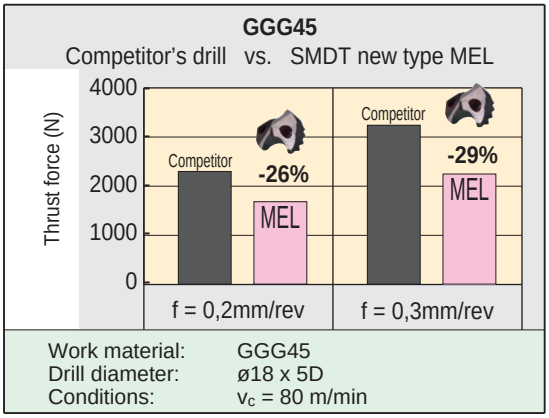
### Chip comparison




Work material: X5CrNi1810 (1.4301)
Drill diameter: ø16,5 x 5D
Conditions: $v_c$ = 60 m/min, f = 0,15 mm/rev

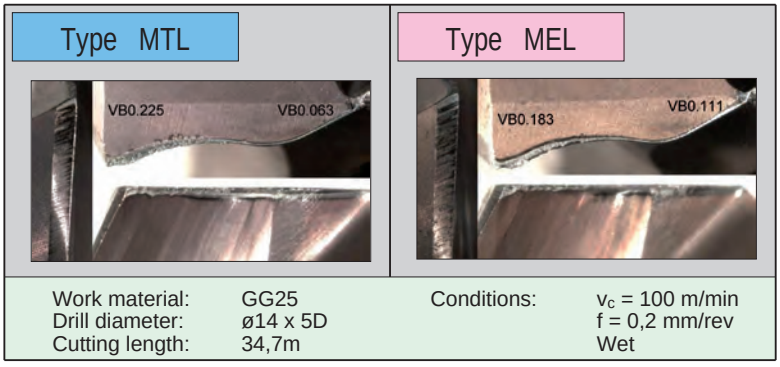
## Performance (Cast iron machinig)

### Comparison of cutting force




Work material: GGG45
Drill diameter: ø18 x 5D
Conditions: $v_c$ = 80 m/min

### Comparison of wear resistance




Work material: GG25
Drill diameter: ø14 x 5D
Cutting length: 34,7m
Conditions: $v_c$ = 100 m/min
f = 0,2 mm/rev
Wet

# WDX Type

ECONOMICAL - FAST - ACCURATE - RIGID

High Feed Drilling - 4 Edge Inserts



## General Features

The newly designed WDX drill features indexable inserts with 4 cutting edges and a range of optimised chipbreakers;
light (L) - general purpose (G) - heavy (H) for rapid chip removal.

The balanced cut design maximises feed rates and accuracy whilst the super ZX ultra hard coated inserts double the tool life.

## Advantages

### ● Rigid - Economical - Multi-function

Drills - Bores - External Turns
Diameter range 13,0 ~ 55,0 mm
Drilling depth ~ 2D, ~ 3D, ~ 4D, ~ 5D

### ● Excellent chip control

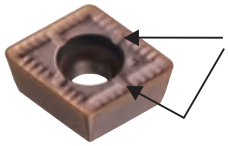
Wide application suitability - choose from 3 styles of chipbreaker



**L** Type
- Excellent chip control under low feed rate conditions
- Excellent hole accuracy
- Excellent surface finish



**G** Type
- General purpose chipbreaker
- Excellent chip control
- Low cutting force
- Low / medium feed rates




**H** Type
- Strong cutting edge at higher feed rates
- Stable machining ~ eliminates vibration and noise

### ● One insert style for both pockets

4 Edge insert provides both Inner and Outer cutting edges
Newly designed insert style simplifies insert management.

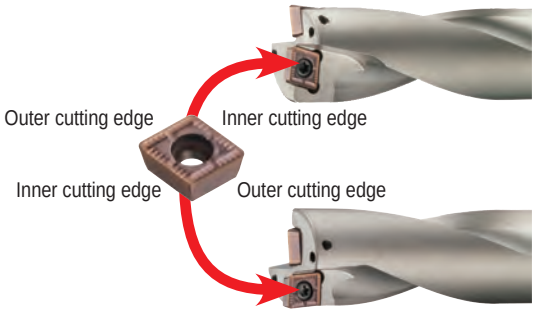
### ● Ultra hard Super ZX inserts double tool life

**ACP300** for steels - stainless steels - difficult to cut materials
**ACK300** for cast irons

### ● Excellent hole accuracy

Improved cutting force balance and insert design for optimum performance

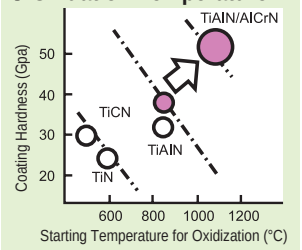




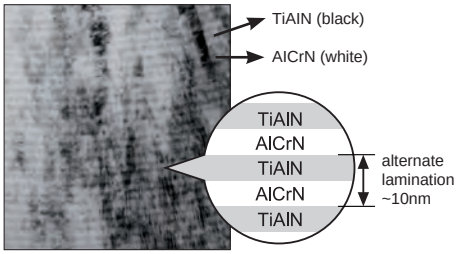

## ● Features of Super ZX Coating

- Super-multi layered coating with ultra-thin (nanometer) layers of TiAlN and AlCrN, alternately stacked up to 1.000 layers.
- 40% increase in coating hardness and 200% increase in oxidation temperature as compared with conventional grades

### ● Oxidation Temperature



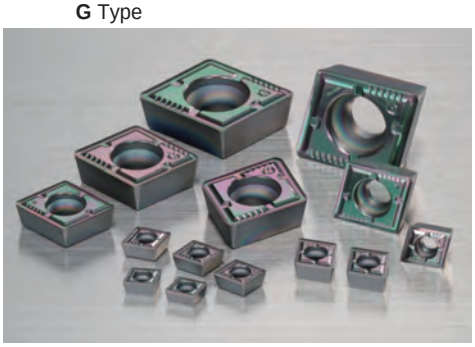

### ● Coating Structure




## "AURORA" Coating DLC (Diamond Like Carbon)

Coated Grade **DL1500** for Aluminium

**G** Type



### ● Super smooth surface and low coefficient of friction

Achieving beautiful finishing on Aluminium and non-ferrous metalls with its high resistance to build-up edge.

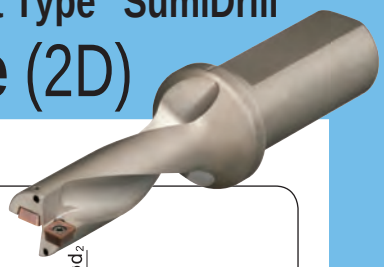
| Peripheral Insert | |
|---|---|
| **DL1500** | ACK300 |



| Central Insert | |
|---|---|
| **DL1500** | ACK300 |



# WDX Type (2D)



## Max. Depth : 2 x øD

Guide for machining tolerance : -0,05 ~ +0,15

Fig. 1

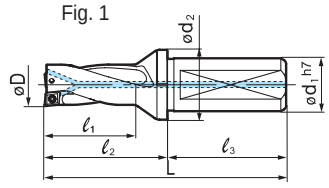



Fig. 2

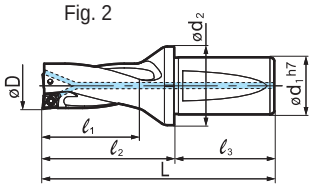
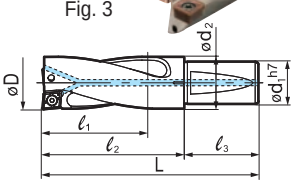



Fig. 3




## Holder

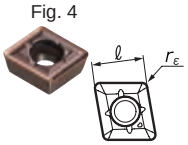
| øD (mm) | Cat. No. | Stock | Dimensions (mm) L | ℓ1 | ℓ2 | ød1 | ød2 | ℓ3 | Applicable Insert | Fig. |
|---|---|---|---|---|---|---|---|---|---|---|
| 13,0 | WDX 130D2S20 | ● | 88 | 29 | 44 | | | | | |
| 13,5 | WDX 135D2S20 | ● | 89 | 30 | 45 | | | | | |
| 14,0 | WDX 140D2S20 | ● | 90 | 31 | 46 | 20 | 28 | 44 | WDXT 042004 | |
| 14,5 | WDX 145D2S20 | ● | 91 | 32 | 47 | | | | | |
| **15,0** | WDX 150D2S20 | ● | 92 | 33 | 48 | | | | | |
| 15,5 | WDX 155D2S20 | ● | 93 | 34 | 49 | | | | | |
| 16,0 | WDX 160D2S20 | ● | 94 | 35 | 50 | 20 | 30 | 44 | | |
| 16,5 | WDX 165D2S20 | ● | 95 | 36 | 51 | | | | WDXT 052504 | |
| 17,0 | WDX 170D2S20 | ● | 96 | 37 | 52 | | | | | |
| 17,5 | WDX 175D2S25 | ● | 109 | 38 | 53 | 25 | 32 | 56 | | |
| 18,0 | WDX 180D2S25 | ● | 110 | 39 | 54 | | | | | |
| 18,5 | WDX 185D2S25 | ● | 111 | 40 | 55 | | | | | |
| 19,0 | WDX 190D2S25 | ● | 112 | 41 | 56 | | | | | |
| 19,5 | WDX 195D2S25 | ● | 113 | 42 | 57 | | | | | |
| **20,0** | WDX 200D2S25 | ● | 114 | 43 | 58 | | | | | |
| 20,5 | WDX 205D2S25 | ● | 115 | 44 | 59 | 25 | 33 | 56 | WDXT 063006 | 1 |
| 21,0 | WDX 210D2S25 | ● | 116 | 45 | 60 | | | | | |
| 21,5 | WDX 215D2S25 | ● | 117 | 46 | 61 | | | | | |
| 22,0 | WDX 220D2S25 | ● | 118 | 47 | 62 | | | | | |
| 22,5 | WDX 225D2S25 | ● | 119 | 48 | 63 | | | | | |
| 23,0 | WDX 230D2S25 | ● | 123 | 49 | 67 | | | | | |
| 23,5 | WDX 235D2S25 | ● | 124 | 50 | 68 | | | | | |
| 24,0 | WDX 240D2S25 | ● | 125 | 51 | 69 | 25 | 37 | 56 | | |
| 24,5 | WDX 245D2S25 | ● | 126 | 52 | 70 | | | | | |
| **25,0** | WDX 250D2S25 | ● | 127 | 53 | 71 | | | | | |
| 25,5 | WDX 255D2S32 | ● | 134 | 54 | 74 | | | | WDXT 073506 | |
| 26,0 | WDX 260D2S32 | ● | 135 | 55 | 75 | | | | | |
| 26,5 | WDX 265D2S32 | ● | 136 | 56 | 76 | | | | | |
| 27,0 | WDX 270D2S32 | ● | 137 | 57 | 77 | 32 | 41 | 60 | | |
| 27,5 | WDX 275D2S32 | ● | 138 | 58 | 78 | | | | | |
| 28,0 | WDX 280D2S32 | ● | 139 | 59 | 79 | | | | | |
| 28,5 | WDX 285D2S32 | ● | 140 | 60 | 80 | | | | | |
| 29,0 | WDX 290D2S32 | ● | 143 | 62 | 83 | 32 | 50 | 60 | | |
| 29,5 | WDX 295D2S32 | ● | 144 | 63 | 84 | | | | | |
| **30,0** | WDX 300D2S40 | ● | 158 | 64 | 88 | | | | | |
| 31,0 | WDX 310D2S40 | ● | 160 | 66 | 90 | | | | | |
| 32,0 | WDX 320D2S40 | ● | 162 | 68 | 92 | | | | | |
| 33,0 | WDX 330D2S40 | ● | 164 | 70 | 94 | 40 | 54 | 70 | WDXT 094008 | 2 |
| 34,0 | WDX 340D2S40 | ● | 166 | 72 | 96 | | | | | |
| **35,0** | WDX 350D2S40 | ● | 168 | 74 | 98 | | | | | |
| 36,0 | WDX 360D2S40 | ● | 170 | 76 | 100 | | | | | |
| 37,0 | WDX 370D2S40 | ● | 179 | 79 | 109 | | | | | |
| 38,0 | WDX 380D2S40 | ● | 181 | 81 | 111 | | | | | |
| 39,0 | WDX 390D2S40 | ● | 183 | 83 | 113 | | | | | |
| **40,0** | WDX 400D2S40 | ● | 185 | 85 | 115 | | | | | |
| 41,0 | WDX 410D2S40 | ● | 187 | 87 | 117 | 40 | 49,5 | 70 | WDXT 125012 | |
| 42,0 | WDX 420D2S40 | ● | 189 | 89 | 119 | | | | | |
| 43,0 | WDX 430D2S40 | ● | 191 | 91 | 121 | | | | | |
| 44,0 | WDX 440D2S40 | ● | 193 | 93 | 123 | | | | | |
| **45,0** | WDX 450D2S40 | ● | 195 | 95 | 125 | | | | | |
| 46,0 | WDX 460D2S40 | ● | 197 | 97 | 127 | | | | | |
| 47,0 | WDX 470D2S40 | ● | 199 | 99 | 129 | | | | | |
| 48,0 | WDX 480D2S40 | ● | 201 | 101 | 131 | | 49,5 | | | |
| 49,0 | WDX 490D2S40 | ● | 203 | 103 | 133 | | | | | |
| **50,0** | WDX 500D2S40 | ● | 205 | 105 | 135 | 40 | | 70 | WDXT 156012 | |
| 51,0 | WDX 510D2S40 | ● | 207 | 107 | 137 | | | | | |
| 52,0 | WDX 520D2S40 | ● | 209 | 109 | 139 | | 50,5 | | | 3 |
| 53,0 | WDX 530D2S40 | ● | 211 | 111 | 141 | | 51,5 | | | |
| 54,0 | WDX 540D2S40 | ● | 213 | 113 | 143 | | 52,5 | | | |
| **55,0** | WDX 550D2S40 | ● | 215 | 115 | 145 | | 53,5 | | | |
| 56,0 | WDX 560D2S40 | ○ | 222 | 120 | 152 | | 54 | | | |
| 57,0 | WDX 570D2S40 | ○ | 224 | 122 | 154 | | 55 | | | |
| 58,0 | WDX 580D2S40 | ○ | 226 | 124 | 156 | | 56 | | | |
| 59,0 | WDX 590D2S40 | ○ | 228 | 126 | 158 | | 57 | | | |
| **60,0** | WDX 600D2S40 | ○ | 230 | 128 | 160 | 40 | 58 | 70 | WDXT 186012 | |
| 61,0 | WDX 610D2S40 | ○ | 232 | 130 | 162 | | 59 | | | |
| 62,0 | WDX 620D2S40 | ○ | 234 | 132 | 164 | | 60 | | | |
| 63,0 | WDX 630D2S40 | ○ | 236 | 134 | 166 | | 61 | | | |
| 64,0 | WDX 640D2S40 | ○ | 238 | 136 | 168 | | 62 | | | |
| **65,0** | WDX 650D2S40 | ○ | 240 | 138 | 170 | | 63 | | | |

● = Euro stock
○ = Stock item in Japan

## Inserts

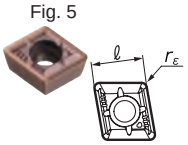
(mm)

Fig. 4



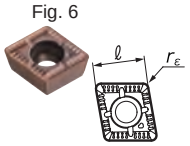

**L** Type
Excellent chip control at low feed rates

Fig. 5




**G** Type
General purpose chipbreaker

Fig. 6




**H** Type
Strong cutting edge at higher feed rates

| Cat. No. | Coated ACP300 | ACK300 | DL1500 | Fig. | Dimensions (mm) ℓ | Thickness | rε | Applicable Holder |
|---|---|---|---|---|---|---|---|---|
| WDXT 042004-L | ● | ● | | 1 | | | | |
| WDXT 042004-G | ● | ● | ● | 2 | 4,2 | 2,0 | 0,4 | WDX 130 ~ 150 |
| WDXT 042004-H | ● | ● | | 3 | | | | |
| WDXT 052504-L | ● | ● | | 1 | | | | |
| WDXT 052504-G | ● | ● | ● | 2 | 5,0 | 2,5 | 0,4 | WDX 155 ~ 180 |
| WDXT 052504-H | ● | ● | | 3 | | | | |
| WDXT 063006-L | ● | ● | | 1 | | | | |
| WDXT 063006-G | ● | ● | ● | 2 | 6,0 | 3,0 | 0,6 | WDX 185 ~ 225 |
| WDXT 063006-H | ● | ● | | 3 | | | | |
| WDXT 073506-L | ● | ● | | 1 | | | | |
| WDXT 073506-G | ● | ● | ● | 2 | 7,5 | 3,5 | 0,6 | WDX 230 ~ 285 |
| WDXT 073506-H | ● | ● | | 3 | | | | |
| WDXT 094008-L | ● | ● | | 1 | | | | |
| WDXT 094008-G | ● | ● | ● | 2 | 9,6 | 4,0 | 0,8 | WDX 290 ~ 360 |
| WDXT 094008-H | ● | ● | | 3 | | | | |
| WDXT 125012-L | ● | ● | | 1 | | | | |
| WDXT 125012-G | ● | ● | ● | 2 | 12,4 | 5,0 | 1,2 | WDX 370 ~ 450 |
| WDXT 125012-H | ● | ● | | 3 | | | | |
| WDXT 156012-L | ● | ● | | 1 | | | | |
| WDXT 156012-G | ● | ● | ● | 2 | 15,2 | 6,0 | 1,2 | WDX 460 ~ 550 |
| WDXT 156012-H | ● | ● | | 3 | | | | |
| WDXT 186012-G | ○ | ○ | | 2 | 18,0 | 6,0 | 1,2 | WDX 560 ~ 650 |

## Spare Parts

| Screw | Wrench | Wrench | Applicable Holders | Recommended Torque (Nm) |
|---|---|---|---|---|
| BFTX 01604 N | TRX 06 | – | WDX 130D○S20 ~ 150D○S20 | 0,5 |
| BFTX 0204 N | TRX 06 | – | WDX 155D○S20 ~ 180D○S25 | 0,5 |
| BFTY 02206 | – | TRD 07 | WDX 185D○S25 ~ 225D○S25 | 1,0 |
| BFTX 02506 N | – | TRD 08 | WDX 230D○S25 ~ 285D○S32 | 1,5 |
| BFTX 03584 | – | TRD 15 | WDX 290D○S32 ~ 360D○S40 | 3,5 |
| BFTX 0511 N | – | TRD 20 | WDX 370D○S40 ~ 450D○S40 | 5,0 |
| BFTX 0615 N | – | TRD 25 | WDX 460D○S40 ~ 650D○S40 | 5,0 |

Identification of Drill Body

**WDX 200 D2 S25**

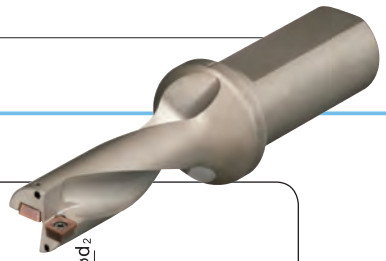
- 200: Drill Diameter ( ø20,0 mm)
- D2: Flute Length L/D ( 2 x D )
- S25: Shank Size ( ø25,0 mm)

Identification of Indexable Insert

**WDXT 06 30 06 -G**

- 06: Width Across Flats ( 6,0 mm)
- 30: Thickness ( 3,0 mm)
- 06: Corner Radius ( 0,6 mm)
- -G: Breaker Type

# WDX Type (3D)



## Max. Depth : 3 x øD

Guide for machining tolerance : +0,00 ~ +0,20

Fig. 1

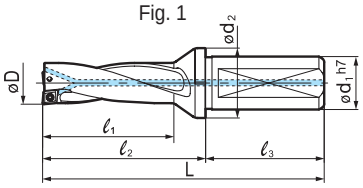



Fig. 2

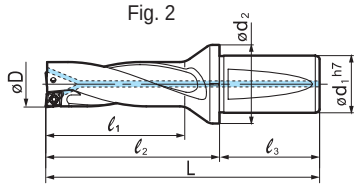
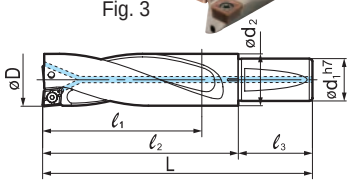



Fig. 3



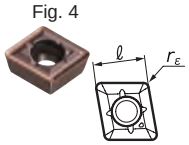

## Holder

| øD (mm) | Cat. No. | Stock | Dimensions (mm) L | ℓ1 | ℓ2 | ød1 | ød2 | ℓ3 | Applicable Insert | Fig. |
|---|---|---|---|---|---|---|---|---|---|---|
| 13,0 | **WDX 130D3S20** | ● | 101,0 | 42,0 | 57,0 | | | | | |
| 13,5 | **WDX 135D3S20** | ● | 102,5 | 43,5 | 58,5 | | | | | |
| 14,0 | **WDX 140D3S20** | ● | 104,0 | 45,0 | 60,0 | 20 | 28 | 44 | WDXT 042004 | |
| 14,5 | **WDX 145D3S20** | ● | 105,5 | 46,5 | 61,5 | | | | | |
| **15,0** | **WDX 150D3S20** | ● | 107,0 | 58,0 | 63,0 | | | | | |
| 15,5 | **WDX 155D3S20** | ● | 108,5 | 49,5 | 64,5 | | | | | |
| 16,0 | **WDX 160D3S20** | ● | 110,0 | 51,0 | 66,0 | 20 | 30 | 44 | WDXT 052504 | |
| 16,5 | **WDX 165D3S20** | ● | 111,5 | 52,5 | 67,5 | | | | | |
| 17,0 | **WDX 170D3S20** | ● | 113,0 | 54,0 | 69,0 | | | | | |
| 17,5 | **WDX 175D3S25** | ● | 126,5 | 55,5 | 70,5 | 25 | 32 | 56 | | |
| 18,0 | **WDX 180D3S25** | ● | 128,0 | 57,0 | 72,0 | | | | | |
| 18,5 | **WDX 185D3S25** | ● | 129,5 | 58,5 | 73,5 | | | | | |
| 19,0 | **WDX 190D3S25** | ● | 131,0 | 60,0 | 75,0 | | | | | 1 |
| 19,5 | **WDX 195D3S25** | ● | 132,5 | 61,5 | 76,5 | | | | | |
| **20,0** | **WDX 200D3S25** | ● | 134,0 | 63,0 | 78,0 | 25 | 33 | 56 | WDXT 063006 | |
| 20,5 | **WDX 205D3S25** | ● | 135,5 | 64,5 | 79,5 | | | | | |
| 21,0 | **WDX 210D3S25** | ● | 137,0 | 66,0 | 81,0 | | | | | |
| 21,5 | **WDX 215D3S25** | ● | 138,5 | 67,5 | 82,5 | | | | | |
| 22,0 | **WDX 220D3S25** | ● | 140,0 | 69,0 | 84,0 | | | | | |
| 22,5 | **WDX 225D3S25** | ● | 141,5 | 70,5 | 85,5 | | | | | |
| 23,0 | **WDX 230D3S25** | ● | 146,0 | 72,0 | 90,0 | | | | | |
| 23,5 | **WDX 235D3S25** | ● | 147,5 | 73,5 | 91,5 | | | | | |
| 24,0 | **WDX 240D3S25** | ● | 149,0 | 75,0 | 93,0 | 25 | 37 | 56 | | |
| 24,5 | **WDX 245D3S25** | ● | 150,5 | 76,5 | 94,5 | | | | | |
| **25,0** | **WDX 250D3S25** | ● | 152,0 | 78,0 | 96,0 | | | | | |
| 25,5 | **WDX 255D3S32** | ● | 159,5 | 79,5 | 97,5 | | | | WDXT 073506 | |
| 26,0 | **WDX 260D3S32** | ● | 161,0 | 81,0 | 101,0 | | | | | |
| 26,5 | **WDX 265D3S32** | ● | 162,5 | 82,5 | 102,5 | | | | | |
| 27,0 | **WDX 270D3S32** | ● | 164,0 | 84,0 | 104,0 | 32 | 41 | 60 | | |
| 27,5 | **WDX 275D3S32** | ● | 165,5 | 85,5 | 105,5 | | | | | |
| 28,0 | **WDX 280D3S32** | ● | 167,0 | 87,0 | 107,0 | | | | | |
| 28,5 | **WDX 285D3S32** | ● | 168,5 | 88,5 | 108,5 | | | | | |
| 29,0 | **WDX 290D3S32** | ● | 172,0 | 91,0 | 112,0 | 32 | 50 | 60 | | |
| 29,5 | **WDX 295D3S32** | ● | 173,5 | 92,5 | 113,5 | | | | | |
| **30,0** | **WDX 300D3S40** | ● | 188,0 | 94,0 | 118,0 | | | | | |
| 31,0 | **WDX 310D3S40** | ● | 191,0 | 97,0 | 121,0 | | | | | |
| 32,0 | **WDX 320D3S40** | ● | 194,0 | 100,0 | 124,0 | | | | | |
| 33,0 | **WDX 330D3S40** | ● | 197,0 | 103,0 | 127,0 | 40 | 54 | 70 | WDXT 094008 | |
| 34,0 | **WDX 340D3S40** | ● | 200,0 | 106,0 | 130,0 | | | | | |
| **35,0** | **WDX 350D3S40** | ● | 203,0 | 109,0 | 133,0 | | | | | |
| 36,0 | **WDX 360D3S40** | ● | 206,0 | 112,0 | 136,0 | | | | | 2 |
| 37,0 | **WDX 370D3S40** | ● | 216,0 | 116,0 | 146,0 | | | | | |
| 38,0 | **WDX 380D3S40** | ● | 219,0 | 119,0 | 149,0 | | | | | |
| 39,0 | **WDX 390D3S40** | ● | 222,0 | 122,0 | 152,0 | | | | | |
| **40,0** | **WDX 400D3S40** | ● | 225,0 | 125,0 | 155,0 | | | | | |
| 41,0 | **WDX 410D3S40** | ● | 228,0 | 128,0 | 158,0 | 40 | 49,5 | 70 | WDXT 125012 | |
| 42,0 | **WDX 420D3S40** | ● | 231,0 | 131,0 | 161,0 | | | | | |
| 43,0 | **WDX 430D3S40** | ● | 234,0 | 134,0 | 164,0 | | | | | |
| 44,0 | **WDX 440D3S40** | ● | 237,0 | 137,0 | 167,0 | | | | | |
| **45,0** | **WDX 450D3S40** | ● | 240,0 | 140,0 | 170,0 | | | | | |
| 46,0 | **WDX 460D3S40** | ● | 243,0 | 143,0 | 173,0 | | | | | |
| 47,0 | **WDX 470D3S40** | ● | 246,0 | 146,0 | 176,0 | | | | | |
| 48,0 | **WDX 480D3S40** | ● | 249,0 | 149,0 | 179,0 | | 49,5 | | | |
| 49,0 | **WDX 490D3S40** | ● | 252,0 | 152,0 | 182,0 | | | | | |
| **50,0** | **WDX 500D3S40** | ● | 255,0 | 155,0 | 185,0 | 40 | | 70 | WDXT 156012 | |
| 51,0 | **WDX 510D3S40** | ● | 258,0 | 158,0 | 188,0 | | | | | |
| 52,0 | **WDX 520D3S40** | ● | 261,0 | 161,0 | 191,0 | | 50,5 | | | |
| 53,0 | **WDX 530D3S40** | ● | 264,0 | 164,0 | 194,0 | | 51,5 | | | |
| 54,0 | **WDX 540D3S40** | ● | 267,0 | 167,0 | 197,0 | | 52,5 | | | |
| **55,0** | **WDX 550D3S40** | ● | 270,0 | 170,0 | 200,0 | | 53,5 | | | |
| 56,0 | **WDX 560D3S40** | ❍ | 278,0 | 176,0 | 208,0 | | 54 | | | |
| 57,0 | **WDX 570D3S40** | ❍ | 281,0 | 179,0 | 211,0 | | 55 | | | |
| 58,0 | **WDX 580D3S40** | ❍ | 284,0 | 182,0 | 214,0 | | 56 | | | 3 |
| 59,0 | **WDX 590D3S40** | ❍ | 287,0 | 185,0 | 217,0 | | 57 | | | |
| **60,0** | **WDX 600D3S40** | ❍ | 290,0 | 188,0 | 220,0 | 40 | 58 | 70 | WDXT 186012 | |
| 61,0 | **WDX 610D3S40** | ❍ | 293,0 | 191,0 | 223,0 | | 59 | | | |
| 62,0 | **WDX 620D3S40** | ❍ | 296,0 | 194,0 | 226,0 | | 60 | | | |
| 63,0 | **WDX 630D3S40** | ❍ | 299,0 | 197,0 | 229,0 | | 61 | | | |
| 64,0 | **WDX 640D3S40** | ❍ | 302,0 | 200,0 | 232,0 | | 62 | | | |
| 65,0 | **WDX 650D3S40** | ❍ | 305,0 | 203,0 | 235,0 | | 63 | | | |

## Inserts

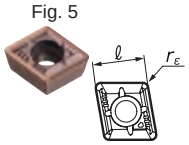
(mm)

Fig. 4



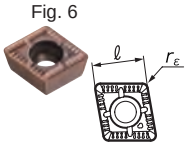

**L** Type
Excellent chip control at low feed rates

Fig. 5




**G** Type
General purpose chipbreaker

Fig. 6




**H** Type
Strong cutting edge at higher feed rates

| Cat. No. | Coated ACP300 | ACK300 | DL1500 | Fig. | Dimensions (mm) ℓ | Thickness | rε | Applicable Holder |
|---|---|---|---|---|---|---|---|---|
| **WDXT 042004-L** | ● | ● | | 1 | | | | |
| **WDXT 042004-G** | ● | ● | ● | 2 | 4,2 | 2,0 | 0,4 | WDX 130 ~ 150 |
| **WDXT 042004-H** | ● | ● | | 3 | | | | |
| **WDXT 052504-L** | ● | ● | | 1 | | | | |
| **WDXT 052504-G** | ● | ● | ● | 2 | 5,0 | 2,5 | 0,4 | WDX 155 ~ 180 |
| **WDXT 052504-H** | ● | ● | | 3 | | | | |
| **WDXT 063006-L** | ● | ● | | 1 | | | | |
| **WDXT 063006-G** | ● | ● | ● | 2 | 6,0 | 3,0 | 0,6 | WDX 185 ~ 225 |
| **WDXT 063006-H** | ● | ● | | 3 | | | | |
| **WDXT 073506-L** | ● | ● | | 1 | | | | |
| **WDXT 073506-G** | ● | ● | ● | 2 | 7,5 | 3,5 | 0,6 | WDX 230 ~ 285 |
| **WDXT 073506-H** | ● | ● | | 3 | | | | |
| **WDXT 094008-L** | ● | ● | | 1 | | | | |
| **WDXT 094008-G** | ● | ● | ● | 2 | 9,6 | 4,0 | 0,8 | WDX 290 ~ 360 |
| **WDXT 094008-H** | ● | ● | | 3 | | | | |
| **WDXT 125012-L** | ● | ● | | 1 | | | | |
| **WDXT 125012-G** | ● | ● | ● | 2 | 12,4 | 5,0 | 1,2 | WDX 370 ~ 450 |
| **WDXT 125012-H** | ● | ● | | 3 | | | | |
| **WDXT 156012-L** | ● | ● | | 1 | | | | |
| **WDXT 156012-G** | ● | ● | ● | 2 | 15,2 | 6,0 | 1,2 | WDX 460 ~ 550 |
| **WDXT 156012-H** | ● | ● | | 3 | | | | |
| **WDXT 186012-G** | ❍ | ❍ | | 2 | 18,0 | 6,0 | 1,2 | WDX 560 ~ 650 |

## Spare Parts

| Screw | Wrench | Wrench | Applicable Holders | Recommended Torque (Nm) |
|---|---|---|---|---|
|  |  |  | | |
| BFTX 01604 N | TRX 06 | – | WDX 130D❍S20 ~ 150D❍S20 | 0,5 |
| BFTX 0204 N | TRX 06 | – | WDX 155D❍S20 ~ 180D❍S25 | 0,5 |
| BFTY 02206 | – | TRD 07 | WDX 185D❍S25 ~ 225D❍S25 | 1,0 |
| BFTX 02506 N | – | TRD 08 | WDX 230D❍S25 ~ 285D❍S32 | 1,5 |
| BFTX 03584 | – | TRD 15 | WDX 290D❍S32 ~ 360D❍S40 | 3,5 |
| BFTX 0511 N | – | TRD 20 | WDX 370D❍S40 ~ 450D❍S40 | 5,0 |
| BFTX 0615 N | – | TRD 25 | WDX 460D❍S40 ~ 650D❍S40 | 5,0 |

Identification of Drill Body

**WDX 200 D3 S25**

- 200 — Drill Diameter ( ø20,0 mm)
- D3 — Flute Length L/D ( 3 x D )
- S25 — Shank Size ( ø25,0 mm)

Identification of Indexable Insert

**WDXT 06 30 06 -G**

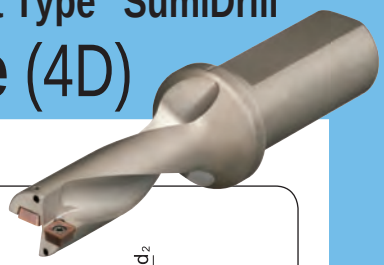
- 06 — Width Across Flats ( 6,0 mm)
- 30 — Thickness ( 3,0 mm)
- 06 — Corner Radius ( 0,6 mm)
- -G — Breaker Type





● = Euro stock
❍ = Stock item in Japan

# WDX Type (4D)



## Max. Depth : 4 x øD

Guide for machining tolerance : +0,00 ~ +0,25

Fig. 1

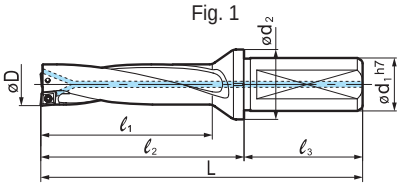



Fig. 2

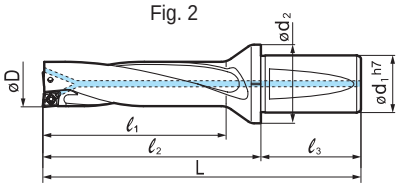
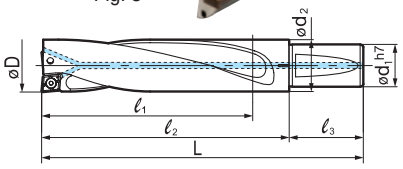



Fig. 3



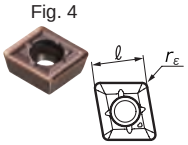

## Holder

| øD (mm) | Cat. No. | Stock | Dimensions (mm) L | ℓ1 | ℓ2 | ød1 | ød2 | ℓ3 | Applicable Insert | Fig. |
|---|---|---|---|---|---|---|---|---|---|---|
| 13,0 | WDX 130D4S20 | ● | 114 | 55 | 70 | | | | | |
| 13,5 | WDX 135D4S20 | ● | 116 | 57 | 72 | | | | | |
| 14,0 | WDX 140D4S20 | ● | 118 | 59 | 74 | 20 | 28 | 44 | WDXT 042004 | |
| 14,5 | WDX 145D4S20 | ● | 120 | 61 | 76 | | | | | |
| **15,0** | WDX 150D4S20 | ● | 122 | 63 | 78 | | | | | |
| 15,5 | WDX 155D4S20 | ● | 124 | 65 | 80 | | | | | |
| 16,0 | WDX 160D4S20 | ● | 126 | 67 | 82 | 20 | 30 | 44 | | |
| 16,5 | WDX 165D4S20 | ● | 128 | 69 | 84 | | | | WDXT 052504 | |
| 17,0 | WDX 170D4S20 | ● | 130 | 71 | 86 | | | | | |
| 17,5 | WDX 175D4S25 | ● | 144 | 73 | 88 | 25 | 32 | 56 | | |
| 18,0 | WDX 180D4S25 | ● | 146 | 75 | 90 | | | | | |
| 18,5 | WDX 185D4S25 | ● | 148 | 77 | 92 | | | | | |
| 19,0 | WDX 190D4S25 | ● | 150 | 79 | 94 | | | | | |
| 19,5 | WDX 195D4S25 | ● | 152 | 81 | 96 | | | | | |
| **20,0** | WDX 200D4S25 | ● | 154 | 83 | 98 | | | | | |
| 20,5 | WDX 205D4S25 | ● | 156 | 85 | 100 | 25 | 33 | 56 | WDXT 063006 | 1 |
| 21,0 | WDX 210D4S25 | ● | 158 | 87 | 102 | | | | | |
| 21,5 | WDX 215D4S25 | ● | 160 | 89 | 104 | | | | | |
| 22,0 | WDX 220D4S25 | ● | 162 | 91 | 106 | | | | | |
| 22,5 | WDX 225D4S25 | ● | 164 | 93 | 108 | | | | | |
| 23,0 | WDX 230D4S25 | ● | 169 | 95 | 113 | | | | | |
| 23,5 | WDX 235D4S25 | ● | 171 | 97 | 115 | | | | | |
| 24,0 | WDX 240D4S25 | ● | 173 | 99 | 117 | 25 | 37 | 56 | | |
| 24,5 | WDX 245D4S25 | ● | 175 | 101 | 119 | | | | | |
| **25,0** | WDX 250D4S25 | ● | 177 | 103 | 121 | | | | | |
| 25,5 | WDX 255D4S32 | ● | 185 | 105 | 125 | | | | WDXT 073506 | |
| 26,0 | WDX 260D4S32 | ● | 187 | 107 | 127 | | | | | |
| 26,5 | WDX 265D4S32 | ● | 189 | 109 | 129 | | | | | |
| 27,0 | WDX 270D4S32 | ● | 191 | 111 | 131 | 32 | 41 | 60 | | |
| 27,5 | WDX 275D4S32 | ● | 193 | 113 | 133 | | | | | |
| 28,0 | WDX 280D4S32 | ● | 195 | 115 | 135 | | | | | |
| 28,5 | WDX 285D4S32 | ● | 197 | 117 | 137 | | | | | |
| 29,0 | WDX 290D4S32 | ● | 201 | 120 | 141 | 32 | 50 | 60 | | |
| 29,5 | WDX 295D4S32 | ● | 203 | 122 | 143 | | | | | |
| **30,0** | WDX 300D4S40 | ● | 218 | 124 | 148 | | | | | |
| 31,0 | WDX 310D4S40 | ● | 222 | 128 | 152 | | | | | |
| 32,0 | WDX 320D4S40 | ● | 226 | 132 | 156 | | | | | |
| 33,0 | WDX 330D4S40 | ● | 230 | 136 | 160 | 40 | 54 | 70 | WDXT 094008 | |
| 34,0 | WDX 340D4S40 | ● | 234 | 140 | 164 | | | | | |
| **35,0** | WDX 350D4S40 | ● | 238 | 144 | 168 | | | | | 2 |
| 36,0 | WDX 360D4S40 | ● | 242 | 148 | 172 | | | | | |
| 37,0 | WDX 370D4S40 | ● | 253 | 153 | 183 | | | | | |
| 38,0 | WDX 380D4S40 | ● | 257 | 157 | 187 | | | | | |
| 39,0 | WDX 390D4S40 | ● | 261 | 161 | 191 | | | | | |
| **40,0** | WDX 400D4S40 | ● | 265 | 165 | 195 | | | | | |
| 41,0 | WDX 410D4S40 | ● | 269 | 169 | 199 | 40 | 49,5 | 70 | WDXT 125012 | |
| 42,0 | WDX 420D4S40 | ● | 273 | 173 | 203 | | | | | |
| 43,0 | WDX 430D4S40 | ● | 277 | 177 | 207 | | | | | |
| 44,0 | WDX 440D4S40 | ● | 281 | 181 | 211 | | | | | |
| **45,0** | WDX 450D4S40 | ● | 285 | 185 | 215 | | | | | |
| 46,0 | WDX 460D4S40 | ● | 289 | 189 | 219 | | | | | |
| 47,0 | WDX 470D4S40 | ● | 293 | 193 | 223 | | | | | |
| 48,0 | WDX 480D4S40 | ● | 297 | 197 | 227 | | | | | |
| 49,0 | WDX 490D4S40 | ● | 301 | 201 | 231 | | 49,5 | | | |
| **50,0** | WDX 500D4S40 | ● | 305 | 205 | 235 | 40 | | 70 | WDXT 156012 | |
| 51,0 | WDX 510D4S40 | ● | 309 | 209 | 239 | | | | | |
| 52,0 | WDX 520D4S40 | ● | 313 | 213 | 243 | | 50,5 | | | 3 |
| 53,0 | WDX 530D4S40 | ● | 317 | 217 | 247 | | 51,5 | | | |
| 54,0 | WDX 540D4S40 | ● | 321 | 221 | 251 | | 52,5 | | | |
| **55,0** | WDX 550D4S40 | ● | 325 | 225 | 255 | | 53,5 | | | |
| 56,0 | WDX 560D4S40 | ○ | 334 | 232 | 264 | | 54 | | | |
| 57,0 | WDX 570D4S40 | ○ | 338 | 236 | 268 | | 55 | | | |
| 58,0 | WDX 580D4S40 | ○ | 342 | 240 | 272 | 40 | 56 | 70 | WDXT 186012 | |
| 59,0 | WDX 590D4S40 | ○ | 346 | 244 | 276 | | 57 | | | |
| **60,0** | WDX 600D4S40 | ○ | 350 | 248 | 280 | | 58 | | | |

## Inserts

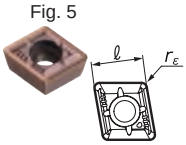
(mm)

Fig. 4



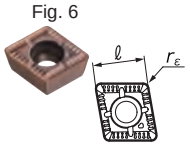

**L** Type
Excellent chip control at low feed rates

Fig. 5




**G** Type
General purpose chipbreaker

Fig. 6




**H** Type
Strong cutting edge at higher feed rates

| Cat. No. | Coated ACP300 | ACK300 | DL1500 | Fig. | Dimensions (mm) ℓ | Thickness | rε | Applicable Holder |
|---|---|---|---|---|---|---|---|---|
| WDXT 042004-L | ● | ● | | 1 | | | | |
| WDXT 042004-G | ● | ● | ● | 2 | 4,2 | 2,0 | 0,4 | WDX 130 ~ 150 |
| WDXT 042004-H | ● | ● | | 3 | | | | |
| WDXT 052504-L | ● | ● | | 1 | | | | |
| WDXT 052504-G | ● | ● | ● | 2 | 5,0 | 2,5 | 0,4 | WDX 155 ~ 180 |
| WDXT 052504-H | ● | ● | | 3 | | | | |
| WDXT 063006-L | ● | ● | | 1 | | | | |
| WDXT 063006-G | ● | ● | ● | 2 | 6,0 | 3,0 | 0,6 | WDX 185 ~ 225 |
| WDXT 063006-H | ● | ● | | 3 | | | | |
| WDXT 073506-L | ● | ● | | 1 | | | | |
| WDXT 073506-G | ● | ● | ● | 2 | 7,5 | 3,5 | 0,6 | WDX 230 ~ 285 |
| WDXT 073506-H | ● | ● | | 3 | | | | |
| WDXT 094008-L | ● | ● | | 1 | | | | |
| WDXT 094008-G | ● | ● | ● | 2 | 9,6 | 4,0 | 0,8 | WDX 290 ~ 360 |
| WDXT 094008-H | ● | ● | | 3 | | | | |
| WDXT 125012-L | ● | ● | | 1 | | | | |
| WDXT 125012-G | ● | ● | ● | 2 | 12,4 | 5,0 | 1,2 | WDX 370 ~ 450 |
| WDXT 125012-H | ● | ● | | 3 | | | | |
| WDXT 156012-L | ● | ● | | 1 | | | | |
| WDXT 156012-G | ● | ● | ● | 2 | 15,2 | 6,0 | 1,2 | WDX 460 ~ 550 |
| WDXT 156012-H | ● | ● | | 3 | | | | |
| WDXT 186012-G | ○ | ○ | | 2 | 18,0 | 6,0 | 1,2 | WDX 560 ~ 650 |

## Spare Parts

| Screw | Wrench | Wrench | Applicable Holders | Recommended Torque (Nm) |
|---|---|---|---|---|
|  |  |  | | |
| BFTX 01604 N | TRX 06 | – | WDX 130D○S20 ~ 150D○S20 | 0,5 |
| BFTX 0204 N | TRX 06 | – | WDX 155D○S20 ~ 180D○S25 | 0,5 |
| BFTY 02206 | – | TRD 07 | WDX 185D○S25 ~ 225D○S25 | 1,0 |
| BFTX 02506 N | – | TRD 08 | WDX 230D○S25 ~ 285D○S32 | 1,5 |
| BFTX 03584 | – | TRD 15 | WDX 290D○S32 ~ 360D○S40 | 3,5 |
| BFTX 0511 N | – | TRD 20 | WDX 370D○S40 ~ 450D○S40 | 5,0 |
| BFTX 0615 N | – | TRD 25 | WDX 460D○S40 ~ 600D○S40 | 5,0 |

Identification of Drill Body

**WDX 200 D4 S25**

- 200 — Drill Diameter ( ø20,0 mm)
- D4 — Flute Length L/D ( 4 x D )
- S25 — Shank Size ( ø25,0 mm)

Identification of Indexable Insert

**WDXT 06 30 06 -G**

- 06 — Width Across Flats ( 6,0 mm)
- 30 — Thickness ( 3,0 mm)
- 06 — Corner Radius ( 0,6 mm)
- -G — Breaker Type

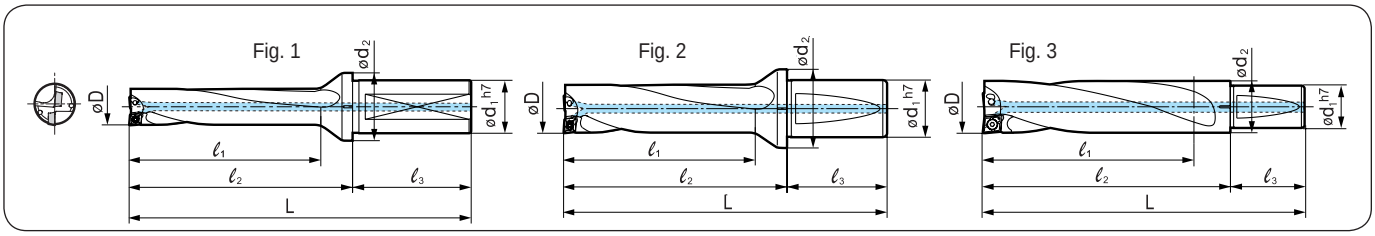
● = Euro stock
○ = Stock item in Japan

# WDX Type (5D)



## Max. Depth : 5 x øD

Guide for machining tolerance : +0,00 ~ +0,25

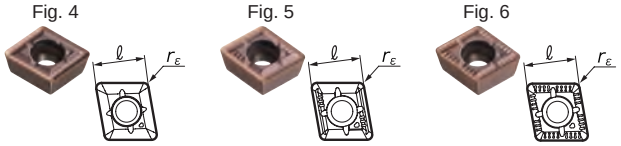



## Holder

| øD (mm) | Cat. No. | Stock | Dimensions (mm) L | ℓ1 | ℓ2 | ød1 | ød2 | ℓ3 | Applicable Insert | Fig. |
|---|---|---|---|---|---|---|---|---|---|---|
| 13,0 | **WDX 130D5S20** | ● | 127,0 | 68,0 | 83,0 | 20 | 28 | 44 | WDXT 042004 | 1 |
| 13,5 | **WDX 135D5S20** | ● | 129,5 | 70,5 | 85,5 | | | | | |
| 14,0 | **WDX 140D5S20** | ● | 132,0 | 73,0 | 88,0 | | | | | |
| 14,5 | **WDX 145D5S20** | ● | 134,5 | 75,5 | 90,5 | | | | | |
| **15,0** | **WDX 150D5S20** | ● | 137,0 | 78,0 | 93,0 | | | | | |
| 15,5 | **WDX 155D5S20** | ● | 139,5 | 80,5 | 95,5 | 20 | 30 | 44 | WDXT 052504 | |
| 16,0 | **WDX 160D5S20** | ● | 142,0 | 83,0 | 98,0 | | | | | |
| 16,5 | **WDX 165D5S20** | ● | 144,5 | 85,5 | 100,5 | | | | | |
| 17,0 | **WDX 170D5S20** | ● | 147,0 | 88,0 | 103,0 | | | | | |
| 17,5 | **WDX 175D5S25** | ● | 161,5 | 90,5 | 105,5 | 25 | 32 | 56 | | |
| 18,0 | **WDX 180D5S25** | ● | 164,0 | 93,0 | 108,0 | | | | | |
| 18,5 | **WDX 185D5S25** | ● | 166,5 | 95,5 | 110,5 | 25 | 33 | 56 | WDXT 063006 | |
| 19,0 | **WDX 190D5S25** | ● | 169,0 | 98,0 | 113,0 | | | | | |
| 19,5 | **WDX 195D5S25** | ● | 171,5 | 100,5 | 115,5 | | | | | |
| **20,0** | **WDX 200D5S25** | ● | 174,0 | 103,0 | 118,0 | | | | | |
| 20,5 | **WDX 205D5S25** | ● | 176,5 | 105,5 | 120,5 | | | | | |
| 21,0 | **WDX 210D5S25** | ● | 179,0 | 108,0 | 123,0 | | | | | |
| 21,5 | **WDX 215D5S25** | ● | 181,5 | 110,5 | 125,5 | | | | | |
| 22,0 | **WDX 220D5S25** | ● | 184,0 | 113,0 | 128,0 | | | | | |
| 22,5 | **WDX 225D5S25** | ● | 186,5 | 115,5 | 130,5 | | | | | |
| 23,0 | **WDX 230D5S25** | ● | 192,0 | 118,0 | 136,0 | 25 | 37 | 56 | WDXT 073506 | |
| 23,5 | **WDX 235D5S25** | ● | 194,5 | 120,5 | 138,5 | | | | | |
| 24,0 | **WDX 240D5S25** | ● | 197,0 | 123,0 | 141,0 | | | | | |
| 24,5 | **WDX 245D5S25** | ● | 199,5 | 125,5 | 143,5 | | | | | |
| **25,0** | **WDX 250D5S25** | ● | 202,0 | 128,0 | 146,0 | | | | | |
| 26,0 | **WDX 260D5S32** | ● | 213,0 | 133,0 | 153,0 | 32 | 41 | 60 | | 2 |
| 27,0 | **WDX 270D5S32** | ● | 218,0 | 138,0 | 158,0 | | | | | |
| 28,0 | **WDX 280D5S32** | ● | 223,0 | 143,0 | 163,0 | | | | | |
| 29,0 | **WDX 290D5S32** | ● | 230,0 | 149,0 | 170,0 | 32 | 50 | 60 | WDXT 094008 | |
| **30,0** | **WDX 300D5S40** | ● | 248,0 | 154,0 | 178,0 | 40 | 54 | 70 | | |
| 31,0 | **WDX 310D5S40** | ● | 253,0 | 159,0 | 183,0 | | | | | |
| 32,0 | **WDX 320D5S40** | ● | 258,0 | 164,0 | 188,0 | | | | | |
| 33,0 | **WDX 330D5S40** | ● | 263,0 | 169,0 | 193,0 | | | | | |
| 34,0 | **WDX 340D5S40** | ● | 268,0 | 174,0 | 198,0 | | | | | |
| **35,0** | **WDX 350D5S40** | ● | 273,0 | 179,0 | 203,0 | | | | | |
| 36,0 | **WDX 360D5S40** | ● | 278,0 | 184,0 | 208,0 | | | | | |

## Inserts

(mm)




**L** Type
Excellent chip control at low feed rates

**G** Type
General purpose chipbreaker

**H** Type
Strong cutting edge at higher feed rates

| Cat. No. | Coated ACP300 | ACK300 | DL1500 | Fig. | Dimensions (mm) ℓ | Thickness | rε | Applicable Holder |
|---|---|---|---|---|---|---|---|---|
| **WDXT 042004-L** | ● | ● | | 1 | 4,2 | 2,0 | 0,4 | WDX 130 ~ 150 |
| **WDXT 042004-G** | ● | ● | ● | 2 | | | | |
| **WDXT 042004-H** | ● | ● | | 3 | | | | |
| **WDXT 052504-L** | ● | ● | | 1 | 5,0 | 2,5 | 0,4 | WDX 155 ~ 180 |
| **WDXT 052504-G** | ● | ● | ● | 2 | | | | |
| **WDXT 052504-H** | ● | ● | | 3 | | | | |
| **WDXT 063006-L** | ● | ● | | 1 | 6,0 | 3,0 | 0,6 | WDX 185 ~ 225 |
| **WDXT 063006-G** | ● | ● | ● | 2 | | | | |
| **WDXT 063006-H** | ● | ● | | 3 | | | | |
| **WDXT 073506-L** | ● | ● | | 1 | 7,5 | 3,5 | 0,6 | WDX 230 ~ 285 |
| **WDXT 073506-G** | ● | ● | ● | 2 | | | | |
| **WDXT 073506-H** | ● | ● | | 3 | | | | |
| **WDXT 094008-L** | ● | ● | | 1 | 9,6 | 4,0 | 0,8 | WDX 290 ~ 360 |
| **WDXT 094008-G** | ● | ● | ● | 2 | | | | |
| **WDXT 094008-H** | ● | ● | | 3 | | | | |
| **WDXT 125012-L** | ● | ● | | 1 | 12,4 | 5,0 | 1,2 | WDX 370 ~ 450 |
| **WDXT 125012-G** | ● | ● | ● | 2 | | | | |
| **WDXT 125012-H** | ● | ● | | 3 | | | | |
| **WDXT 156012-L** | ● | ● | | 1 | 15,2 | 6,0 | 1,2 | WDX 460 ~ 550 |
| **WDXT 156012-G** | ● | ● | ● | 2 | | | | |
| **WDXT 156012-H** | ● | ● | | 3 | | | | |

## Spare Parts

| Screw | Wrench | Wrench | Applicable Holders | Recommended Torque (Nm) |
|---|---|---|---|---|
|  |  |  | | |
| BFTX 01604 N | TRX 06 | – | WDX 130D○S20 ~ 150D○S20 | 0,5 |
| BFTX 0204 N | TRX 06 | – | WDX 155D○S20 ~ 180D○S25 | 0,5 |
| BFTY 02206 | – | TRD 07 | WDX 185D○S25 ~ 225D○S25 | 1,0 |
| BFTX 02506 N | – | TRD 08 | WDX 230D○S25 ~ 285D○S32 | 1,5 |
| BFTX 03584 | – | TRD 15 | WDX 290D○S32 ~ 360D○S40 | 3,5 |
| BFTX 0511 N | – | TRD 20 | WDX 370D○S40 ~ 450D○S40 | 5,0 |
| BFTX 0615 N | – | TRD 25 | WDX 460D○S40 ~ 550D○S40 | 5,0 |

Identification of Drill Body

**WDX 200 D5 S25**

- WDX 200: Drill Diameter ( ø20,0 mm)
- D5: Flute Length L/D ( 5 x D )
- S25: Shank Size ( ø25,0 mm)

Identification of Indexable Insert

**WDXT 06 30 06 -G**

- 06: Width Across Flats ( 6,0 mm)
- 30: Thickness ( 3,0 mm)
- 06: Corner Radius ( 0,6 mm)
- -G: Breaker Type



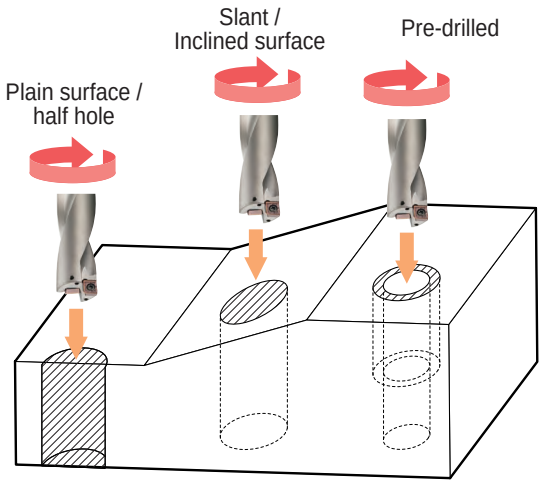


● = Euro stock
○ = Stock item in Japan

# Indexable Insert Type "SumiDrill"
# WDX Type

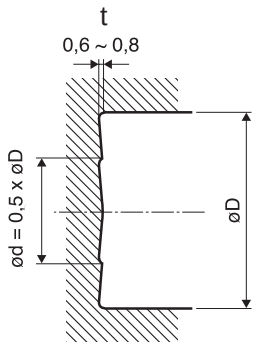
## Multi-Purpose Functionality

### ● Applications for machining centre




**Recommended conditions - reduce feed rate to 70%**

### ● Hole profile

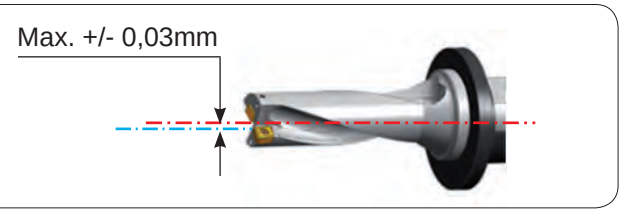



| Drill Diameter | t (mm) |
|---|---|
| 13,0 - 18,0 | 0,4 |
| 18,5 - 28,5 | 0,6 |
| 29,0 - 36,0 | 0,8 |
| 37,0 - 55,0 | 1,2 |

## Applications for Lathes

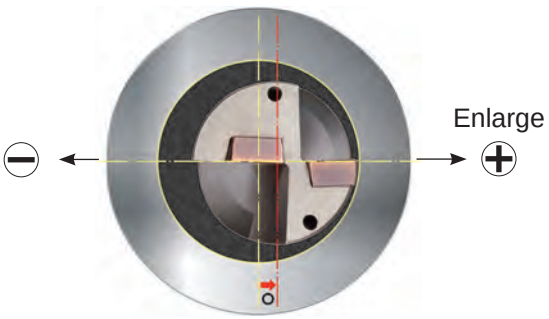
### Setting Instruction

Ensure the face of the drill flange is hard against the face of the tool holder.
Align the centreline of the drill to the centreline of the lathes Y axis




### Drilling Over Holes

Offset the lathes X axis within the maximum amount stated in the table




| Drill description | Max. Offset (mm) | Drill description | Max. Offset (mm) |
|---|---|---|---|
| WDX130... | 0,35 | WDX280... | 0,15 |
| WDX135... | 0,30 | WDX285... | 0,10 |
| WDX140... | 0,25 | WDX290... | 1,00 |
| WDX145... | 0,20 | WDX295... | 0,95 |
| WDX150... | 0,15 | WDX300... | 0,90 |
| WDX155... | 0,40 | WDX310... | 0,80 |
| WDX160... | 0,40 | WDX320... | 0,70 |
| WDX165... | 0,35 | WDX330... | 0,55 |
| WDX170... | 0,30 | WDX340... | 0,45 |
| WDX175... | 0,25 | WDX350... | 0,35 |
| WDX180... | 0,20 | WDX360... | 0,20 |
| WDX185... | 0,50 | WDX370... | 1,00 |
| WDX190... | 0,45 | WDX380... | 1,00 |
| WDX195... | 0,40 | WDX390... | 0,90 |
| WDX200... | 0,30 | WDX400... | 0,80 |
| WDX205... | 0,30 | WDX410... | 0,70 |
| WDX210... | 0,20 | WDX420... | 0,60 |
| WDX215... | 0,15 | WDX430... | 0,50 |
| WDX220... | 0,10 | WDX440... | 0,50 |
| WDX225... | 0,06 | WDX450... | 0,40 |
| WDX230... | 0,70 | WDX460... | 1,50 |
| WDX235... | 0,70 | WDX470... | 1,40 |
| WDX240... | 0,60 | WDX480... | 1,30 |
| WDX245... | 0,50 | WDX490... | 1,20 |
| WDX250... | 0,50 | WDX500... | 1,10 |
| WDX255... | 0,45 | WDX510... | 1,00 |
| WDX260... | 0,40 | WDX520... | 0,90 |
| WDX265... | 0,35 | WDX530... | 0,80 |
| WDX270... | 0,25 | WDX540... | 0,60 |
| WDX275... | 0,20 | WDX550... | 0,50 |

Recommended conditions - reduce feed rate to 30%

### Turning by lathes




**Recommended conditions - reduce feed rate to 50%**

## Recommended Cutting Conditions (2D)

[ min. - **optimal** - max. ]

| Material Group ISO | Work material | Hardness (HB) | Chip breaker & Grade | | Cutting Speed Vc (m/min) | Feed rate (mm/rev) ø13,0 ~ ø18,0 | ø18,5 ~ ø29,0 | ø29,5 ~ ø36,0 | ø37,0 ~ ø55,0 | ø56,0 ~ ø65,0 |
|---|---|---|---|---|---|---|---|---|---|---|
| P | Carbon steel | 125 | L | ACP300 | 150 - **220** - 250 | 0,04 - **0,08** - 0,12 | 0,04 - **0,08** - 0,12 | 0,04 - **0,08** - 0,13 | 0,05 - **0,10** - 0,15 | 0,06 - **0,11** - 0,17 |
| | | 190 | G | ACP300 | 150 - **220** - 250 | 0,08 - **0,13** - 0,24 | 0,08 - **0,13** - 0,24 | 0,08 - **0,14** - 0,26 | 0,09 - **0,16** - 0,29 | 0,10 - **0,17** - 0,32 |
| | | 250 | G | ACP300 | 125 - **170** - 230 | 0,06 - **0,11** - 0,18 | 0,06 - **0,11** - 0,18 | 0,06 - **0,12** - 0,19 | 0,07 - **0,13** - 0,22 | 0,08 - **0,14** - 0,24 |
| | | 270 | G | ACP300 | 125 - **170** - 230 | 0,08 - **0,13** - 0,22 | 0,08 - **0,14** - 0,24 | 0,08 - **0,14** - 0,23 | 0,09 - **0,16** - 0,26 | 0,10 - **0,17** - 0,29 |
| | | 300 | G | ACP300 | 100 - **130** - 170 | 0,06 - **0,11** - 0,17 | 0,06 - **0,12** - 0,18 | 0,06 - **0,12** - 0,18 | 0,07 - **0,13** - 0,20 | 0,08 - **0,14** - 0,22 |
| | Low alloyed steel | 180 | L | ACP300 | 150 - **180** - 220 | 0,05 - **0,08** - 0,14 | 0,05 - **0,08** - 0,14 | 0,05 - **0,08** - 0,16 | 0,06 - **0,09** - 0,17 | 0,07 - **0,10** - 0,19 |
| | | 275 | G | ACP300 | 125 - **150** - 200 | 0,06 - **0,11** - 0,17 | 0,06 - **0,11** - 0,17 | 0,06 - **0,12** - 0,18 | 0,07 - **0,13** - 0,20 | 0,08 - **0,14** - 0,22 |
| | | 300 | G | ACP300 | 100 - **140** - 170 | 0,06 - **0,11** - 0,17 | 0,06 - **0,11** - 0,17 | 0,06 - **0,12** - 0,18 | 0,07 - **0,13** - 0,20 | 0,08 - **0,14** - 0,22 |
| | | 350 | G | ACP300 | 80 - **120** - 150 | 0,06 - **0,11** - 0,17 | 0,06 - **0,11** - 0,17 | 0,06 - **0,12** - 0,18 | 0,07 - **0,13** - 0,20 | 0,08 - **0,14** - 0,22 |
| | High alloyed steel | 200 | G | ACP300 | 100 - **150** - 200 | 0,08 - **0,13** - 0,24 | 0,08 - **0,13** - 0,24 | 0,08 - **0,14** - 0,26 | 0,09 - **0,16** - 0,29 | 0,10 - **0,17** - 0,32 |
| | | 325 | G | ACP300 | 80 - **120** - 160 | 0,06 - **0,11** - 0,18 | 0,06 - **0,11** - 0,18 | 0,06 - **0,12** - 0,19 | 0,07 - **0,13** - 0,22 | 0,08 - **0,14** - 0,24 |
| M | Stainless steel, martensitic / ferritic | 200 | L/G | ACP300 | 100 - **150** - 200 | 0,06 - **0,11** - 0,18 | 0,06 - **0,11** - 0,18 | 0,06 - **0,12** - 0,19 | 0,07 - **0,13** - 0,22 | 0,08 - **0,14** - 0,24 |
| | Stainless steel, martensitic / tempered | 240 | L/G | ACP300 | 90 - **120** - 150 | 0,06 - **0,11** - 0,18 | 0,06 - **0,11** - 0,18 | 0,06 - **0,12** - 0,19 | 0,07 - **0,13** - 0,22 | 0,08 - **0,14** - 0,24 |
| | Stainless steel, austenitic / quenched | 180 | L/G | ACP300 | 100 - **150** - 200 | 0,04 - **0,08** - 0,18 | 0,06 - **0,11** - 0,18 | 0,06 - **0,12** - 0,19 | 0,07 - **0,13** - 0,22 | 0,08 - **0,14** - 0,24 |
| | Stainless steel, austenitic / ferritic (Duplex) | 230 | L/G | ACP300 | 80 - **120** - 150 | 0,04 - **0,08** - 0,18 | 0,06 - **0,11** - 0,18 | 0,06 - **0,12** - 0,19 | 0,07 - **0,13** - 0,22 | 0,08 - **0,14** - 0,24 |
| K | Cast iron (GG) | 180 | H | ACK300 | 120 - **160** - 200 | 0,09 - **0,20** - 0,32 | 0,10 - **0,22** - 0,36 | 0,11 - **0,24** - 0,39 | 0,12 - **0,26** - 0,44 | 0,13 - **0,29** - 0,48 |
| | | 260 | H | ACK300 | 120 - **160** - 200 | 0,09 - **0,20** - 0,32 | 0,10 - **0,22** - 0,36 | 0,11 - **0,24** - 0,39 | 0,12 - **0,26** - 0,44 | 0,13 - **0,29** - 0,48 |
| | Nodular cast iron (GGG) | 160 | H | ACK300 | 90 - **120** - 250 | 0,09 - **0,20** - 0,32 | 0,10 - **0,22** - 0,36 | 0,11 - **0,24** - 0,39 | 0,12 - **0,26** - 0,44 | 0,13 - **0,29** - 0,48 |
| | | 250 | H | ACK300 | 90 - **120** - 150 | 0,09 - **0,20** - 0,32 | 0,10 - **0,22** - 0,36 | 0,11 - **0,24** - 0,39 | 0,12 - **0,26** - 0,44 | 0,13 - **0,29** - 0,48 |
| S | Heat resistant alloy | 200 | L/G | ACP300 | 25 - **50** - 70 | 0,06 - **0,11** - 0,18 | 0,06 - **0,11** - 0,18 | 0,06 - **0,12** - 0,19 | 0,07 - **0,13** - 0,22 | 0,08 - **0,14** - 0,24 |
| N | Aluminium alloy | | G | DL1500 | 200 - **260** - 320 | 0,06 - **0,11** - 0,17 | 0,06 - **0,11** - 0,17 | 0,06 - **0,12** - 0,18 | 0,07 - **0,13** - 0,20 | 0,08 - **0,14** - 0,22 |
| | Copper alloy | | G | DL1500 | 180 - **230** - 280 | 0,06 - **0,11** - 0,17 | 0,06 - **0,11** - 0,17 | 0,06 - **0,12** - 0,18 | 0,07 - **0,13** - 0,20 | 0,08 - **0,14** - 0,22 |

## Recommended Cutting Conditions (3D)

[ min. - **optimal** - max. ]

| Material Group ISO | Work material | Hardness (HB) | Chip breaker & Grade | | Cutting Speed Vc (m/min) | Feed rate (mm/rev) ø13,0 ~ ø18,0 | ø18,5 ~ ø29,0 | ø29,5 ~ ø36,0 | ø37,0 ~ ø55,0 | ø56,0 ~ ø65,0 |
|---|---|---|---|---|---|---|---|---|---|---|
| P | Carbon steel | 125 | L | ACP300 | 150 - **220** - 250 | 0,04 - **0,07** - 0,1 | 0,04 - **0,07** - 0,10 | 0,04 - **0,08** - 0,11 | 0,05 - **0,09** - 0,12 | 0,06 - **0,10** - 0,13 |
| | | 190 | G | ACP300 | 150 - **220** - 250 | 0,08 - **0,12** - 0,2 | 0,08 - **0,12** - 0,20 | 0,08 - **0,13** - 0,22 | 0,09 - **0,14** - 0,24 | 0,10 - **0,16** - 0,27 |
| | | 250 | G | ACP300 | 125 - **170** - 230 | 0,06 - **0,10** - 0,15 | 0,06 - **0,10** - 0,15 | 0,06 - **0,11** - 0,16 | 0,07 - **0,12** - 0,18 | 0,08 - **0,13** - 0,20 |
| | | 270 | G | ACP300 | 125 - **170** - 230 | 0,08 - **0,12** - 0,18 | 0,08 - **0,12** - 0,18 | 0,08 - **0,13** - 0,19 | 0,09 - **0,14** - 0,22 | 0,10 - **0,16** - 0,24 |
| | | 300 | G | ACP300 | 100 - **130** - 170 | 0,06 - **0,10** - 0,14 | 0,06 - **0,10** - 0,14 | 0,06 - **0,11** - 0,15 | 0,07 - **0,12** - 0,17 | 0,08 - **0,13** - 0,19 |
| | Low alloyed steel | 180 | L | ACP300 | 150 - **180** - 220 | 0,05 - **0,07** - 0,12 | 0,05 - **0,07** - 0,12 | 0,05 - **0,08** - 0,13 | 0,06 - **0,08** - 0,15 | 0,07 - **0,09** - 0,16 |
| | | 275 | G | ACP300 | 125 - **150** - 200 | 0,06 - **0,10** - 0,14 | 0,06 - **0,10** - 0,14 | 0,06 - **0,11** - 0,15 | 0,07 - **0,12** - 0,17 | 0,08 - **0,13** - 0,19 |
| | | 300 | G | ACP300 | 100 - **140** - 170 | 0,06 - **0,10** - 0,14 | 0,06 - **0,10** - 0,14 | 0,06 - **0,11** - 0,15 | 0,07 - **0,12** - 0,17 | 0,08 - **0,13** - 0,19 |
| | | 350 | G | ACP300 | 80 - **120** - 150 | 0,06 - **0,10** - 0,14 | 0,06 - **0,10** - 0,14 | 0,06 - **0,11** - 0,15 | 0,07 - **0,12** - 0,17 | 0,08 - **0,13** - 0,19 |
| | High alloyed steel | 200 | G | ACP300 | 100 - **150** - 200 | 0,08 - **0,12** - 0,2 | 0,08 - **0,12** - 0,20 | 0,08 - **0,13** - 0,22 | 0,09 - **0,14** - 0,24 | 0,10 - **0,16** - 0,27 |
| | | 325 | G | ACP300 | 80 - **120** - 160 | 0,06 - **0,10** - 0,15 | 0,06 - **0,10** - 0,15 | 0,06 - **0,11** - 0,16 | 0,07 - **0,12** - 0,18 | 0,08 - **0,13** - 0,20 |
| M | Stainless steel, martensitic / ferritic | 200 | L/G | ACP300 | 100 - **150** - 200 | 0,06 - **0,10** - 0,15 | 0,06 - **0,10** - 0,15 | 0,06 - **0,11** - 0,16 | 0,07 - **0,12** - 0,18 | 0,08 - **0,13** - 0,20 |
| | Stainless steel, martensitic / tempered | 240 | L/G | ACP300 | 90 - **120** - 150 | 0,06 - **0,10** - 0,15 | 0,06 - **0,10** - 0,15 | 0,06 - **0,11** - 0,16 | 0,07 - **0,12** - 0,18 | 0,08 - **0,13** - 0,20 |
| | Stainless steel, austenitic / quenched | 180 | L/G | ACP300 | 100 - **150** - 200 | 0,04 - **0,10** - 0,15 | 0,06 - **0,10** - 0,15 | 0,06 - **0,11** - 0,16 | 0,07 - **0,12** - 0,18 | 0,08 - **0,13** - 0,20 |
| | Stainless steel, austenitic / ferritic (Duplex) | 230 | L/G | ACP300 | 80 - **120** - 150 | 0,04 - **0,10** - 0,15 | 0,06 - **0,10** - 0,15 | 0,06 - **0,11** - 0,16 | 0,07 - **0,12** - 0,18 | 0,08 - **0,13** - 0,20 |
| K | Cast iron (GG) | 180 | H | ACK300 | 120 - **160** - 200 | 0,09 - **0,18** - 0,27 | 0,10 - **0,20** - 0,30 | 0,11 - **0,22** - 0,32 | 0,12 - **0,24** - 0,36 | 0,13 - **0,26** - 0,40 |
| | | 260 | H | ACK300 | 120 - **160** - 200 | 0,09 - **0,18** - 0,27 | 0,10 - **0,20** - 0,30 | 0,11 - **0,22** - 0,32 | 0,12 - **0,24** - 0,36 | 0,13 - **0,26** - 0,40 |
| | Nodular cast iron (GGG) | 160 | H | ACK300 | 90 - **120** - 250 | 0,09 - **0,18** - 0,27 | 0,10 - **0,20** - 0,30 | 0,11 - **0,22** - 0,32 | 0,12 - **0,24** - 0,36 | 0,13 - **0,26** - 0,40 |
| | | 250 | H | ACK300 | 90 - **120** - 150 | 0,09 - **0,18** - 0,27 | 0,10 - **0,20** - 0,30 | 0,11 - **0,22** - 0,32 | 0,12 - **0,24** - 0,36 | 0,13 - **0,26** - 0,40 |
| S | Heat resistant alloy | 200 | L/G | ACP300 | 25 - **50** - 70 | 0,06 - **0,10** - 0,15 | 0,06 - **0,10** - 0,15 | 0,06 - **0,11** - 0,16 | 0,07 - **0,12** - 0,18 | 0,08 - **0,13** - 0,20 |
| N | Aluminium alloy | | G | DL1500 | 200 - **260** - 320 | 0,06 - **0,11** - 0,17 | 0,06 - **0,11** - 0,17 | 0,06 - **0,12** - 0,18 | 0,07 - **0,13** - 0,20 | 0,08 - **0,14** - 0,22 |
| | Copper alloy | | G | DL1500 | 180 - **230** - 280 | 0,06 - **0,11** - 0,17 | 0,06 - **0,11** - 0,17 | 0,06 - **0,12** - 0,18 | 0,07 - **0,13** - 0,20 | 0,08 - **0,14** - 0,22 |

# Indexable Insert Type "SumiDrill"
# WDX Type

## Recommended Cutting Conditions (4D)

[ min. - **optimal** - max. ]

| ISO | Work material | Hardness (HB) | Chip breaker & Grade | | Cutting Speed Vc (m/min) | Feed rate (mm/rev) ø13,0 ~ ø18,0 | ø18,5 ~ ø29,0 | ø29,5 ~ ø36,0 | ø37,0 ~ ø55,0 | ø56,0 ~ ø65,0 |
|---|---|---|---|---|---|---|---|---|---|---|
| P | Carbon steel | 125 | L | ACP300 | 150 - **220** - 250 | 0,04 - **0,07** - 0,09 | 0,04 - **0,07** - 0,09 | 0,04 - **0,07** - 0,09 | 0,05 - **0,08** - 0,10 | 0,05 - **0,08** - 0,10 |
| | | 190 | G | ACP300 | 150 - **220** - 250 | 0,08 - **0,11** - 0,17 | 0,08 - **0,11** - 0,17 | 0,08 - **0,12** - 0,18 | 0,09 - **0,14** - 0,21 | 0,09 - **0,14** - 0,21 |
| | | 250 | G | ACP300 | 125 - **170** - 230 | 0,06 - **0,10** - 0,13 | 0,06 - **0,10** - 0,13 | 0,06 - **0,10** - 0,14 | 0,07 - **0,11** - 0,15 | 0,07 - **0,11** - 0,15 |
| | | 270 | G | ACP300 | 125 - **170** - 230 | 0,08 - **0,11** - 0,15 | 0,08 - **0,11** - 0,15 | 0,08 - **0,12** - 0,17 | 0,09 - **0,14** - 0,19 | 0,09 - **0,14** - 0,19 |
| | | 300 | G | ACP300 | 100 - **130** - 170 | 0,06 - **0,10** - 0,12 | 0,06 - **0,10** - 0,12 | 0,06 - **0,10** - 0,13 | 0,07 - **0,11** - 0,14 | 0,07 - **0,11** - 0,14 |
| | Low alloyed steel | 180 | L | ACP300 | 150 - **180** - 220 | 0,05 - **0,07** - 0,10 | 0,05 - **0,07** - 0,10 | 0,05 - **0,07** - 0,11 | 0,06 - **0,08** - 0,12 | 0,06 - **0,08** - 0,12 |
| | | 275 | G | ACP300 | 125 - **150** - 200 | 0,06 - **0,10** - 0,12 | 0,06 - **0,10** - 0,12 | 0,06 - **0,10** - 0,13 | 0,07 - **0,11** - 0,14 | 0,07 - **0,11** - 0,14 |
| | | 300 | G | ACP300 | 100 - **140** - 170 | 0,06 - **0,10** - 0,12 | 0,06 - **0,10** - 0,12 | 0,06 - **0,10** - 0,13 | 0,07 - **0,11** - 0,14 | 0,07 - **0,11** - 0,14 |
| | | 350 | G | ACP300 | 80 - **120** - 150 | 0,06 - **0,10** - 0,12 | 0,06 - **0,10** - 0,12 | 0,06 - **0,10** - 0,13 | 0,07 - **0,11** - 0,14 | 0,07 - **0,11** - 0,14 |
| | High alloyed steel | 200 | G | ACP300 | 100 - **150** - 200 | 0,08 - **0,11** - 0,17 | 0,08 - **0,11** - 0,17 | 0,08 - **0,12** - 0,18 | 0,09 - **0,14** - 0,21 | 0,09 - **0,14** - 0,21 |
| | | 325 | G | ACP300 | 80 - **120** - 160 | 0,06 - **0,10** - 0,13 | 0,06 - **0,10** - 0,13 | 0,06 - **0,10** - 0,14 | 0,07 - **0,11** - 0,15 | 0,07 - **0,11** - 0,15 |
| M | Stainless steel, martensitic / ferritic | 200 | L/G | ACP300 | 100 - **150** - 200 | 0,06 - **0,10** - 0,13 | 0,06 - **0,10** - 0,13 | 0,06 - **0,10** - 0,14 | 0,07 - **0,11** - 0,15 | 0,07 - **0,11** - 0,15 |
| | Stainless steel, martensitic / tempered | 240 | L/G | ACP300 | 90 - **120** - 150 | 0,06 - **0,10** - 0,13 | 0,06 - **0,10** - 0,13 | 0,06 - **0,10** - 0,14 | 0,07 - **0,11** - 0,15 | 0,07 - **0,11** - 0,15 |
| | Stainless steel, austenitic / quenched | 180 | L/G | ACP300 | 100 - **150** - 200 | 0,04 - **0,10** - 0,13 | 0,06 - **0,10** - 0,13 | 0,06 - **0,10** - 0,14 | 0,07 - **0,11** - 0,15 | 0,07 - **0,11** - 0,15 |
| | Stainless steel, austenitic / ferritic (Duplex) | 230 | L/G | ACP300 | 80 - **120** - 150 | 0,04 - **0,10** - 0,13 | 0,06 - **0,10** - 0,13 | 0,06 - **0,10** - 0,14 | 0,07 - **0,11** - 0,15 | 0,07 - **0,11** - 0,15 |
| K | Cast iron (GG) | 180 | H | ACK300 | 120 - **160** - 200 | 0,09 - **0,17** - 0,23 | 0,10 - **0,19** - 0,26 | 0,11 - **0,21** - 0,28 | 0,12 - **0,23** - 0,31 | 0,12 - **0,23** - 0,31 |
| | | 260 | H | ACK300 | 120 - **160** - 200 | 0,09 - **0,17** - 0,23 | 0,10 - **0,19** - 0,26 | 0,11 - **0,21** - 0,28 | 0,12 - **0,23** - 0,31 | 0,12 - **0,23** - 0,31 |
| | Nodular cast iron (GGG) | 160 | H | ACK300 | 90 - **120** - 250 | 0,09 - **0,17** - 0,23 | 0,10 - **0,19** - 0,26 | 0,11 - **0,21** - 0,28 | 0,12 - **0,23** - 0,31 | 0,12 - **0,23** - 0,31 |
| | | 250 | H | ACK300 | 90 - **120** - 150 | 0,09 - **0,17** - 0,23 | 0,10 - **0,19** - 0,26 | 0,11 - **0,21** - 0,28 | 0,12 - **0,23** - 0,31 | 0,12 - **0,23** - 0,31 |
| S | Heat resistant alloy | 200 | L/G | ACP300 | 25 - **50** - 70 | 0,06 - **0,10** - 0,13 | 0,06 - **0,10** - 0,13 | 0,06 - **0,10** - 0,14 | 0,07 - **0,11** - 0,15 | 0,07 - **0,11** - 0,15 |
| N | Aluminium alloy | | G | DL1500 | 200 - **260** - 320 | 0,05 - **0,10** - 0,15 | 0,05 - **0,10** - 0,15 | 0,06 - **0,11** - 0,16 | 0,06 - **0,12** - 0,18 | 0,07 - **0,13** - 0,20 |
| | Copper alloy | | G | DL1500 | 180 - **230** - 280 | 0,05 - **0,10** - 0,15 | 0,05 - **0,10** - 0,15 | 0,06 - **0,11** - 0,16 | 0,06 - **0,12** - 0,18 | 0,07 - **0,13** - 0,20 |

## Recommended Cutting Conditions (5D)

[ min. - **optimal** - max. ]

| ISO | Work material | Hardness (HB) | Chip breaker & Grade | | Cutting Speed Vc (m/min) | Feed rate (mm/rev) ø13,0 ~ ø18,0 | ø18,5 ~ ø29,0 | ø29,5 ~ ø36,0 | ø37,0 ~ ø55,0 | ø56,0 ~ ø65,0 |
|---|---|---|---|---|---|---|---|---|---|---|
| P | Carbon steel | 125 | L | ACP300 | 150 - **220** - 250 | 0,04 - **0,06** - 0,09 | 0,04 - **0,06** - 0,08 | 0,04 - **0,06** - 0,08 | 0,05 - **0,07** - 0,09 | |
| | | 190 | G | ACP300 | 150 - **220** - 250 | 0,07 - **0,10** - 0,15 | 0,07 - **0,10** - 0,15 | 0,08 - **0,11** - 0,17 | 0,09 - **0,12** - 0,19 | |
| | | 250 | G | ACP300 | 125 - **170** - 230 | 0,05 - **0,09** - 0,11 | 0,05 - **0,09** - 0,11 | 0,06 - **0,09** - 0,12 | 0,06 - **0,10** - 0,14 | |
| | | 270 | G | ACP300 | 125 - **170** - 230 | 0,07 - **0,10** - 0,14 | 0,07 - **0,10** - 0,14 | 0,08 - **0,11** - 0,15 | 0,09 - **0,12** - 0,17 | |
| | | 300 | G | ACP300 | 100 - **130** - 170 | 0,05 - **0,09** - 0,11 | 0,05 - **0,09** - 0,11 | 0,06 - **0,09** - 0,12 | 0,06 - **0,10** - 0,13 | |
| | Low alloyed steel | 180 | L | ACP300 | 150 - **180** - 220 | 0,05 - **0,06** - 0,09 | 0,05 - **0,06** - 0,09 | 0,05 - **0,06** - 0,10 | 0,05 - **0,07** - 0,11 | |
| | | 275 | G | ACP300 | 125 - **150** - 200 | 0,05 - **0,09** - 0,11 | 0,05 - **0,09** - 0,11 | 0,06 - **0,09** - 0,12 | 0,06 - **0,10** - 0,13 | |
| | | 300 | G | ACP300 | 100 - **140** - 170 | 0,05 - **0,09** - 0,11 | 0,05 - **0,09** - 0,11 | 0,06 - **0,09** - 0,12 | 0,06 - **0,10** - 0,13 | |
| | | 350 | G | ACP300 | 80 - **120** - 150 | 0,05 - **0,09** - 0,11 | 0,05 - **0,09** - 0,11 | 0,06 - **0,09** - 0,12 | 0,06 - **0,10** - 0,13 | |
| | High alloyed steel | 200 | G | ACP300 | 100 - **150** - 200 | 0,07 - **0,10** - 0,15 | 0,07 - **0,10** - 0,15 | 0,08 - **0,11** - 0,17 | 0,09 - **0,12** - 0,19 | |
| | | 325 | G | ACP300 | 80 - **120** - 160 | 0,05 - **0,09** - 0,11 | 0,06 - **0,09** - 0,11 | 0,06 - **0,09** - 0,12 | 0,06 - **0,10** - 0,14 | |
| M | Stainless steel, martensitic / ferritic | 200 | L/G | ACP300 | 100 - **150** - 200 | 0,05 - **0,09** - 0,11 | 0,05 - **0,09** - 0,11 | 0,06 - **0,09** - 0,12 | 0,06 - **0,10** - 0,14 | |
| | Stainless steel, martensitic / tempered | 240 | L/G | ACP300 | 90 - **120** - 150 | 0,05 - **0,09** - 0,11 | 0,05 - **0,09** - 0,11 | 0,06 - **0,09** - 0,12 | 0,06 - **0,10** - 0,14 | |
| | Stainless steel, austenitic / quenched | 180 | L/G | ACP300 | 100 - **150** - 200 | 0,05 - **0,09** - 0,11 | 0,05 - **0,09** - 0,11 | 0,06 - **0,09** - 0,12 | 0,06 - **0,10** - 0,14 | |
| | Stainless steel, austenitic / ferritic (Duplex) | 230 | L/G | ACP300 | 80 - **120** - 150 | 0,05 - **0,09** - 0,11 | 0,05 - **0,09** - 0,11 | 0,06 - **0,09** - 0,12 | 0,07 - **0,12** - 0,18 | |
| K | Cast iron (GG) | 180 | H | ACK300 | 120 - **160** - 200 | 0,08 - **0,15** - 0,21 | 0,09 - **0,17** - 0,23 | 0,09 - **0,18** - 0,25 | 0,11 - **0,20** - 0,28 | |
| | | 260 | H | ACK300 | 120 - **160** - 200 | 0,08 - **0,15** - 0,21 | 0,09 - **0,17** - 0,23 | 0,09 - **0,18** - 0,25 | 0,11 - **0,20** - 0,28 | |
| | Nodular cast iron (GGG) | 160 | H | ACK300 | 90 - **120** - 250 | 0,08 - **0,15** - 0,21 | 0,09 - **0,17** - 0,23 | 0,09 - **0,18** - 0,25 | 0,11 - **0,20** - 0,28 | |
| | | 250 | H | ACK300 | 90 - **120** - 150 | 0,08 - **0,15** - 0,21 | 0,09 - **0,17** - 0,23 | 0,09 - **0,18** - 0,25 | 0,11 - **0,20** - 0,28 | |
| S | Heat resistant alloy | 200 | L/G | ACP300 | 25 - **50** - 70 | 0,05 - **0,09** - 0,11 | 0,05 - **0,09** - 0,11 | 0,06 - **0,09** - 0,12 | 0,06 - **0,10** - 0,14 | |
| N | Aluminium alloy | | G | DL1500 | 200 - **260** - 320 | 0,05 - **0,10** - 0,15 | 0,05 - **0,10** - 0,15 | 0,06 - **0,11** - 0,16 | 0,06 - **0,12** - 0,18 | |
| | Copper alloy | | G | DL1500 | 180 - **230** - 280 | 0,05 - **0,10** - 0,15 | 0,05 - **0,10** - 0,15 | 0,06 - **0,11** - 0,16 | 0,06 - **0,12** - 0,18 | |



# Indexable Plunge Drill / Plunge Mill
# PDL Type / PCT Type

New



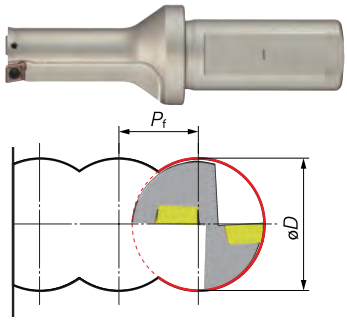

## Description

The tool cuts in the Z axis direction where tool rigidity is highest, allowing high efficiency roughing for aeronautic components and dies with long tool overhang must be used to machine deep holes and pockets.

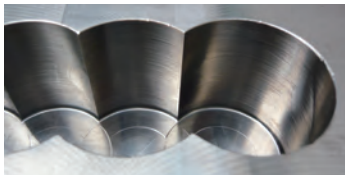
## Characteristics

- The flat cutting edge design produces near-flat bottom profiles to reduce depth of cut variation during finishing.
- All sizes come with an air hole for supplying coolant internally to improve chip evacuation.
- Durable body with special surface treatment offers improved tool life and reliability.
- The tools use SumiDrill WDX type inserts for handling a wide range of work materials, from steel to non-ferrous metals and exotic alloys.

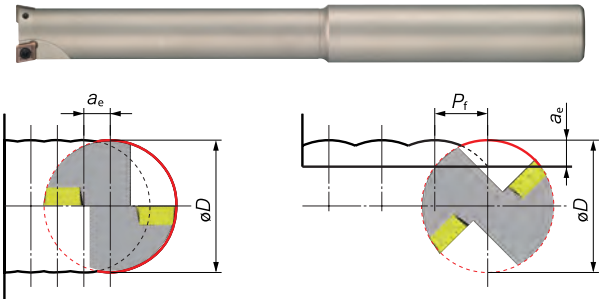
- The PDL type has a central insert making it possible to make radial cuts beyond the tool's radius, pitch feed cutting, and drilling. (Pocket milling, etc.)



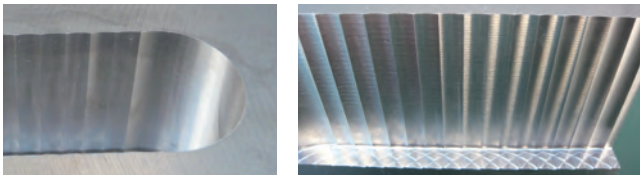

Keep the value of $P_f$ for PDL type tools to less than 70% of the tool diameter (øD).



- Although the PCT type has limited radial cutting ability, the tool has many effective teeth enabling it to perform high feed cutting. (Medium finishing of corners, hole expansion, deep grooving, etc.)

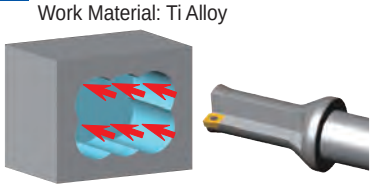



Keep the value of $P_f$ for PCT type tools to less than 50% of the tool diameter (*øD*).
For $a_e$ ($w_{oc}$), refer to the dimension under "$a_e$ max" in the stock / dimensions tables titled "Holders Max, Depth: 3D/5D".



## Application examples

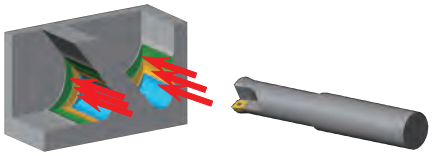
**PDL Pocketing**
Work Material: Ti Alloy



Tool: PDL400D2S40 (ø40)
Insert: WDXT125012-G
Grade: ACK300

Cutting Conditions:
$v_c$ = 40 m/min
f = 0,07 mm/rev
($v_f$ = 22,3 mm/min)
$P_f$ = 25 mm

**PCT Corner Finishing**
Work Material: Ti Alloy

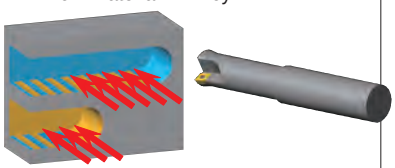


Tool:
PCT320D3S32 (ø32)
PCT250D3S25 (ø25)
PCT200D3S20 (ø20)
Grade: ACK300

Insert:
WDXT094008-G
WDXT073506-G
WDXT063006-G

Cutting Conditions:
$v_c$ = 50 m/min
$f_t$ = 0,08 mm/tooth
($v_f$ = 80~127 mm/min)
$a_e$ ($w_{oc}$) = 3,2 ~ 6,5 mm

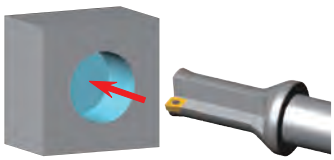
**PCT Grooving**
Work Material: Ti Alloy



Tool: PCT320D5S32 (ø32)
Insert: WDXT094008-G
Grade: ACK300

Cutting Conditions:
$v_c$ = 40 m/min
$f_t$ = 0,07 mm/tooth
($v_f$ = 56 mm/min)
$a_e$ ($P_f$) = 5,0 mm

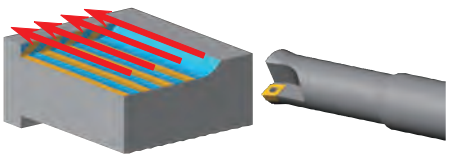
**PDL Drilling**
Work Material: X4 CrNiMo 17 12 2



Tool: PDL200D3S25 (ø20)
Insert: WDXT063006-G
Grade: ACP300

Cutting Conditions:
$v_c$ = 180 m/min
f = 0,10 mm/rev
($v_f$ = 286 mm/min)
øD = 20 mm

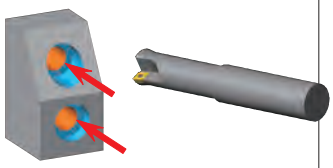
**PCT Aeronautic Components**
Work Material: X5 CrNi 18 10



Tool: PCT320D3S32 (ø32)
Insert: WDXT094008-G
Grade: ACP300

Cutting Conditions:
$v_c$ = 180 m/min
$f_t$ = 0,15 mm/tooth
($v_f$ = 537 mm/min)
$a_e$ ($w_{oc}$) = 7,0 mm, $P_f$ = 5,0 mm

**PCT Machine Components**
Work Material: 34 Cr Ni 4



Tool: PCT200D5S20 (ø20)
Insert: WDXT063006-G
Grade: ACK300

Cutting Conditions:
$v_c$ = 150 m/min
$f_t$ = 0,15 mm/tooth
($v_f$ = 716 mm/min)
$a_e$ ($w_{oc}$) = 3,5 mm

# Indexable Plunge Drill
# PDL Type (2D, 3D)



2D 3D

| Carbon Steel, Alloy Steel | | Tempered Steel | Hardened Steel | | Stainless Steel | Ti Alloy | Heat Resistant Alloy | Cast iron | Ductile Cast Iron | Al Alloy | Cu Alloy | Composite CFRP * |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C≤0,28% | C>0,28% | | HRC≤45 | HRC>45 | | | | | | | | |
| ◎ | ◎ | | ○ | | ○ | ◎ | | ◎ | ◎ | ◎ | ○ | |

Fig 1

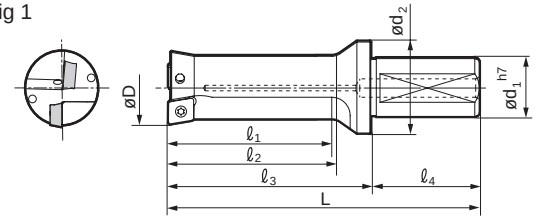
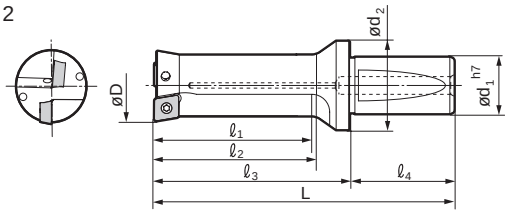



Fig 2



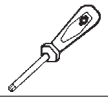

## ■ Holder (Max $D_{oc}$ : 2 D)

| Cat. No. | Stock | Dimensions (mm) | | | | | | | | Applicable Insert | Fig. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | øD | L | $\ell_1$ | $\ell_2$ | $\ell_3$ | $\ell_4$ | ød1 | ød2 | | |
| PDL 160D2S20 | ● | 16,0 | 94 | 32 | 35 | 50 | 44 | 20 | 20 | WDXT052504 | 1 |
| 200D2S25 | ● | 20,0 | 114 | 40 | 43 | 58 | 56 | 25 | 25 | WDXT063006 | |
| 250D2S25 | ● | 25,0 | 127 | 50 | 53 | 71 | 56 | 25 | 25 | WDXT073506 | |
| PDL 320D2S40 | ● | 32,0 | 162 | 64 | 68 | 92 | 70 | 40 | 40 | WDXT094008 | 2 |
| 400D2S40 | ● | 40,0 | 185 | 80 | 85 | 115 | 70 | 40 | 40 | WDXT125012 | |

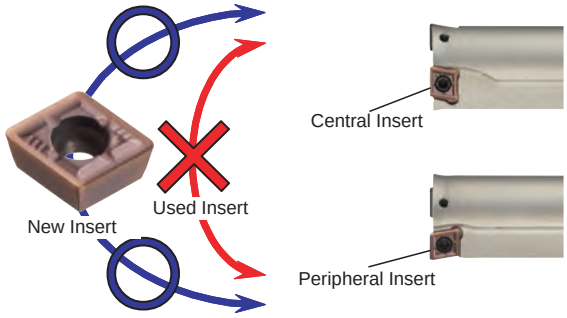
## ■ Holder (Max $D_{oc}$ : 3 D)

| Cat. No. | Stock | Dimensions (mm) | | | | | | | | Applicable Insert | Fig. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | øD | L | $\ell_1$ | $\ell_2$ | $\ell_3$ | $\ell_4$ | ød1 | ød2 | | |
| PDL 160D3S20 | ● | 16,0 | 110 | 48 | 51 | 66 | 44 | 20 | 20 | WDXT052504 | 1 |
| 200D3S25 | ● | 20,0 | 134 | 60 | 63 | 78 | 56 | 25 | 25 | WDXT063006 | |
| 250D3S25 | ● | 25,0 | 152 | 75 | 78 | 96 | 56 | 25 | 25 | WDXT073506 | |
| PDL 320D3S40 | ● | 32,0 | 194 | 96 | 100 | 124 | 70 | 40 | 40 | WDXT094008 | 2 |
| 400D3S40 | ● | 40,0 | 225 | 120 | 125 | 155 | 70 | 40 | 40 | WDXT125012 | |

## ■ Spare Parts

| Screw | Wrench | Wrench | Recommended Torque (Nm) | Applicable Holders |
|---|---|---|---|---|
|  |  |  | | |
| BFTX0204N | TRX06 | – | **0,5** | PDL 160 D2 S20<br>160 D3 S20<br>PCT 160 D3 S16<br>160 D5 S16 |
| BFTY02206 | – | TRD07 | **1,0** | PDL 200 D2 S25<br>200 D3 S25<br>PCT 200 D3 S20<br>200 D5 S20 |
| BFTX02506N | – | TRD08 | **1,5** | PDL 250 D2 S25<br>250 D3 S25<br>PCT 250 D3 S25<br>250 D5 S25 |
| BFTX03584 | – | TRD15 | **3,5** | PDL 320 D2 S40<br>320 D3 S40<br>PCT 320 D3 S32<br>320 D5 S32 |
| BFTX0511N | – | TRD20 | **5,0** | PDL 400 D2 S40<br>400 D3 S40<br>PCT 400 D3 S42<br>400 D5 S42 |

## ● Notes About Mounting Inserts (PDL type)




PDL type: Inserts can be used on either the centre or the outside.
Inserts used on the outside cannot be used in the centre,. Similarly, inserts used in the centre cannot be used on the outside.
PCT type: 2 corners can be used only for the outer inserts.

# Indexable Plunge Mill
# PCT Type (3D, 5D)

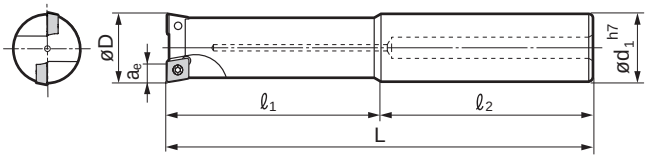


3D 5D

| Carbon Steel, Alloy Steel | | Tempered Steel | Hardened Steel | | Stainless Steel | Ti Alloy | Heat Resistant Alloy | Cast iron | Ductile Cast Iron | Al Alloy | Cu Alloy | Composite CFRP * |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C≤0,28% | C>0,28% | | HRC≤45 | HRC>45 | | | | | | | | |
| ◎ | ◎ | | ○ | | ○ | ◎ | | ◎ | ◎ | ◎ | ○ | |

* CFRP (Carbon Fibre Reinforced Plastic)

Fig 3




## ■ Holder (Max $D_{oc}$ : 3 D)

| Cat. No. | Stock | Dimensions (mm) | | | | | | Fig. | Applicable Insert | Fig. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | øD | $a_e$ max | L | $\ell_1$ | $\ell_2$ | ød1 | | | |
| PCT 160D3S16 | ● | 16,0 | *4,0* | 123 | 53 | 70 | 16 | 2 | WDXT052504 | 3 |
| 200D3S20 | ● | 20,0 | *5,0* | 145 | 65 | 80 | 20 | 2 | WDXT063006 | |
| 250D3S25 | ● | 25,0 | *6,5* | 160 | 80 | 80 | 25 | 2 | WDXT073506 | |
| 320D3S32 | ● | 32,0 | *8,5* | 191 | 101 | 90 | 32 | 2 | WDXT094008 | |
| 400D3S42 | ● | 40,0 | *11,0* | 225 | 125 | 100 | 42 | 3 | WDXT125012 | |

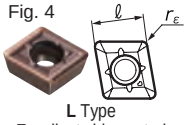
## ■ Holder (Max $D_{oc}$ : 5 D)

| Cat. No. | Stock | Dimensions (mm) | | | | | | Fig. | Applicable Insert | Fig. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | øD | $a_e$ max | L | $\ell_1$ | $\ell_2$ | ød1 | | | |
| PCT 160D5S16 | ● | 16,0 | *4,0* | 155 | 85 | 70 | 16 | 2 | WDXT052504 | 3 |
| 200D5S20 | ● | 20,0 | *5,0* | 185 | 105 | 80 | 20 | 2 | WDXT063006 | |
| 250D5S25 | ● | 25,0 | *6,5* | 210 | 130 | 80 | 25 | 2 | WDXT073506 | |
| 320D5S32 | ● | 32,0 | *8,5* | 255 | 165 | 90 | 32 | 2 | WDXT094008 | |
| 400D5S42 | ● | 40,0 | *11,0* | 305 | 205 | 100 | 42 | 3 | WDXT125012 | |

## ■ Inserts

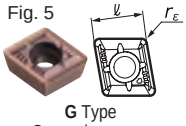
(mm)

Fig. 4



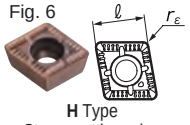

**L** Type
Excellent chip control at low feed rates

Fig. 5




**G** Type
General purpose chipbreaker

Fig. 6




**H** Type
Strong cutting edge at higher feed rates

| Grade | | Coated | | |
|---|---|---|---|---|
| Application | High Speed / Light Cutting | | | N |
| | General Purpose | M | | |
| | Roughing | PM | K | |

| Cat. No. | ACP300 | ACK300 | DL1500 | Fig. | Dimensions (mm) | | | Applicable Holder |
|---|---|---|---|---|---|---|---|---|
| | | | | | $\ell$ | Thickness | $r_\varepsilon$ | |
| WDXT 052504-L | ● | ● | | 4 | 5,0 | 2,5 | 0,4 | PDL160D2S20<br>PDL160D3S20<br>PCT160D3S16<br>PCT160D5S16 |
| 052504-G | ● | ● | ● | 5 | | | | |
| 052504-H | ● | ● | | 6 | | | | |
| WDXT 063006-L | ● | ● | | 4 | 6,0 | 3,0 | 0,6 | PDL200D2S25<br>PDL200D3S25<br>PCT200D3S20<br>PCT200D5S20 |
| 063006-G | ● | ● | ● | 5 | | | | |
| 063006-H | ● | ● | | 6 | | | | |
| WDXT 073506-L | ● | ● | | 4 | 7,5 | 3,5 | 0,6 | PDL250D2S25<br>PDL250D3S25<br>PCT250D3S25<br>PCT250D5S25 |
| 073506-G | ● | ● | ● | 5 | | | | |
| 073506-H | ● | ● | | 6 | | | | |
| WDXT 094008-L | ● | ● | | 4 | 9,6 | 4,0 | 0,8 | PDL320D2S40<br>PDL320D3S40<br>PCT320D3S32<br>PCT320D5S32 |
| 094008-G | ● | ● | ● | 5 | | | | |
| 094008-H | ● | ● | | 6 | | | | |
| WDXT 125012-L | ● | ● | | 4 | 12,4 | 5,0 | 1,2 | PDL400D2S40<br>PDL400D3S40<br>PCT400D3S42<br>PCT400D5S42 |
| 125012-G | ● | ● | ● | 5 | | | | |
| 125012-H | ● | ● | | 6 | | | | |

Recommended Cutting Conditions PDL and PCT Type ☞ J69

PCT, PDL Type Identification

**PCT 250 D3 S25**

Tool Diameter (ø25,0) | Max Depth L/D (3D) | Shank Size (ø25,0)

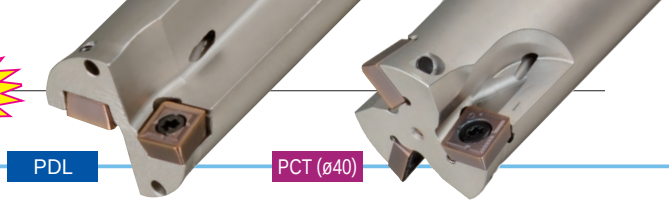
PCT, PDL Type Insert Identification

**WDXT 07 35 06 -G**

Width Across Flats (7,5) | Thickness x 10 (3,5) | Corner Radius x 10 (R0,6) | Breaker Type

# Recommended Cutting Conditions
# PDL Type / PCT Type

New




## Recommended Cutting Conditions (2D)

[ min. - **optimal** - max. ]

| ISO | Material Group / Work material | Hardness (HB) | Chip breaker & Grade | | Cutting Speed Vc (m/min) | Feed rate (mm/rev) ø16,0 | ø20,0 ~ ø25,0 | ø32,0 | ø40,0 |
|---|---|---|---|---|---|---|---|---|---|
| P | Carbon steel | 125 | G | ACP300 | 120-**180**-240 | 0,05-**0,08**-0,10 | 0,05-**0,08**-0,10 | 0,05-**0,08**-0,11 | 0,05-**0,08**-0,12 |
| | | 125 | L | ACP300 | 130-**170**-220 | 0,04-**0,08**-0,12 | 0,04-**0,08**-0,12 | 0,04-**0,08**-0,13 | 0,05-**0,10**-0,15 |
| | | 190 | G | ACP300 | 100-**150**-200 | 0,08-**0,13**-0,24 | 0,08-**0,13**-0,24 | 0,08-**0,14**-0,26 | 0,09-**0,16**-0,29 |
| | | 250 | G | ACP300 | 80-**120**-160 | 0,06-**0,11**-0,18 | 0,06-**0,11**-0,18 | 0,06-**0,12**-0,19 | 0,07-**0,13**-0,22 |
| | | 270 | G | ACP300 | 100-**130**-160 | 0,08-**0,13**-0,22 | 0,08-**0,13**-0,22 | 0,08-**0,14**-0,23 | 0,09-**0,16**-0,26 |
| | | 300 | G | ACP300 | 70-**100**-140 | 0,06-**0,11**-0,17 | 0,06-**0,11**-0,17 | 0,06-**0,12**-0,18 | 0,07-**0,13**-0,20 |
| | Low alloyed steel | 180 | L | ACP300 | 100-**140**-180 | 0,05-**0,08**-0,14 | 0,05-**0,08**-0,14 | 0,05-**0,08**-0,16 | 0,06-**0,09**-0,17 |
| | | 275 | G | ACP300 | 80-**120**-160 | 0,06-**0,11**-0,17 | 0,06-**0,11**-0,17 | 0,06-**0,12**-0,18 | 0,07-**0,13**-0,20 |
| | | 300 | G | ACP300 | 75-**110**-140 | 0,06-**0,11**-0,17 | 0,06-**0,11**-0,17 | 0,06-**0,12**-0,18 | 0,07-**0,13**-0,20 |
| | | 350 | G | ACP300 | 60-**85**-110 | 0,06-**0,11**-0,17 | 0,06-**0,11**-0,17 | 0,06-**0,12**-0,18 | 0,07-**0,13**-0,20 |
| | High alloyed steel | 200 | G | ACP300 | 100-**130**-160 | 0,08-**0,13**-0,24 | 0,08-**0,13**-0,24 | 0,08-**0,14**-0,26 | 0,09-**0,16**-0,29 |
| | | 325 | G | ACP300 | 80-**100**-120 | 0,06-**0,11**-0,18 | 0,06-**0,11**-0,18 | 0,06-**0,12**-0,19 | 0,07-**0,13**-0,22 |
| M | Stainless steel, martensitic / ferritic | 200 | G | ACP300 | 100-**140**-180 | 0,06-**0,11**-0,18 | 0,06-**0,11**-0,18 | 0,06-**0,12**-0,19 | 0,07-**0,13**-0,22 |
| | Stainless steel, martensitic / tempered | 240 | G | ACP300 | 90-**120**-150 | 0,06-**0,11**-0,18 | 0,06-**0,11**-0,18 | 0,06-**0,12**-0,19 | 0,07-**0,13**-0,22 |
| | Stainless steel, austenitic / quenched | 180 | G | ACP300 | 100-**140**-180 | 0,06-**0,08**-0,18 | 0,06-**0,11**-0,18 | 0,06-**0,12**-0,19 | 0,07-**0,13**-0,22 |
| | Stainless steel, austenitic / ferritic (Duplex) | 230 | G | ACP300 | 80-**120**-150 | 0,04-**0,08**-0,18 | 0,06-**0,11**-0,18 | 0,06-**0,12**-0,19 | 0,07-**0,13**-0,22 |
| K | Cast iron (GG) | 180 | H | ACK300 | 120-**160**-200 | 0,09-**0,20**-0,32 | 0,10-**0,22**-0,36 | 0,11-**0,24**-0,39 | 0,12-**0,26**-0,44 |
| | Nodular cast iron (GGG) | 260 | H | ACP300 | 90-**120**-150 | 0,09-**0,20**-0,32 | 0,10-**0,22**-0,36 | 0,11-**0,24**-0,39 | 0,12-**0,26**-0,44 |
| S | Heat resistant alloy | 200 | G | ACP300 | 25-**50**-70 | 0,06-**0,11**-0,18 | 0,06-**0,11**-0,18 | 0,06-**0,12**-0,19 | 0,07-**0,13**-0,22 |
| N | Aluminium alloy | | G | DL1500 | 200-**260**-320 | 0,06-**0,11**-0,17 | 0,06-**0,11**-0,17 | 0,06-**0,12**-0,18 | 0,07-**0,13**-0,20 |
| | Copper alloy | | G | DL1500 | 180-**230**-280 | 0,06-**0,11**-0,17 | 0,06-**0,11**-0,17 | 0,06-**0,12**-0,18 | 0,07-**0,13**-0,20 |

## Recommended Cutting Conditions (3D)

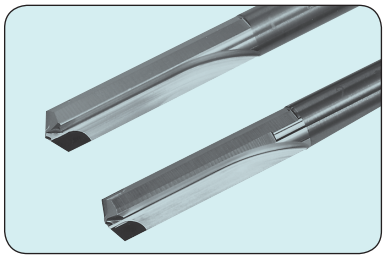
[ min. - **optimal** - max. ]

| ISO | Material Group / Work material | Hardness (HB) | Chip breaker & Grade | | Cutting Speed Vc (m/min) | Feed rate (mm/rev) ø16,0 | ø20,0 ~ ø25,0 | ø32,0 | ø40,0 |
|---|---|---|---|---|---|---|---|---|---|
| P | Carbon steel | 125 | G | ACP300 | 120-**180**-240 | 0,05-**0,07**-0,10 | 0,05-**0,07**-0,10 | 0,05-**0,08**-0,11 | 0,05-**0,08**-0,12 |
| | | 125 | L | ACP300 | 130-**170**-220 | 0,04-**0,07**-0,10 | 0,04-**0,07**-0,10 | 0,04-**0,08**-0,11 | 0,05-**0,09**-0,12 |
| | | 190 | G | ACP300 | 100-**150**-200 | 0,08-**0,12**-0,20 | 0,08-**0,12**-0,20 | 0,08-**0,13**-0,22 | 0,09-**0,14**-0,24 |
| | | 250 | G | ACP300 | 80-**120**-160 | 0,06-**0,10**-0,15 | 0,06-**0,10**-0,15 | 0,06-**0,11**-0,16 | 0,07-**0,12**-0,18 |
| | | 270 | G | ACP300 | 100-**130**-160 | 0,08-**0,12**-0,18 | 0,08-**0,12**-0,18 | 0,08-**0,13**-0,19 | 0,09-**0,14**-0,22 |
| | | 300 | G | ACP300 | 70-**100**-140 | 0,06-**0,10**-0,14 | 0,06-**0,10**-0,14 | 0,06-**0,11**-0,15 | 0,07-**0,12**-0,17 |
| | Low alloyed steel | 180 | L | ACP300 | 100-**140**-180 | 0,05-**0,07**-0,12 | 0,05-**0,07**-0,12 | 0,05-**0,07**-0,13 | 0,06-**0,07**-0,15 |
| | | 275 | G | ACP300 | 80-**120**-160 | 0,06-**0,10**-0,14 | 0,06-**0,10**-0,14 | 0,06-**0,11**-0,15 | 0,07-**0,12**-0,17 |
| | | 300 | G | ACP300 | 75-**110**-140 | 0,06-**0,10**-0,14 | 0,06-**0,10**-0,14 | 0,06-**0,11**-0,15 | 0,07-**0,12**-0,17 |
| | | 350 | G | ACP300 | 60-**85**-110 | 0,06-**0,10**-0,14 | 0,06-**0,10**-0,14 | 0,06-**0,11**-0,15 | 0,07-**0,12**-0,17 |
| | High alloyed steel | 200 | G | ACP300 | 100-**130**-160 | 0,08-**0,12**-0,20 | 0,08-**0,12**-0,20 | 0,08-**0,13**-0,22 | 0,09-**0,14**-0,24 |
| | | 325 | G | ACP300 | 80-**100**-120 | 0,06-**0,10**-0,15 | 0,06-**0,10**-0,15 | 0,06-**0,11**-0,16 | 0,07-**0,12**-0,18 |
| M | Stainless steel, martensitic / ferritic | 200 | G | ACP300 | 100-**140**-180 | 0,06-**0,10**-0,15 | 0,06-**0,10**-0,15 | 0,06-**0,11**-0,16 | 0,07-**0,12**-0,18 |
| | Stainless steel, martensitic / tempered | 240 | G | ACP300 | 90-**120**-150 | 0,06-**0,10**-0,15 | 0,06-**0,10**-0,15 | 0,06-**0,11**-0,16 | 0,07-**0,12**-0,18 |
| | Stainless steel, austenitic / quenched | 180 | G | ACP300 | 100-**140**-180 | 0,06-**0,10**-0,15 | 0,06-**0,10**-0,15 | 0,06-**0,11**-0,16 | 0,07-**0,12**-0,18 |
| | Stainless steel, austenitic / ferritic (Duplex) | 230 | G | ACP300 | 80-**120**-150 | 0,04-**0,10**-0,15 | 0,06-**0,10**-0,15 | 0,06-**0,11**-0,16 | 0,07-**0,12**-0,18 |
| K | Cast iron (GG) | 180 | H | ACK300 | 120-**160**-200 | 0,09-**0,18**-0,27 | 0,10-**0,20**-0,30 | 0,11-**0,22**-0,32 | 0,12-**0,24**-0,36 |
| | Nodular cast iron (GGG) | 260 | H | ACP300 | 90-**120**-150 | 0,09-**0,18**-0,27 | 0,10-**0,20**-0,30 | 0,11-**0,22**-0,32 | 0,12-**0,24**-0,36 |
| S | Heat resistant alloy | 200 | G | ACP300 | 25-**50**-70 | 0,06-**0,10**-0,15 | 0,06-**0,10**-0,15 | 0,06-**0,11**-0,16 | 0,07-**0,12**-0,18 |
| N | Aluminium alloy | | G | DL1500 | 200-**260**-320 | 0,06-**0,11**-0,17 | 0,06-**0,11**-0,17 | 0,06-**0,12**-0,18 | 0,07-**0,13**-0,20 |
| | Copper alloy | | G | DL1500 | 180-**230**-280 | 0,06-**0,11**-0,17 | 0,06-**0,11**-0,17 | 0,06-**0,12**-0,18 | 0,07-**0,13**-0,20 |

## Recommended Cutting Conditions (5D)

[ min. - **optimal** - max. ]

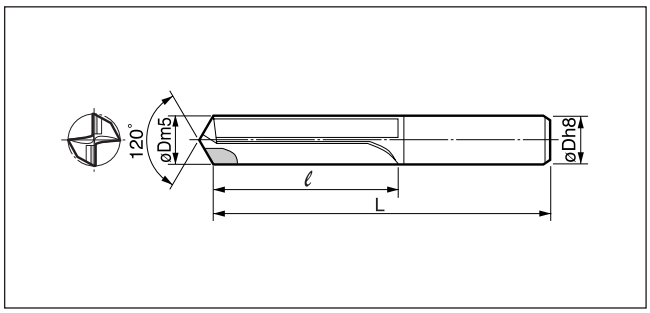
| ISO | Material Group / Work material | Hardness (HB) | Chip breaker & Grade | | Cutting Speed Vc (m/min) | Feed rate (mm/rev) ø16,0 | ø20,0 ~ ø25,0 | ø32,0 | ø40,0 |
|---|---|---|---|---|---|---|---|---|---|
| P | Carbon steel | 125 | G | ACP300 | 120-**180**-240 | 0,05-**0,06**-0,09 | 0,05-**0,06**-0,09 | 0,05-**0,06**-0,09 | 0,05-**0,07**-0,09 |
| | | 125 | L | ACP300 | 130-**170**-220 | 0,04-**0,06**-0,08 | 0,04-**0,06**-0,08 | 0,04-**0,06**-0,08 | 0,05-**0,07**-0,09 |
| | | 190 | G | ACP300 | 100-**150**-200 | 0,07-**0,10**-0,15 | 0,07-**0,10**-0,15 | 0,08-**0,11**-0,17 | 0,09-**0,12**-0,19 |
| | | 250 | G | ACP300 | 80-**120**-160 | 0,05-**0,09**-0,11 | 0,05-**0,09**-0,11 | 0,06-**0,09**-0,12 | 0,06-**0,10**-0,14 |
| | | 270 | G | ACP300 | 100-**130**-160 | 0,07-**0,10**-0,14 | 0,07-**0,10**-0,14 | 0,08-**0,11**-0,15 | 0,09-**0,12**-0,17 |
| | | 300 | G | ACP300 | 70-**100**-140 | 0,05-**0,09**-0,11 | 0,05-**0,09**-0,11 | 0,06-**0,09**-0,12 | 0,06-**0,10**-0,13 |
| | Low alloyed steel | 180 | L | ACP300 | 100-**140**-180 | 0,05-**0,06**-0,09 | 0,05-**0,06**-0,09 | 0,05-**0,06**-0,10 | 0,05-**0,07**-0,11 |
| | | 275 | G | ACP300 | 80-**120**-160 | 0,05-**0,09**-0,11 | 0,05-**0,09**-0,11 | 0,06-**0,09**-0,12 | 0,06-**0,10**-0,13 |
| | | 300 | G | ACP300 | 75-**110**-140 | 0,05-**0,09**-0,11 | 0,05-**0,09**-0,11 | 0,06-**0,09**-0,12 | 0,06-**0,10**-0,13 |
| | | 350 | G | ACP300 | 60-**85**-110 | 0,05-**0,09**-0,11 | 0,05-**0,09**-0,11 | 0,06-**0,09**-0,12 | 0,06-**0,10**-0,13 |
| | High alloyed steel | 200 | G | ACP300 | 100-**130**-160 | 0,07-**0,10**-0,15 | 0,07-**0,10**-0,15 | 0,08-**0,11**-0,17 | 0,09-**0,12**-0,19 |
| | | 325 | G | ACP300 | 80-**100**-120 | 0,05-**0,09**-0,11 | 0,05-**0,09**-0,11 | 0,06-**0,09**-0,12 | 0,06-**0,10**-0,14 |
| M | Stainless steel, martensitic / ferritic | 200 | G | ACP300 | 100-**140**-180 | 0,05-**0,09**-0,11 | 0,05-**0,09**-0,11 | 0,06-**0,09**-0,12 | 0,06-**0,10**-0,14 |
| | Stainless steel, martensitic / tempered | 240 | G | ACP300 | 90-**120**-150 | 0,05-**0,09**-0,11 | 0,05-**0,09**-0,11 | 0,06-**0,09**-0,12 | 0,06-**0,10**-0,14 |
| | Stainless steel, austenitic / quenched | 180 | G | ACP300 | 100-**140**-180 | 0,05-**0,09**-0,11 | 0,05-**0,09**-0,11 | 0,06-**0,09**-0,12 | 0,06-**0,10**-0,14 |
| | Stainless steel, austenitic / ferritic (Duplex) | 230 | G | ACP300 | 80-**120**-150 | 0,05-**0,09**-0,11 | 0,05-**0,09**-0,11 | 0,06-**0,09**-0,12 | 0,06-**0,10**-0,14 |
| K | Cast iron (GG) | 180 | H | ACK300 | 120-**160**-200 | 0,08-**0,15**-0,21 | 0,09-**0,17**-0,23 | 0,09-**0,18**-0,25 | 0,11-**0,20**-0,28 |
| | Nodular cast iron (GGG) | 260 | H | ACP300 | 90-**120**-150 | 0,08-**0,15**-0,21 | 0,09-**0,17**-0,23 | 0,09-**0,18**-0,25 | 0,11-**0,20**-0,28 |
| S | Heat resistant alloy | 200 | G | ACP300 | 25-**50**-70 | 0,05-**0,09**-0,11 | 0,05-**0,09**-0,11 | 0,06-**0,09**-0,12 | 0,06-**0,10**-0,14 |
| N | Aluminium alloy | | G | DL1500 | 200-**260**-320 | 0,05-**0,10**-0,15 | 0,05-**0,10**-0,15 | 0,06-**0,11**-0,16 | 0,06-**0,12**-0,18 |
| | Copper alloy | | G | DL1500 | 180-**230**-280 | 0,05-**0,10**-0,15 | 0,05-**0,10**-0,15 | 0,06-**0,11**-0,16 | 0,06-**0,12**-0,18 |



**From general to High Precision Drilling of Aluminum Alloys!**

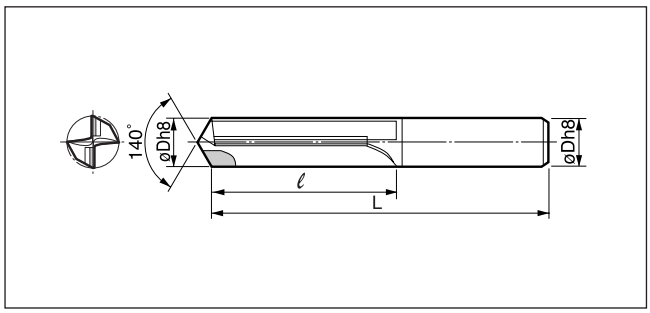
- High precision DAL type is able to produce holes of IT Class of 7~8.
- General DDL type is able to produce holes of IT class of 11~12, mainly for drilling of pre-tap holes.
- DML type is DDL type with a chamfer edge, incorporating 2 processes in one operation.

## DAL Type




| Cat. No. | Stock DA2200 | øD | L | ℓ |
|---|---|---|---|---|
| **DAL 0500H ~ 0600H** | | ø5 ≤ D ≤ ø6 | 80 | 30 |
| **DAL 0601H ~ 0700H** | | ø6 < D ≤ ø7 | 90 | 35 |
| **DAL 0701H ~ 0800H** | | ø7 < D ≤ ø8 | 90 | 35 |
| **DAL 0801H ~ 0900H** | | ø8 < D ≤ ø9 | 100 | 40 |
| **DAL 0901H ~ 1000H** | | ø9 < D ≤ ø10 | 100 | 40 |
| **DAL 1001H ~ 1100H** | | ø10 < D ≤ ø11 | 110 | 50 |
| **DAL 1101H ~ 1200H** | | ø11 < D ≤ ø12 | 110 | 50 |

## DDL Type




| Cat. No. | Stock DA2200 | øD | L | ℓ |
|---|---|---|---|---|
| **DDL 050V ~ 060V** | | ø5 ≤ D ≤ ø6 | 80 | 30 |
| **DDL 061V ~ 070V** | | ø6 < D ≤ ø7 | 90 | 35 |
| **DDL 071V ~ 080V** | | ø7 < D ≤ ø8 | 90 | 35 |
| **DDL 081V ~ 090V** | | ø8 < D ≤ ø9 | 100 | 40 |
| **DDL 091V ~ 100V** | | ø9 < D ≤ ø10 | 100 | 40 |
| **DDL 101V ~ 110V** | | ø10 < D ≤ ø11 | 110 | 50 |
| **DDL 111V ~ 120V** | | ø11 < D ≤ ø12 | 110 | 50 |

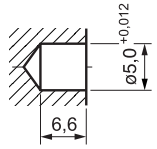
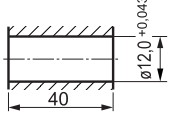
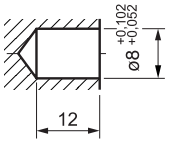
## Recommended Conditions

| | Cutting Speed (m/min) | Feed Rate (mm/tr) | Drilling Length L/D | Oil |
|---|---|---|---|---|
| øD < 8 | 80 ~ 250 | 0,05 ~ 0,2 | Below 3 x D | Water soluble |
| 8 ≤ øD | | 0,1 ~ 0,3 | | |

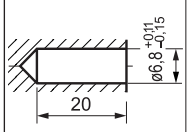
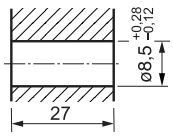
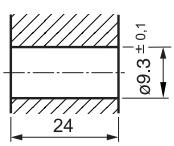
## Important Notes

- Select a high rigidity machine and high precison tool holder.
- Enough coolant to drilled hole.

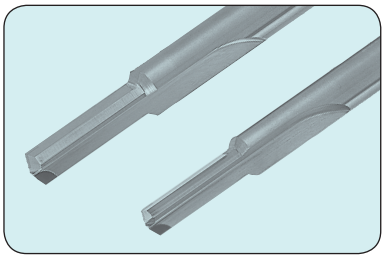
## Application Examples (DAL Type)

| Work Shape | Work | Conditions | Results |
|---|---|---|---|
|   | A390<br>High silicon Aluminum | Vc=100m/min<br>f=0,1mm/rev | • Holes by carbide drill was out of specifications after 2.000 holes/reg.<br>• SumiDia drill could drill up to 30.000 holes/reg.<br>•15 times tool life that of carbide drills. |
|   | A390<br>High silicon Aluminum<br>(pre-cast hole of ø10) | Vc=120m/min<br>f=0,12mm/rev | • Average 40,000 holes/reg<br>• Surface roughness Ry = 1µm |
|   | ADC10<br>Aluminum Die Cast | Vc=90m/min<br>f=0,08mm/rev | • More than 50.000 holes and still running |

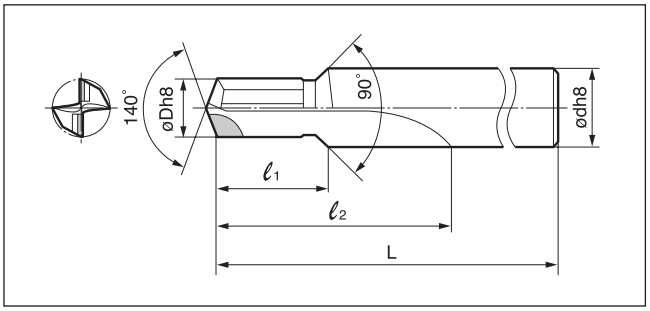
## Application Examples (DDL Type)

| Work Shape | Work | Conditions | Results |
|---|---|---|---|
|   | ADC12<br>Aluminum Die Cast<br>M8 Pre-tap holes | Vc=214m/min<br>f=0,14mm/rev | • Regrind after 100.000 holes |
|   | ADC12<br>Aluminum Die Cast | Vc=200m/min<br>f=0,17mm/rev | • Regrind after 74.000 holes (2.000m) (Preset tool change) |
|   | AC2A<br>Aluminum Casting | Vc=234m/min<br>f=0,28mm/rev | • Regrind after 80.000 holes (Preset tool change) |

# DAL/DDL/DML Type

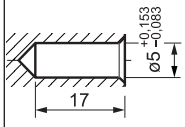
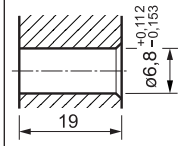
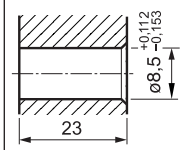


## ■ DML Type

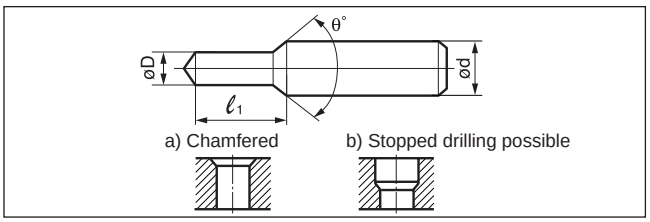



| Applicable Tap Size | Cat. No. | Stock DA2200 | øD | ød | L | $\ell_1$ | $\ell_2$ |
|---|---|---|---|---|---|---|---|
| M6 | **DML 050V** | | 5 | 8 | 90 | 18 | 36 |
| M8 | **DML 068V** | | 6,8 | 10 | 104 | 24 | 48 |
| M10 | **DML 085V** | | 8,5 | 12 | 122 | 30 | 60 |
| M12 | **DML 103V** | | 10,3 | 14 | 136 | 36 | 72 |

## ■ Application Examples (DML Type)

| Work Shape | Work | Conditions | Results |
|---|---|---|---|
|   | AC4C-T6<br>Aluminum Casting<br>M6 Pre-tap holes | Vc=100m/min<br>f=0,1mm/rev<br>m/c=6 spindles | • Regrind after 150.000 holes<br>• Life for carbide drill is 500 holes.<br>• 30 times tool life that of carbide drills |
|   | AC2C-T2<br>Aluminum Casting<br>M8 Pre-tap holes | Vc=210m/min<br>f=0,15mm/rev | • 100.000 holes/reg (2.000m) and still running.<br>• Dilling and chamfering in the same process |
|   | AC4C-T6<br>Aluminum Casting<br>M10 Pre-tap holes | Vc=250m/min<br>f=0,2mm/rev | • 80.000 holes/reg (1,840m) and still running.<br>• Drilling and chamfering in the same process |

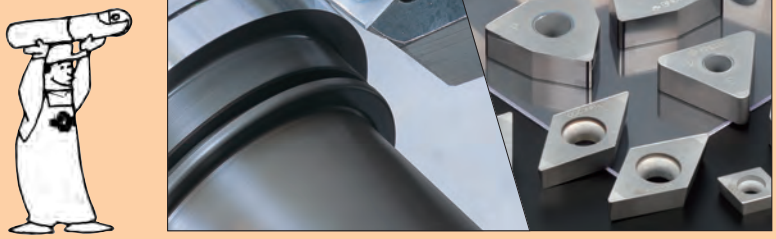
## ■ DML Type Possible Profiles




(1) Tolerance for dimension L is more than 0,2mm.
(2) θ° is less than 180°.

# SUMIBORON
# SUMIDIA

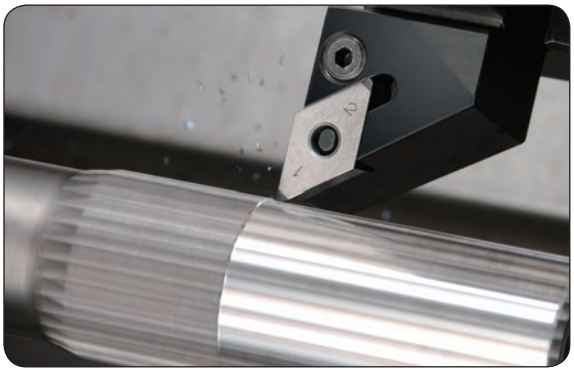
**L1 ~ L22**






| | | |
|---|---|---|
| CBN Grades | **SUMIBORON Series** | L2 |
| | **Recommended Grades** | L3 |
| | **ISO Identification** | L4 |
| Insert types and cutting edge geometries | **LF / LS / HS** Types | L5 |
| SUMIBORON Chipbreaker "Break Master" Type | **FV / LV** New & SV Types | L6 |
| One-Use "Wiper" Insert Type | **WG / WH** New & W Types | L7 |
| Uncoated SUMIBORON Grades | **BN1000** / **BN2000** | L8-9 |
| | **BN350** New | L13 |
| Coated SUMIBORON Grades | **BNC100** | L10 |
| | **BNC160** | L11 |
| | **BNC200** | L12 |
| | **BNC300** | L13 |
| | **BNC500** | L14 |
| Uncoated SUMIBORON Grades | **BN7000** New | L15 |
| | **BN7500** | L16 |
| | **BNS800** | L17 |
| SUMIBORON / SUMIDIA | **Production Process** | L18 |
| SUMIDIA PCD Grades | **DA1000** / DA2200 / DA150 | L19 |
| SUMIDIA Insert | **NF** Type | L20 |
| SUMIDIA Chipbreaker "Break Master" | **DM** Type | L21 |

## Second generation Sumiboron inserts – an even better way to machine hardened steels



### General

Building on its global success machining hardened steels with Sumiboron inserts the addition of heat and wear resistant coatings to a variety of tough new CBN substrates has resulted in a new generation of high performance inserts. With economy in mind the new inserts are multi cornered.

Choose the coated insert suitable for your application and take your hard part machining operations to the new industry standard.

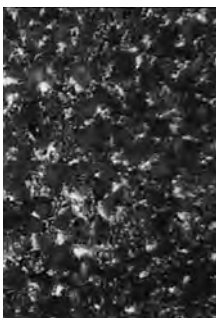
### Types and application

Microstructure



| Type | Grade | Application | Characteristic | Hardness(Hv) (GPa) | TRS (GPa) |
|---|---|---|---|---|---|
| Uncoated CBN | BN1000 | High speed Continuous cutting | Best wear resistance grade and suitable for high speed continuous cutting | 27 ~ 31 | 0,90 ~ 1,00 |
| | BN2000 | Continuous and Interrupted cutting | Micro-grain CBN with Ceramic binder improves fracture toughness and wear resistance | 31 ~ 34 | 1,05 ~ 1,15 |
| | 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 |
| | New BN350 | Interrupted cutting (Heavy) | Micro-grain CBN with higher fracture toughness that improves cutting edge strength | 33 ~ 35 | 1,20 ~ 1,30 |
| Coated CBN | BNC100 | High speed continuous and light interrupted cutting | High speed finishing grade for continuous and light interrupted cutting applications | 29 ~ 32 | 1,00 ~ 1,10 |
| | BNC160 | High precision continuous cutting | High precision grade for continuous cutting - ideal when an excellent surface finish is required | 31 ~ 33 | 1,10 ~ 1,20 |
| | BNC200 | Continuous and Interrupted cutting (Light-Medium Interrupted) | General purpose grade with low to high speed cutting capability and extended tool life - removes the carburised layer on heat treated components | 33 ~ 35 | 1,10 ~ 1,20 |
| | BNC300 | Interrupted cutting (Heavy) | Tough grade for heavy interrupted cutting applications | 33 ~ 35 | 1,15 ~ 1,25 |
| | BNC500 | GG and GGG machining | For Cast Iron machining with a good balance of wear and fracture resistance | 32 ~ 34 | 1,00 ~ 1,10 |

Microstructure



| Type | Grade | Application | Characteristic | Hardness(Hv) (GPa) | TRS (GPa) |
|---|---|---|---|---|---|
| Uncoated CBN | New BN7000 | High speed machining of GG Cast Iron machining Iron based products Rolls of high hardness Heat resistant alloy | First choice for high speed finishing of grey cast iron | 41 ~ 44 | 1,25 ~ 1,35 |
| | BN7500 | High efficiency machining of powdered metal | Less burrs when machining sintered parts due to excellent edge sharpness | 41 ~ 44 | 1,40 ~ 1,50 |
| | 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 |

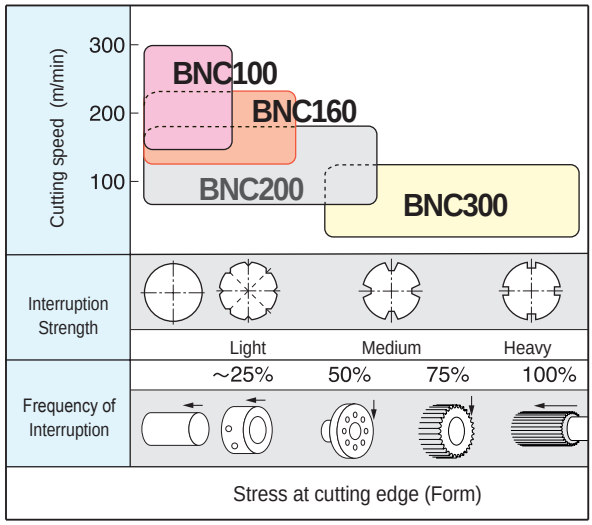
H

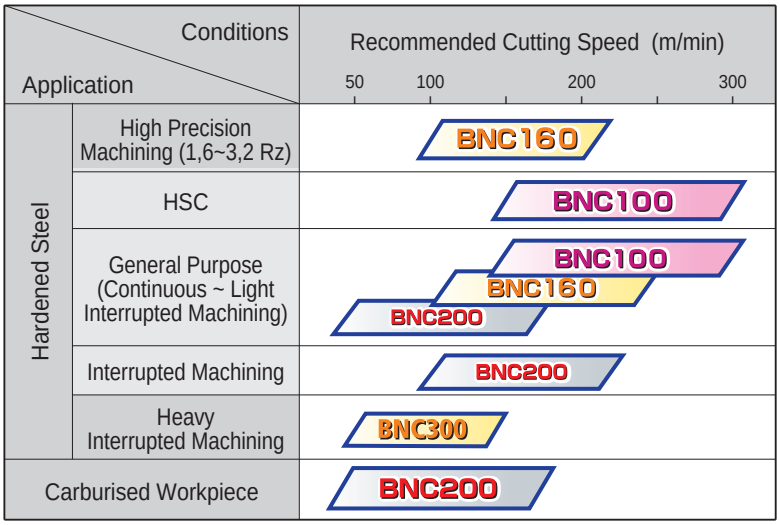
## HARDENED STEEL MACHINING

● Advantages of using CBN

In terms of cost investment, it is much lower in machine cost and overhead cost due to the fact that a CNC lathe is cheaper than a grinding machine.
As for the quality of finish, inserts can machine different profiles and the finishing is also commendable as compared to grinding.
Environmentally, sludge treatment for grinding is a hazard to the environment but for turning, the chips can be collected and recycled.

■ Application Range



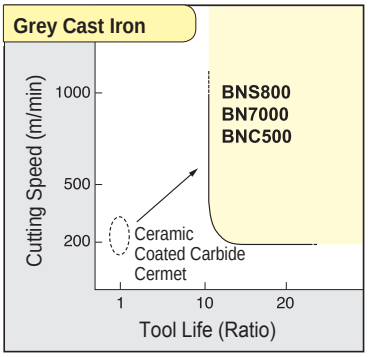

K

## CAST IRON MACHINING

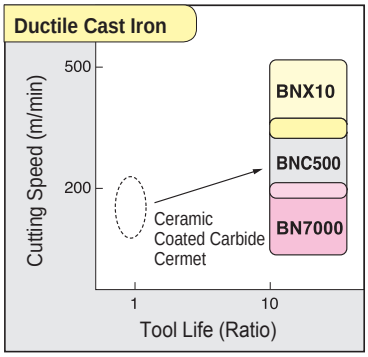
● Advantages of using CBN

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.

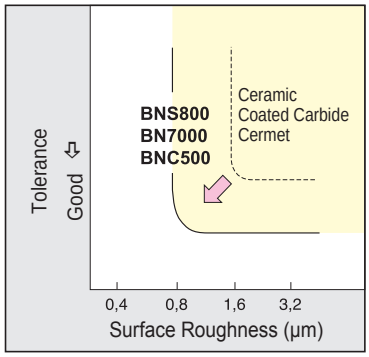
● High Speed Machining



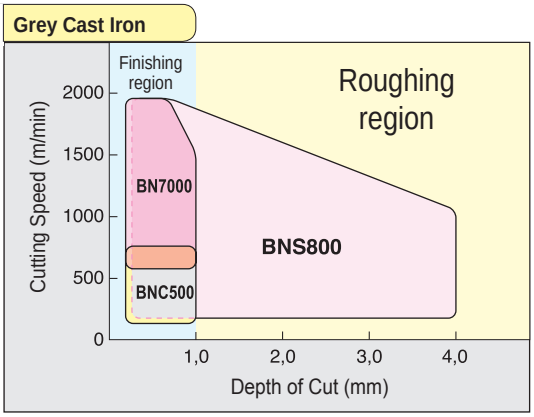

● High Speed Machining

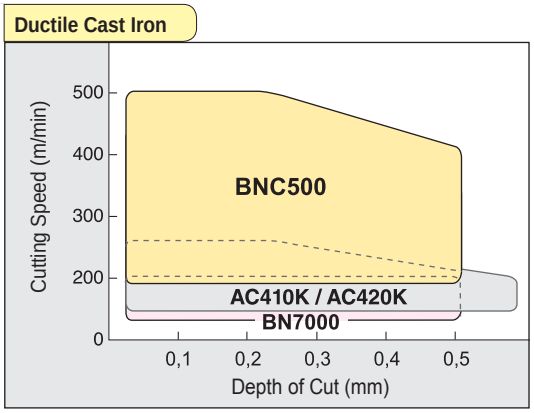



● High Precision Machining




■ Application Range



# Insert Identification

Regrindable Type

## CNMA120408(-)B

① Insert Identification: ISO ☞ C2/C3

② Additional Information: Table 2

Table 2, Additional Information

| Code | Code Description |
|---|---|
| (–) B | Full-top CBN insert |

One-Use Type

## CNGG 120408 N-SV NC-WG-4

① Chip Breaker: Table 2*

② One-Use Type: Table 3

③ Wiper Insert: Table 4

④ No. of Cutting Edge: Table 5

*) Additional Information

Table 2*

| Code | Code Description |
|---|---|
| – | Standard Type |
| LF | Sharp cutting edge |
| LS | Low cutting force |
| HS | Strong cutting edge |
| N-FV<br>N-LV<br>N-SV | Chipbreaker Type |

Table 3

| Code | One-Use Type | Grade |
|---|---|---|
| NC | Coated SUMIBORON | BNC100, 160<br>BNC200, 300<br>BNC500 |
| NU | Coated CBN | BNX10, 20<br>BN1000, 2000<br>BN350, 700<br>BN7000, 7500 |
| NS | | BNX25 |

Table 4

| Code | Wiper Insert |
|---|---|
| WG | Finishing<br>0,05 ≤ f ≤ 0,20 |
| WH | High feed cutting<br>0,20 ≤ f < 0,40 |
| W | Surface Roughness<br>Standard: $R_z$ 1,6~3,2µm |

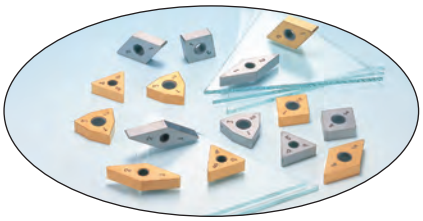
f : Feed Rate (mm/rev)

Table 5

| Code | No. of Cutting Edges | |
|---|---|---|
| – | 1 cutting edge | Single-corner |
| 2 | 2 cutting edges | Multi-corner |
| 3 | 3 cutting edges | |
| 4 | 4 cutting edges | |
| 6 | 6 cutting edges | |

## Insert types and cutting edge geometries

### Multi Cornered One-Use Type Inserts



#### Characteristics

- One-use type inserts improve machining efficiency by using each cutting edge to its full potential following the numbering system on each cutting edge then throwing the insert away.
- Multi cornered inserts have a single piece of Sumiboron mounted on every useable corner. Single sided inserts use the top corners whilst double sided inserts use both top and bottom corners. Diamond shaped inserts have 4 corners and triangular inserts have 6 corners.
- A variety of Sumiboron coated grades readily replace expensive grinding operations for high precision tolerances outstanding surface finish, heavy interrupted cutting and efficient cost effective machining of hardened parts.

#### Cutting Edge Preparation

**LF type: Sharp cutting edge**

For cutting non-ferrous metals

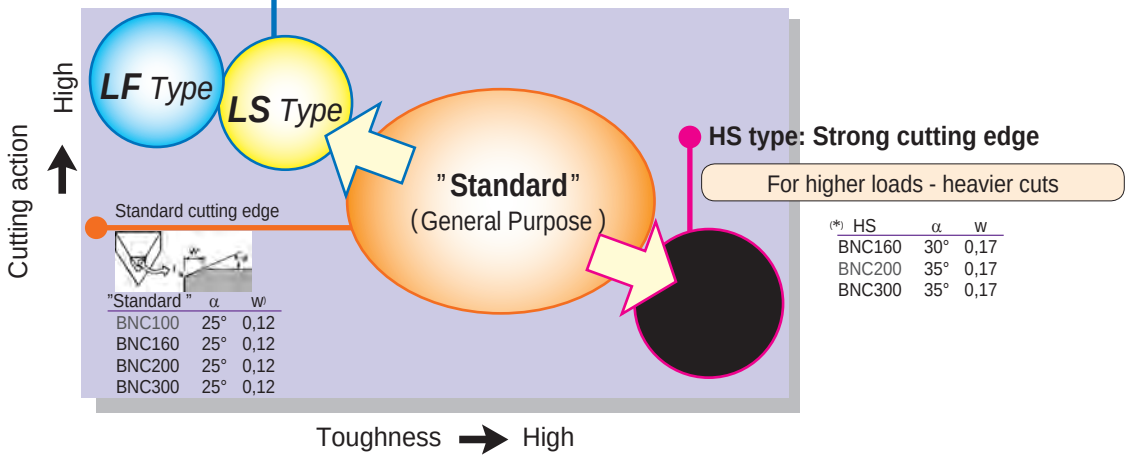
| (*) LF | α | w |
|---|---|---|
| BN7500 | 0° | – |

**LS type: Low cutting force (Negative land + Honing)**

| (*) LS | α | w |
|---|---|---|
| BNC100 | 15° | 0,17 |
| BNC160 | 20° | 0,10 |
| BNC200 | 15° | 0,10 |

Improved surface finish

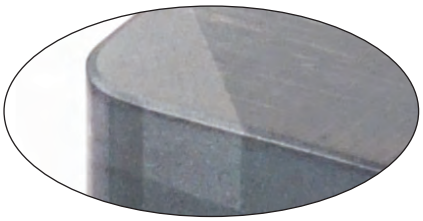
For higher dimensional accuracy




| "Standard" | α | w |
|---|---|---|
| BNC100 | 25° | 0,12 |
| BNC160 | 25° | 0,12 |
| BNC200 | 25° | 0,12 |
| BNC300 | 25° | 0,12 |

| (*) HS | α | w |
|---|---|---|
| BNC160 | 30° | 0,17 |
| BNC200 | 35° | 0,17 |
| BNC300 | 35° | 0,17 |

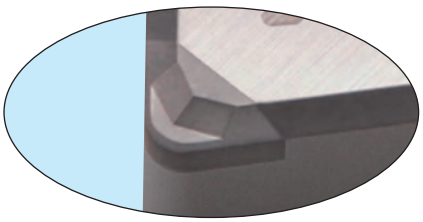
### One-Use Wiper Insert



#### Characteristics

- New lineup includes:
  - New **WG** Type ⇨ for low-feed cutting
  - New **WH** Type ⇨ for high-feed cutting
- SUMIBORON one-use insert with wiper edge for hardened steel machining
- Excellent surface finish similar to grinding
- Improved efficiency with higher speeds and feeds

### Break Master N-FV New, N-LV New



Break Master N-SV Type

#### Characteristics

- N-SV type is perfect for carburised layer removal while N-FV / N-LV types are best suited to finishing of hardened steel.
- First CBN insert to feature an integral chipbreaker
- Ideal for removing carburised layer - can be used on both hardened and unhardened materals.
- Effective chip control solution protects component from swarf damage.

# Break Master N-FV /-LV /-SV

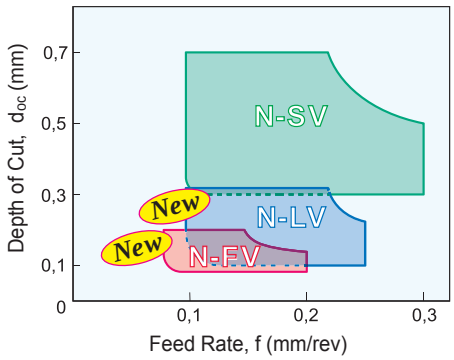


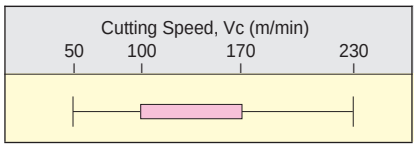



## Characteristics

- SUMIBORON one-use insert with chipbreaker.
- N-SV type is perfect for carburised layer removal while N-FV / N-LV types are best suited to finishing of hardened steel.
- Breaker included on the CBN edge, chipbreaking effect can be maintained throughout machining process.
- Unique breaker design can be applied to both hardened and non-hardened parts with effective chip control.
- SV type lineup now includes new BNC160 for good wear resistance, while Coated SUMIBORON BNC200 allows high efficiency machining.
- In addition to general purpose Coated SUMIBORON BNC200, the N-FV / N-LV type lineup includes BNC160 for excellent wear resistance and general purpose uncoated SUMIBORON BN2000.

## Application Range

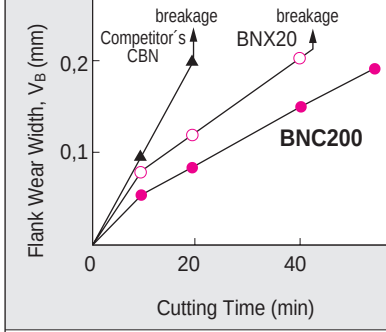



* When machining heat treated steel harder than $H_RC50$ the depth of cut should not exceed 0,5 mm.

## Cutting Performance

Carburised Layer Removal

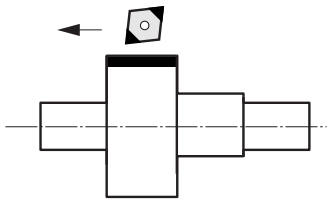


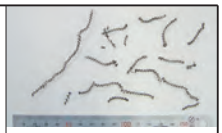

Work material: 42CrMo4
Insert: CNGG120408N-SV NC4
Cutting conditions:
$v_c$=100m/min, f=0,13mm/rev
$d_{oc}$=0,4mm, x3 passes, Dry

● Stable tool life with BNC200

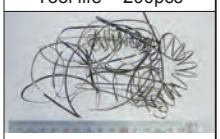
## Application Examples

### External Carburised Layer Removal





Break Master N-SV
Tool life = 200pcs



BNC200 (no breaker)
Tool life = 200pcs



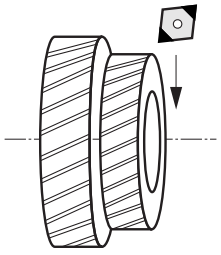
Comp. CBN (no breaker)
Tool life = 100pcs

No constant stopages or incorrect part dimention problem and the chips are small.

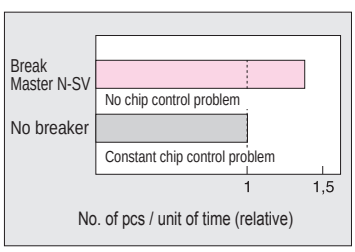
Double the tool life of competitor's CBN

Work material: 42CrMo4, Carburised steel (shaft)
Insert: CNGG 120408 N-SV NC4 (BNC200)
Conditions: $v_c$=150m/min, f=0,15mm/rev, $d_{oc}$=0,5mm, x 2 passes, Wet

### Carburised Face Layer Removal

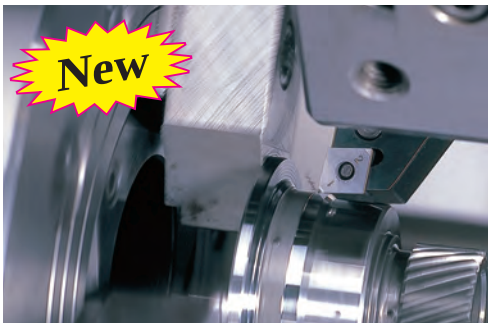


Break Master N-SV type improves chip control with increased productivity until the pre-set tool life.



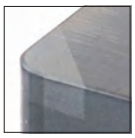

Work material: 42CrMo4 (HRC30-62)
Insert: CNGG 120408 N-SV NC4 (BNC200)
Conditions: $v_c$=140m/min, f=0,15mm/rev, $d_{oc}$=0,3mm, Wet

# SUMIBORON
# One-Use Wiper Inserts

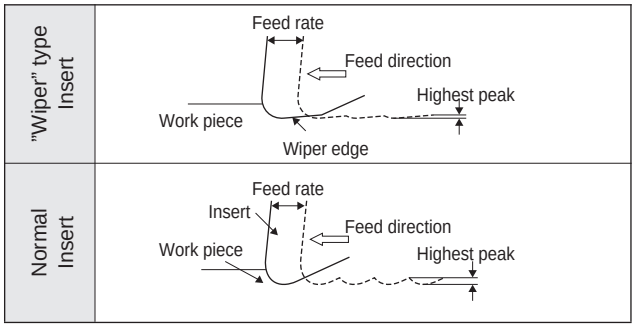



## Characteristics

- SUMIBORON one-use insert with wiper edge for hardened steel machining
- Excellent surface finish similar to grinding
- Improved efficiency with higher speeds and feeds
- New lineup includes:
  **WG** type ⇨ for low-feed cutting
  **WH** type ⇨ for high-feed cutting



## Purpose of Wiper Edge



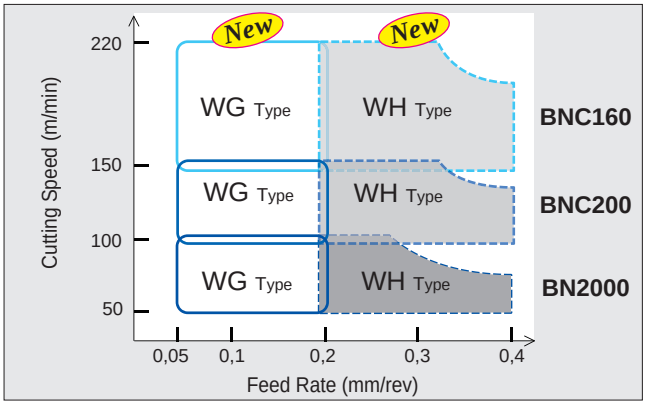

## Surface Roughness of Wiper Insert

| | "Wiper" Insert (r=0,8) | | Standard Insert (r=0,8) | |
|---|---|---|---|---|
| | Finishing (f=0,10mm/rev) | High feed cutting (f=0,30mm/rev) | Finishing (f=0,10mm/rev) | High feed cutting (f=0,30mm/rev) |
| Surface Roughness Profile | **WG** Type | **WH** Type | | |
| Surface Roughness $R_z$ | 0,63µm | 1,39µm | 1,98µm | 9,20µm |

## Recommended Cutting Conditions
(Surface Roughness Standard: $R_z$ = 1,6 ~ 3,2µm)

- For optimum effectiveness, use wiper inserts for continuous cutting.
- For copy turning, inserts with nose-radius is recommended.
- Chattering and undulation may occur, please use work and machine with high rigidity.

Two types are available depending on the feed rate:
**WG** type: Recommended feed rate: less than **f ≤ 0,20mm/rev**
**WH** type: Recommended feed rate: more than **f ≥ 0,20mm/rev**
Range of good surface roughness: **$R_z$=1,6µm to 3,2µm**
Available grades: BN2000, BNC160, BNC200

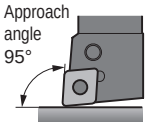



## Tool-Setup WG / WH Wiper

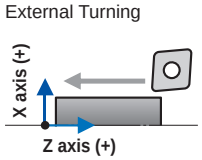
### CNGA / CCGW / WNGA Type Wiper

1. Use a holder with a 95° approach angle.
2. Tool **compensation required**.

CNGA / CCGW / WNGA type wiper inserts do not follow the ISO standard. Correction of the tool offset of the cutting edge as explained on the right.




**Cutting Edge Position Compensation, Outer Processing**

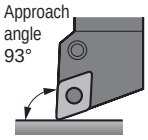



| Nose Radius | Type | X-Direction | Z-Direction |
|---|---|---|---|
| R0,4 | WG | -0,02 | -0,02 |
| | WH | -0,06 | -0,06 |
| R0,8/R1,2 | WG | -0,01 | -0,01 |
| | WH | -0,06 | -0,06 |

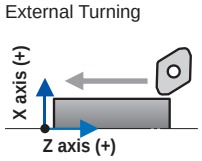
### DNGA / DCGW Type Wiper

1. Use a holder with a 93° approach angle.
2. Tool **compensation required**.

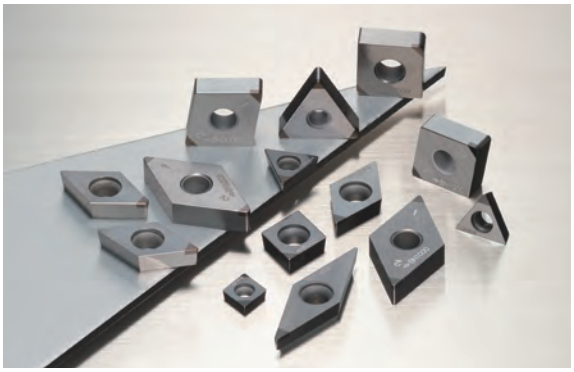
DNGA / DCGW type wiper inserts do not follow the ISO standard. Correction of the tool offset of the cutting edge as explained on the right.
**Note**: DNGA/DCGW type wiper inserts are only possible for external and internal turning, not for facing.




**Cutting Edge Position Compensation, Outer Processing**




| Nose Radius | Type | X-Direction | Z-Direction |
|---|---|---|---|
| R0,4 | WG | -0,17 | -0,01 |
| | WH | -0,70 | -0,06 |
| R0,8 | WG | -0,05 | 0 |
| | WH | -0,58 | -0,05 |



## Uncoated CBN grades for hardened steel machining

### ■ General Features

A new uncoated type of SUMIBORON that has a newly developed high-purity ceramic binder.
Both fracture and wear resistance are combined to achieve a stable tool life in a wide variety of hardened steel machining.

Available in single corner and multi-corner type inserts.

### ■ Characteristics

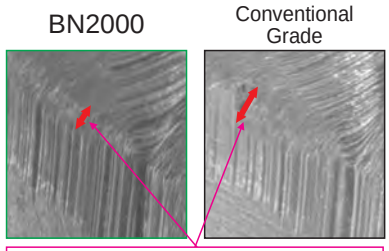
● BN1000

- **Superior high-speed machining grade with the highest wear resistance of any uncoated SUMIBORON.**
  Delivers excellent tool life in continuous cutting to light-interrupted cutting.
- **Improved fracture resistance while also emphasizing wear resistance.**
  Improved hardness and heat resistance from the high-purity TiCN ceramic binder.

● BN2000

- **General purpose grade suitable for typical hardened steel machining applications.**
  Provides stable tool life in everything from continuous cutting to light-to-medium interrupted cutting.
- **High degrees of both fracture resistance and wear resistance.**
  Significant improvements in the performance of both by employing a high-purity ceramic binder.
- **Stable surface roughness by increasing sharpness (Figure on right).**

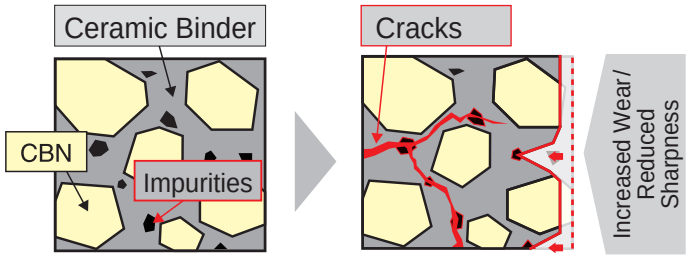
Sharpness Comparison




Compared to conventional grades, small cutting edge roundness

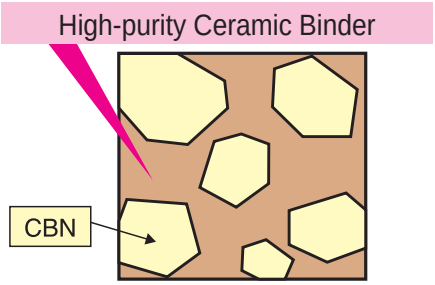
### ■ Newly Developed High-Purity Ceramic Binder

● Conventional Grade




The impurities contained in the ceramic binder for conventional grades cause a weakening in the sintered body and a decrease in heat resistance, which becomes the cause of cracks (chipping) and wear.

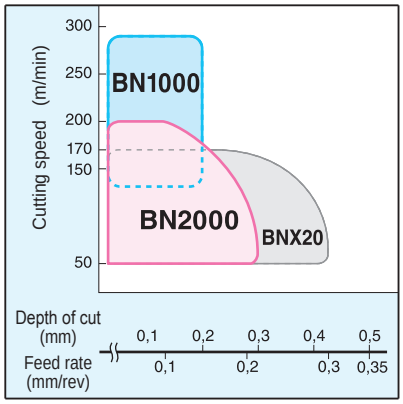
● BN1000 / BN2000



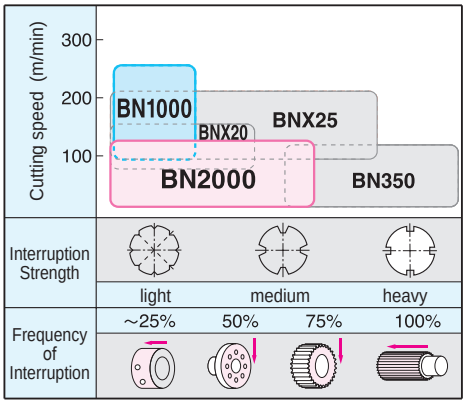

With the newly developed high-purity **ceramic binder**, the BN1000 / BN2000 achieve toughness and improved heat resistance by decreasing impurities to an extreme!

### ■ Recommended Application Range

● Continuous Cutting




● Interrupted Cutting




### ■ Cutting Conditions

● BN1000

| $v_c$ (m/min) | f (mm/rev) | $d_{oc}$ (mm) |
|---|---|---|
| 100 150 200 250 300<br>120 | 0,03-0,15 | 0,03-0,2 |

● BN2000

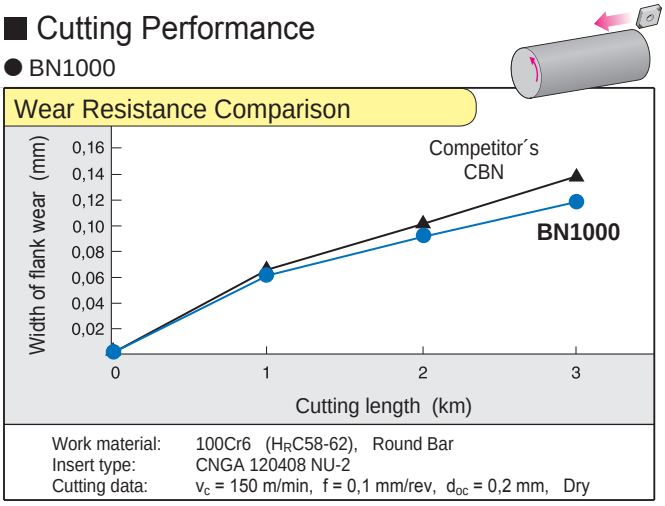
| $v_c$ (m/min) | f (mm/rev) | $d_{oc}$ (mm) |
|---|---|---|
| 50 100 150 200 250<br>80 120 | 0,03-0,2 | 0,03-0,3 |

* Coolant ... Continuous cutting: Dry or Wet
Interrupted cutting: Dry

# Uncoated SUMIBORON
# BN1000 / BN2000

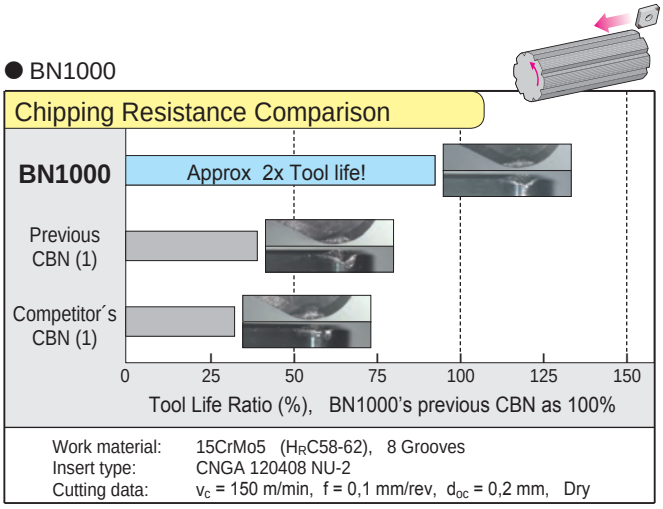
## ■ Cutting Performance

● BN1000



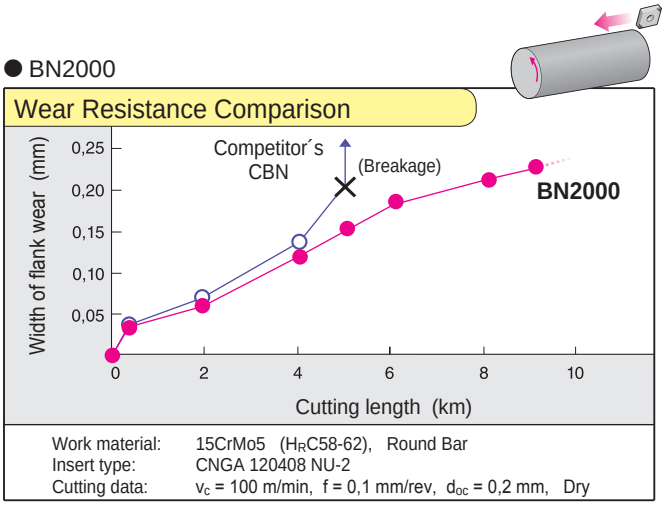

Work material: 100Cr6 ($H_RC58$-62), Round Bar
Insert type: CNGA 120408 NU-2
Cutting data: $v_c$ = 150 m/min, f = 0,1 mm/rev, $d_{oc}$ = 0,2 mm, Dry

● BN1000



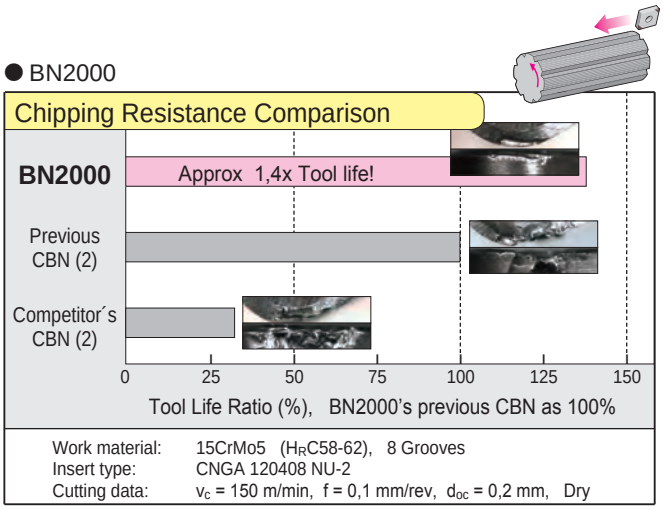

Work material: 15CrMo5 ($H_RC58$-62), 8 Grooves
Insert type: CNGA 120408 NU-2
Cutting data: $v_c$ = 150 m/min, f = 0,1 mm/rev, $d_{oc}$ = 0,2 mm, Dry

● BN2000




Work material: 15CrMo5 ($H_RC58$-62), Round Bar
Insert type: CNGA 120408 NU-2
Cutting data: $v_c$ = 100 m/min, f = 0,1 mm/rev, $d_{oc}$ = 0,2 mm, Dry

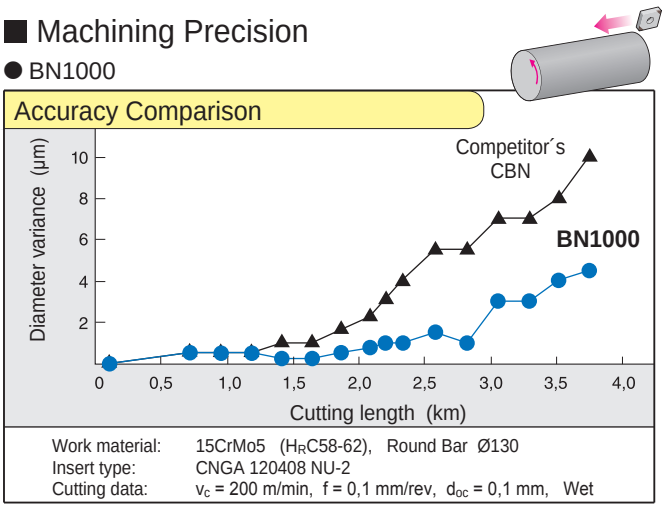
● BN2000




Work material: 15CrMo5 ($H_RC58$-62), 8 Grooves
Insert type: CNGA 120408 NU-2
Cutting data: $v_c$ = 150 m/min, f = 0,1 mm/rev, $d_{oc}$ = 0,2 mm, Dry

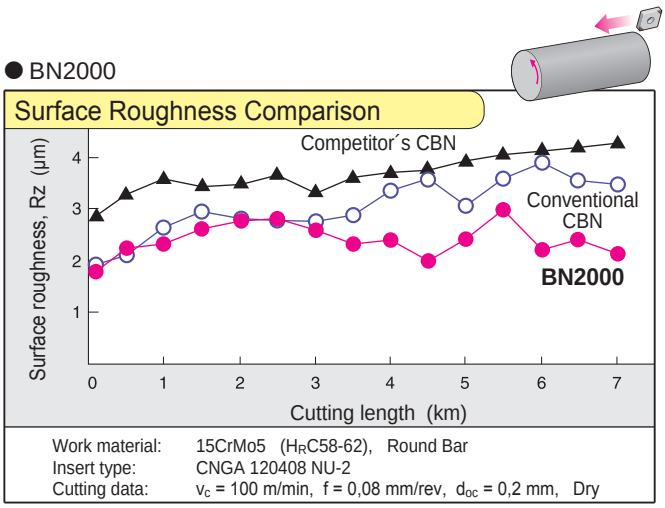
## ■ Machining Precision

● BN1000



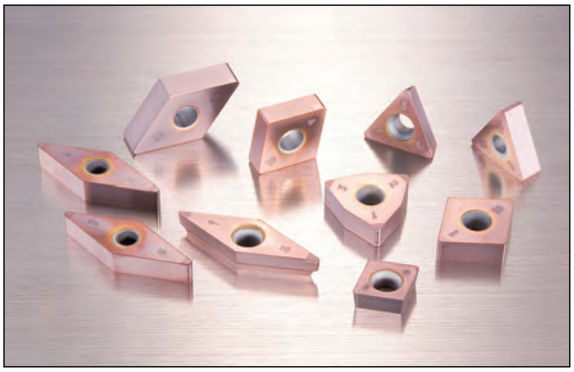

Work material: 15CrMo5 ($H_RC58$-62), Round Bar Ø130
Insert type: CNGA 120408 NU-2
Cutting data: $v_c$ = 200 m/min, f = 0,1 mm/rev, $d_{oc}$ = 0,1 mm, Wet

● BN2000




Work material: 15CrMo5 ($H_RC58$-62), Round Bar
Insert type: CNGA 120408 NU-2
Cutting data: $v_c$ = 100 m/min, f = 0,08 mm/rev, $d_{oc}$ = 0,2 mm, Dry

## Coated Sumiboron premium grade for high speed machining of hardened steels



### General Features

Our copper coloured Sumiboron grade BNC 100 resists premature plastic deformation of the cutting edge by withstanding the high temperatures that occur when machining hardened steels. This new grade features a heat resistant CBN substrate and a special TiCN based ceramic coating to enhance surface finish across a broad range of finishing applications at elevated cutting speeds.

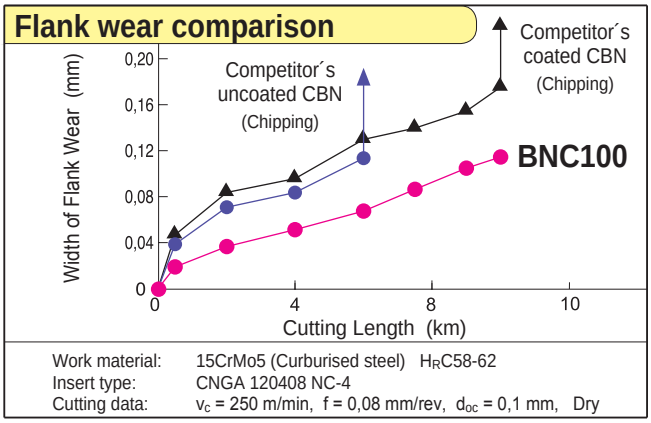
Ideal for higher speed machining and suitable for continuous or light interrupted cuts BNC100 delivers reliable performance and excellent tool life

### Advantages

- **High speed machining!**
  Suitable for continuous to light interrupted high speed cutting with $v_c$ = 150 ~ 300 m/min.
- **Extended tool life!**
  Wear resistant ceramic coating and tough CBN substrate considerably extends tool life.
- **Excellent surface finish!**
  A consistent surface finish to values less than 6,3 Rz is easily achieved on both continuous and light interrupted cut applications.

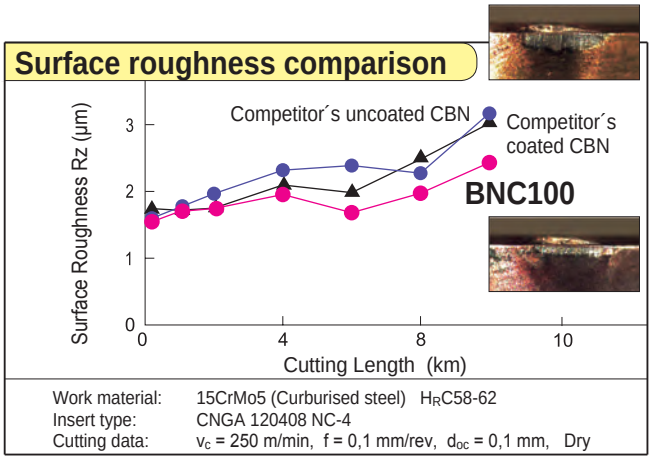
### Performance

**Flank wear comparison**




Work material: 15CrMo5 (Curburised steel) $H_RC58$-62
Insert type: CNGA 120408 NC-4
Cutting data: $v_c$ = 250 m/min, f = 0,08 mm/rev, $d_{oc}$ = 0,1 mm, Dry

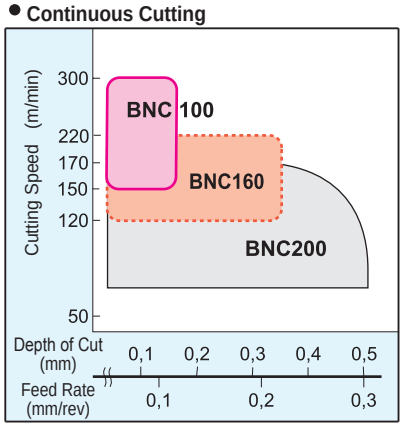
**Surface roughness comparison**



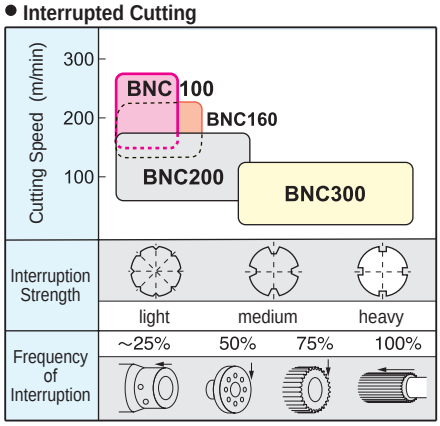

Work material: 15CrMo5 (Curburised steel) $H_RC58$-62
Insert type: CNGA 120408 NC-4
Cutting data: $v_c$ = 250 m/min, f = 0,1 mm/rev, $d_{oc}$ = 0,1 mm, Dry

### Application Range

**Continuous Cutting**




**Interrupted Cutting**



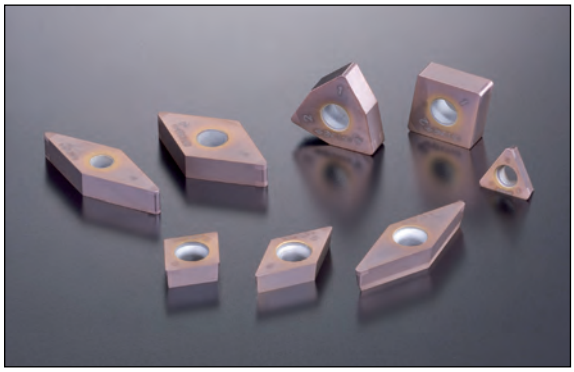

### Recommended Cutting Conditions

| $v_c$ (m/min) 100 150 200 250 300 | f (mm/rev) | $d_{oc}$ (mm) |
|---|---|---|
| | 0,03-0,2 | 0,03-0,3 |

Coolant ... Continuous cutting: Dry or Wet
Interrupted cutting: Dry

# Coated SUMIBORON BNC160

## High precision machining with surface finishes down to 1,6 Rz possible thanks to smooth coating!



### General

Use the copper coloured Sumiboron grade BNC160 to improve surface integrity as well as machining accuracy.
The TiCN based smooth surface ceramic coating and the newly developed Sumiboron substrate enhances edge strength and wear resistance making high precision machining with surface finishes as low as 1,6Rz readily achievable.

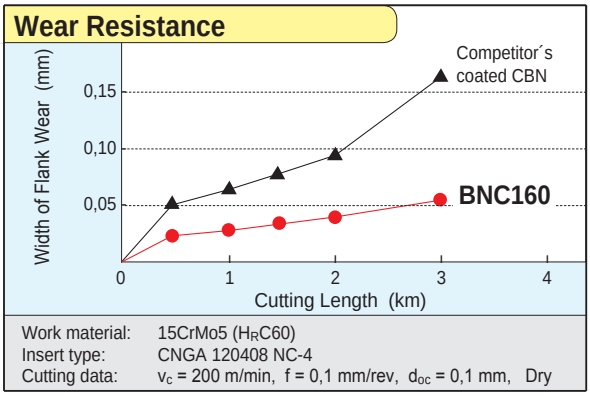
This new grade is ideal for turning components that previously relied on precision grinding machines for final machining.

### Advantages

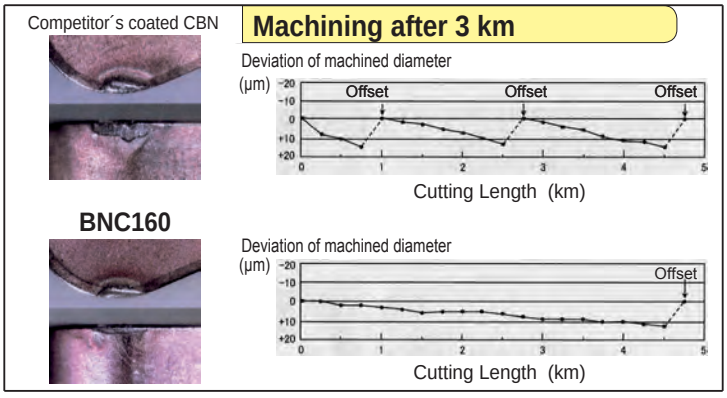
- **Excellent surface roughness!**
  A consistent surface roughness is maintained for hours because wear at the boundary is so gradual.
- **High Precision Machining**
  High precision work previously ground, can now be turned.
- **Enlarged scope of application!**
  A wider range of hardened steels can be cut using Sumiboron the result being high productivity on close tolerance machining applications.

### Performance

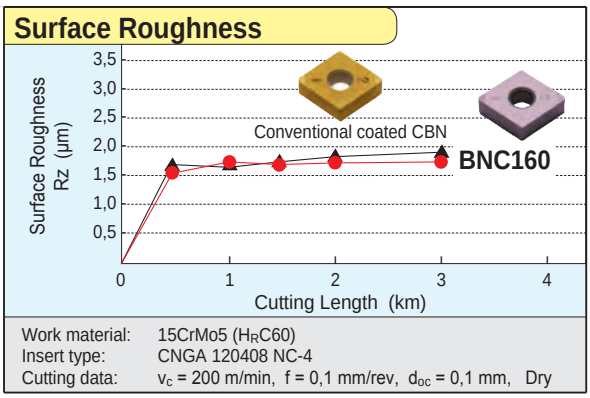
**Continuous Cutting**




**Machining Accuracy**




**Continuous Cutting**




### Recommended cutting Conditions

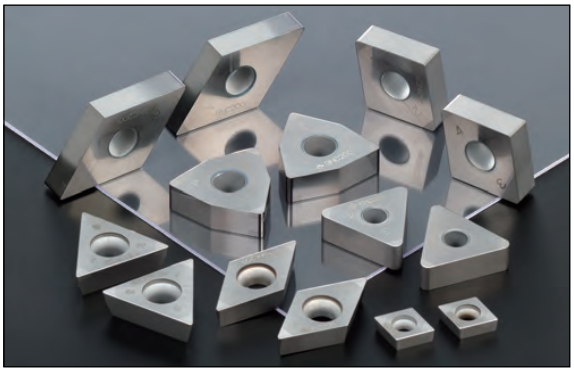
| vc (m/min) 120 150 200 220 250 | f (mm/rev) | doc (mm) |
|---|---|---|
| | 0,03-0,2 | 0,03-0,35 |

Feed rate and nose radius are set such that the theoretical surface roughness is 1/2 to 1/3 of the required surface roughness.

Coolant ... Continuous cutting: Dry or Wet
Interrupted cutting: Dry

**Most suitable for high speed finishing !**

## Excellent wear and fracture resistance!
## Predictable tool life on a wide range of applications!



### General

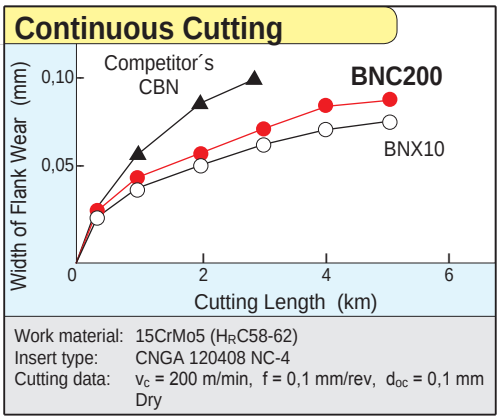
Our silver coloured Sumiboron insert grade BNC200 offers safe reliable cutting and predictable tool life.

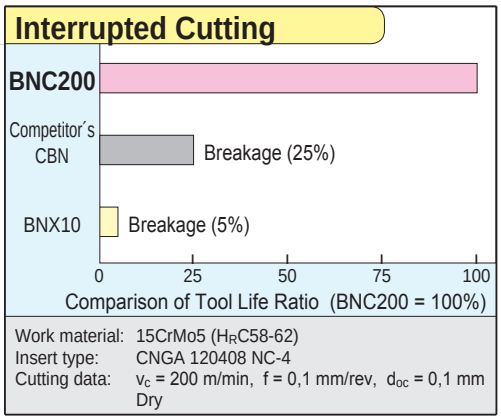
The newly developed cutting material with enhanced edge strength is coated with TiAlN based ceramic for excellent wear resistance and realises extended tool life even when interrupted cutting.
This grade is especially suitable for medium speed machining of carburised surfaces.

### Advantages

- **Predictable tool life!**
  Extended tool life is realised even when high speed cutting thanks to excellent wear resistance.
- **Wide range of applications!**
  Sumiboron is suitable for a wide range of applications eg. from low to high speed interrupted cutting.
- The newly developed brazing technology maximises edge strength making Sumiboron suitable for interrupted and continuous cutting.

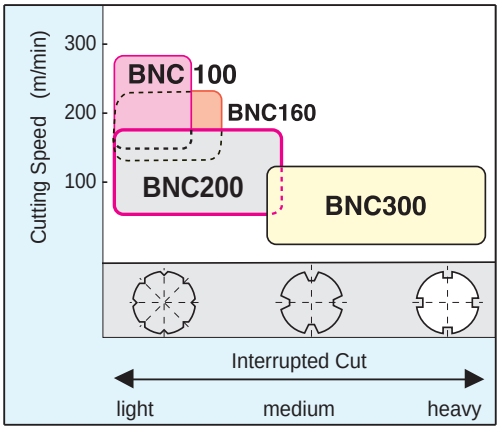
### Performance




- **BNC200 features excellent wear resistance comparable with BNX10, plus outstanding fracture resistance.**

### Application Range




### Recommended Cutting Conditions

| vc (m/min) 50 80 170 220 | f (mm/rev) | doc (mm) |
|---|---|---|
| | 0,03-0,25 | 0,05-0,5 |

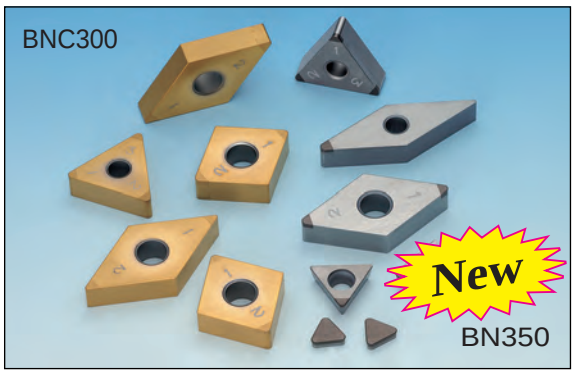
Coolant ... Continuous cutting: Dry or Wet
Interrupted cutting: Dry

**Can be used in a wide range of applications from low to high speed operation.**

Coated / Uncoated SUMIBORON

# BNC300 / BN350

## The ultimate grades BNC300 and BN350 in interrupted machining of hardened steel




## General Features

● BNC300

Newly developed CBN substrate that emphasizes on toughness coupled with a highly wear resistant TiAlN based coating layer that has improved adhesion strength. With a good balance of fracture and wear resistance, stable and longer tool life can be achieve in interrupted cut or in a mixture of continuous and interrupted cutting.

● BN350

SUMIBORON series highest fracture resistance and toughest CBN. Reliable grade for achieving stable tool life in heavy interrupted cutting conditions.

## Characteristics

BNC300

● **Stable and long tool life in interrupted cutting**
Achieving stable and long tool life in heavy interrupted cutting, with superior fracture resistance.

● **Superior dimensional precision**
Good adhesion strength, TiAlN based, high wear resistance coating. Achieving superior dimensional precision even in interrupted cutting.

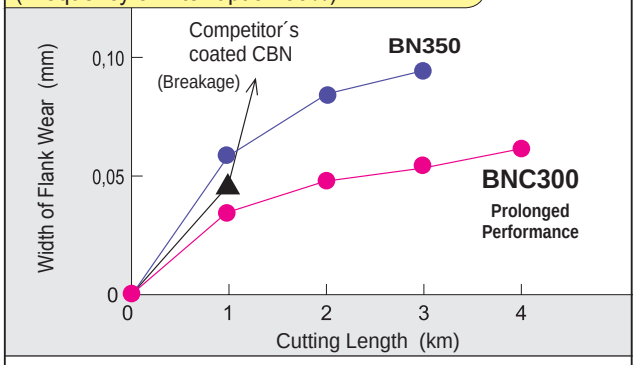
● **Suitable for different types of workpieces**
Achieving significantly longer tool life even on workpieces that have a mixture of continuous and interrupted cutting.

BN350

● **Stable and long tool life in interrupted cutting**
Stable and long tool life with superior fracture resistance, that prevents fractures which commonly occurs during interrupted cutting.

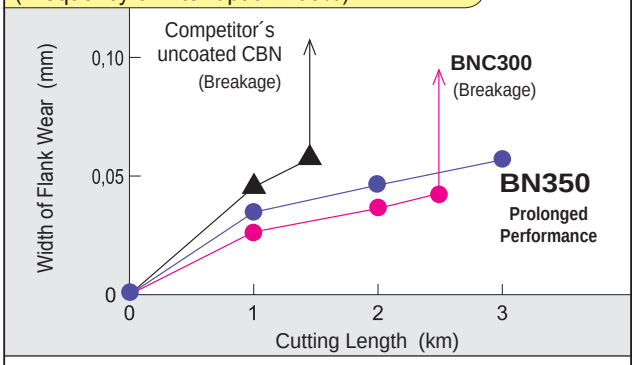
## Performance

Continuous ~ Light Interrupted Machining
(Frequency of Interruption 50%)




Work material: 15CrMo5 ($H_RC58$-62)
Insert type: CNGA 120408 NC-4
Cutting data: $v_c$ = 120 m/min, f = 0,1 mm/rev, $d_{oc}$ = 0,2 mm, Dry

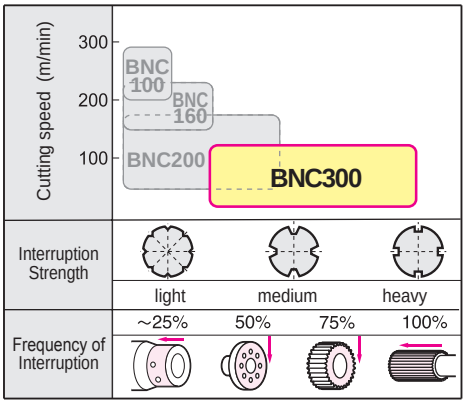
Heavy Interrupted Machining
(Frequency of Interruption 100%)



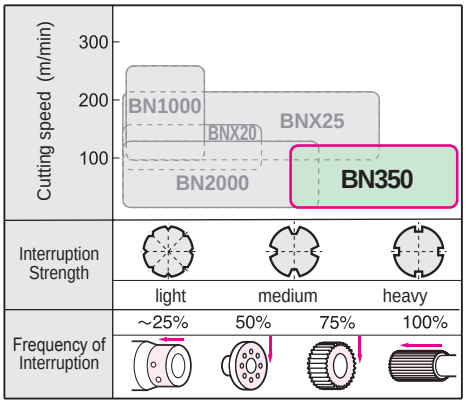

Work material: 15CrMo5 ($H_RC58$-62)
Insert type: CNGA 120408 NU-2
Cutting data: $v_c$ = 100 m/min, f = 0,1 mm/rev, $d_{oc}$ = 0,2 mm, Dry

## Recommended Application Range

● Coated SUMIBORON




● Uncoated SUMIBORON



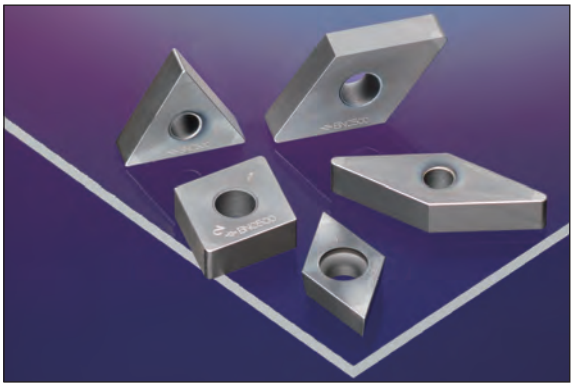

## Recommended Cutting Conditions (BNC300, BN350)

| $v_c$ (m/min) | f (mm/rev) | $d_{oc}$ (mm) |
|---|---|---|
| 50 100 150 200<br>80 120 | 0,03-0,2 | 0,03-0,3 |

※ Coolant ... Interrupted cutting: Dry

SUMIBORON

## Coated CBN grade for ductile cast iron machining

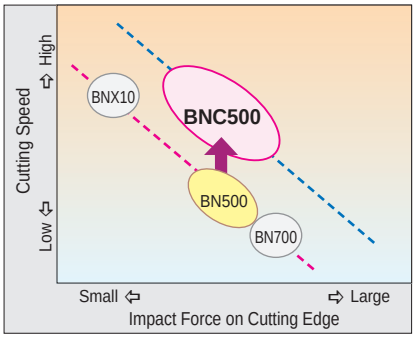


### General Features

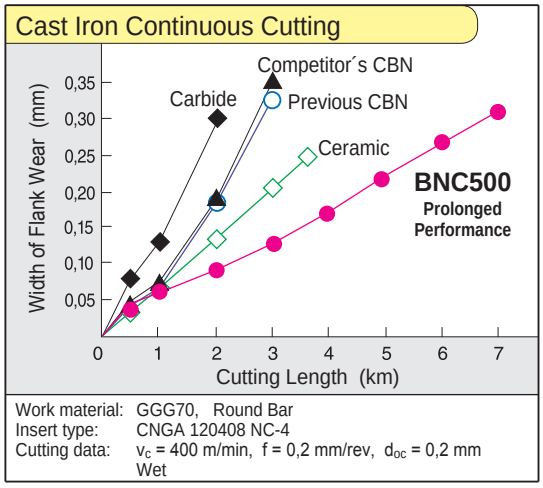
Further improvements in the toughness of the sintered CBN and wear resistance from the application of a newly developed high-purity TiC binder. In addition, it demonstrates exceptional wear resistance by combining a ceramic coating with excellent heat resistance. High-speed and high-precision machining is achieved when finishing ductile cast iron. It also provides a long, stable tool life in machining high-strength ductile cast iron, special cast irons such as vermicular cast iron, and centrifugally cast iron.

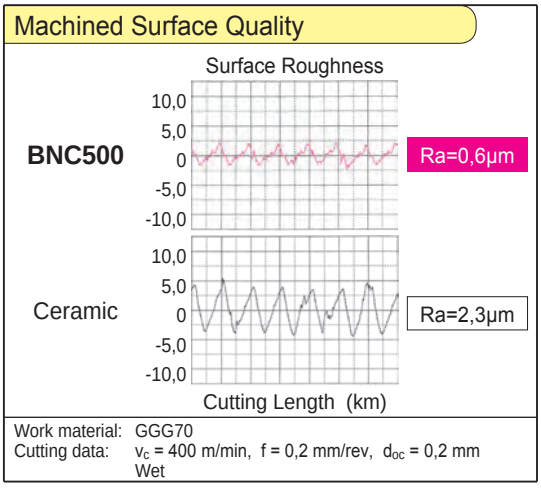
### Characteristics

- **Achieves a Long, Stable Tool Life at $v_c$=400 m/min**
  Superior wear resistance, makes stable machining possible under high-speed conditions.
- **Supports High-precision Machining**
  Can maintain excellent dimensional tolerance and surface roughness.

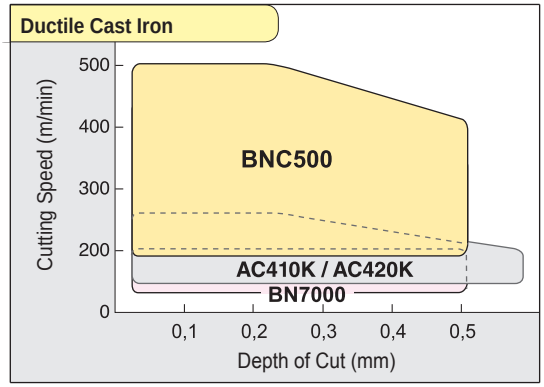



### Cutting Performance

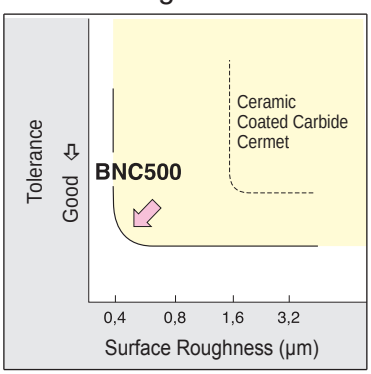


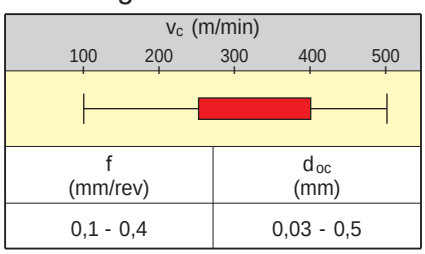

### Application Range




### High Precision Machining




### Recommended Cutting Conditions




| f (mm/rev) | $d_{oc}$ (mm) |
|---|---|
| 0,1 - 0,4 | 0,03 - 0,5 |

* Coolant ... Wet

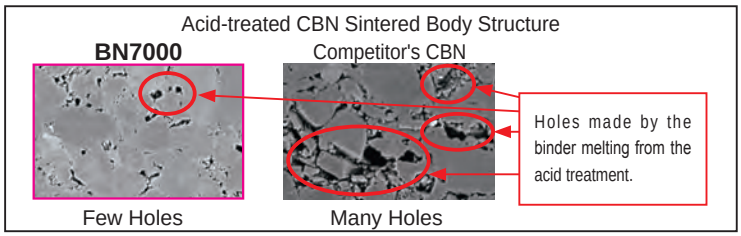
# Uncoated SUMIBORON
# BN7000

## Uncoated CBN grade for high-speed finishing of cast iron, powdered metals, and difficult-to-machine materials!




### ■ General Features

Medium-grain CBN sintered to a high density to achieve the maximum content percentage.
Also delivers superior fracture resistance by increasing the binding strength between CBN particles. Provides stable, long tool life for high-speed finishing work with cast iron, powdered metals, and difficult-to-machine materials.




### ■ Characteristics

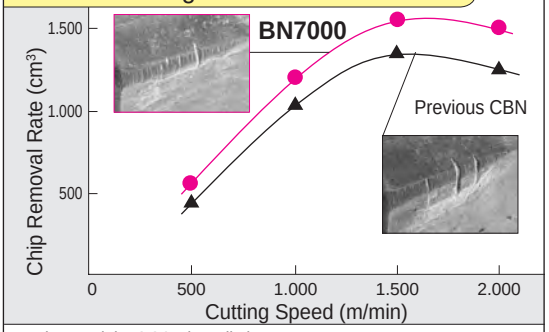
● **Excellent for high speed finishing of Cast Iron!**
Good wear and fracture resistance in high speed machining of Grey Cast Iron.

● **High efficiency machining of powdered metal**
With 4 different types of edge treatment, stable and long tool life can be achieved from machining of Sintered Alloys of any shape or hardness.

● **Able to machine any Exotic Metals.**
Long tool life can also be achieved for the machining of exotic materials such as Roll, HSS and Heat-Resistive Alloy etc.

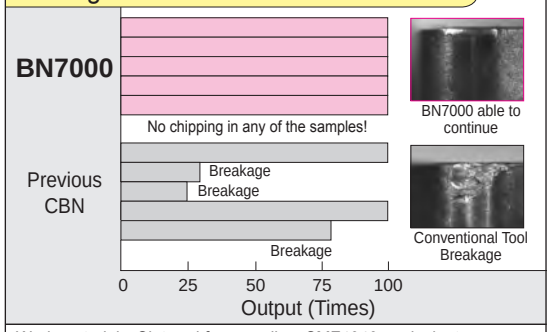
### ■ Cutting Performance

**Cast Iron Milling**



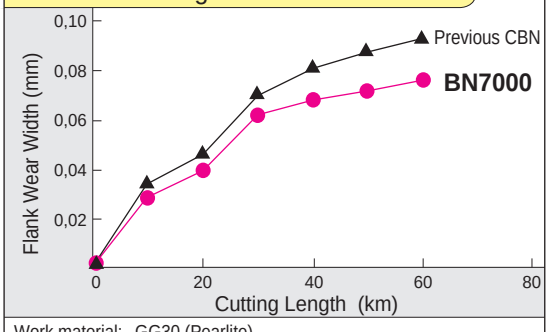

Work material: GG25 (Pearlite)
Insert (Cutter): SNEW 1203 ADTR, (FMU 4100 R)
Cutting data: $v_c$ = 500 ~ 2.000 m/min, f = 0,2 mm/rev
$d_{oc}$ = 0,3 mm, Wet

**Turning of Powdered Metal**



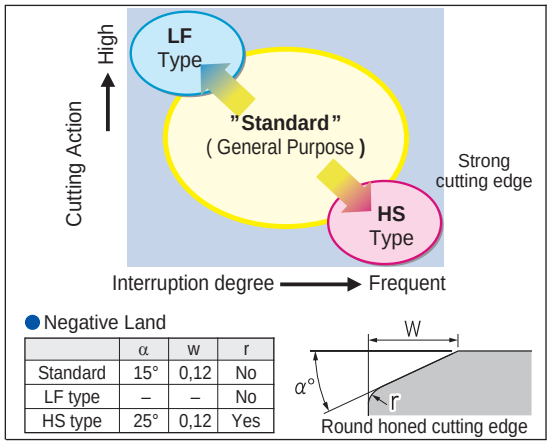

Work material: Sintered ferrous alloy, SMF4040 equivalent (HRB70, Interrupted Machining)
Insert type: CNGA 120408
Cutting data: $v_c$ = 250 m/min, f = 0,1 mm/rev, $d_{oc}$ = 0,3 mm, Wet

**Cast Iron Turning**




Work material: GG30 (Pearlite)
Insert type: CNGA 120408 NU-2
Cutting data: $v_c$ = 800 m/min, f = 0,15 mm/rev, $d_{oc}$ = 0,2 mm, Wet

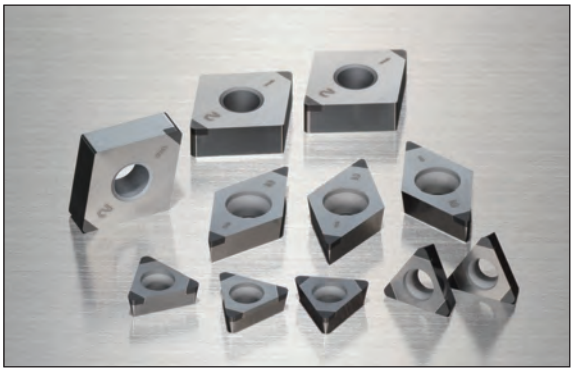
### ■ Recommended Edge Treatment




● Negative Land

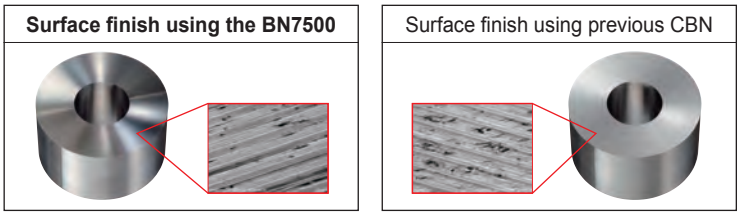
| | α | w | r |
|---|---|---|---|
| Standard | 15° | 0,12 | No |
| LF type | – | – | No |
| HS type | 25° | 0,12 | Yes |

## Uncoated CBN grade for high precision and high efficiency machining of powdered metal



### General Features

High density sintered material made of micro-grained CBN grains provide excellent sharpness and wear resistance for high quality surfaces in sintered alloy finishing.




The previous CBN left white blemishes on the finished surface whereas the BN7500 leaves a better, glossy surface finish.

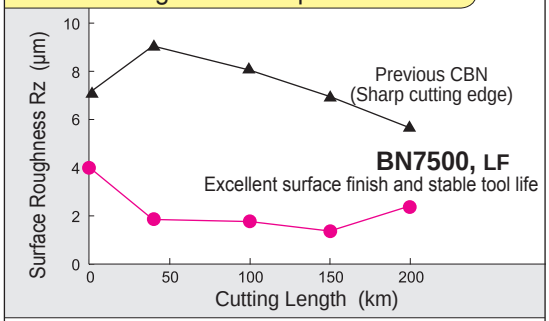
### Characteristics

● **Excellent for finishing of powdered metal**
Excellent machined surface finish and surface appearance.

● **Available with 3 different types of edge treatment for machining sintered alloys of any shape or hardness**
The LF type has a sharper edge designed specifically for machining sintered alloys with minimal burr and improved machining precision.
The HS Type has a strengthened cutting edge for stable chipping resistance during interrupted cutting and finishing.

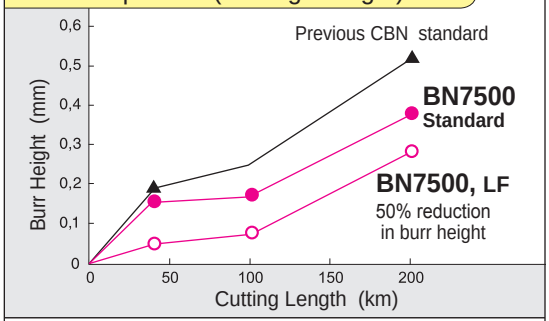
### Cutting Performance

**Surface Roughness Comparison**



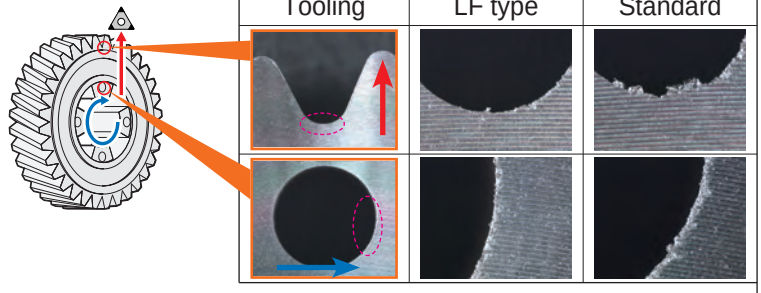

Work material: Sintered ferrous alloy, SMF4040 equivalent (HRB70, Continuous cut)
Insert type: CNGA 120408 LF-NU2
Cutting data: $v_c$ = 200 m/min, f = 0,1 mm/rev, $d_{oc}$ = 0,1 mm, Wet

**Burr Comparison (Average Height)**




Work material: Sintered ferrous alloy, SMF4040 equivalent (HRB70, Continuous cut)
Insert type: CNGA 120408 LF-NU2
Cutting data: $v_c$ = 200 m/min, f = 0,1 mm/rev, $d_{oc}$ = 0,1 mm, Wet

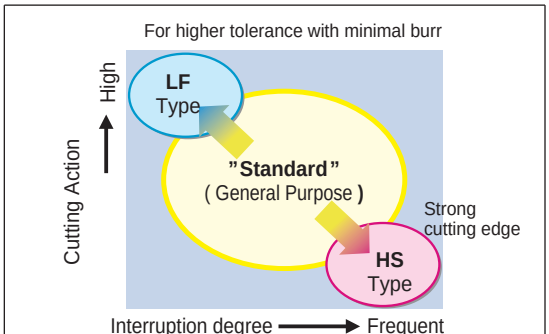
### ● Feed and Burr Relationship




The LF Type without negative land has a cutting edge sharpness superior to the standard type and can control burrs better.

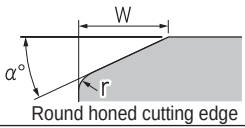
Work material: VVT Facing
Insert type: TNGA 160404 NU3
Cutting data: $v_c$ = 200 m/min, f = 0,1 mm/rev, $d_{oc}$ = 0,1 mm, Wet

### Recommended Edge Treatment




● Negative Land

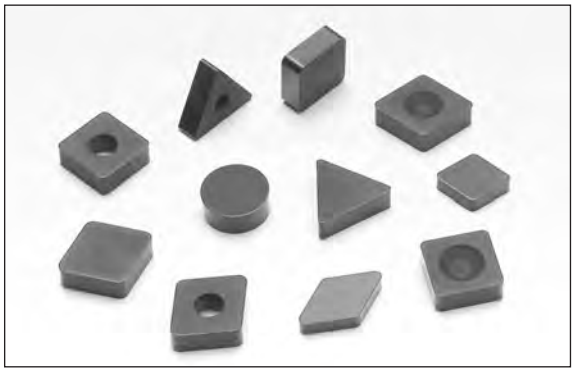
| | α | w | r |
|---|---|---|---|
| Standard | 15° | 0,12 | No |
| LF type | – | – | No |
| HS type | 25° | 0,05 | Yes |




Round honed cutting edge

# Uncoated SUMIBORON
# BNS800

## Solid CBN grade for high speed rough and finish machining of cast cron



### General

Solid CBN grade with high content CBN and special binder phase provide high fracture toughness and high thermal conductivity.

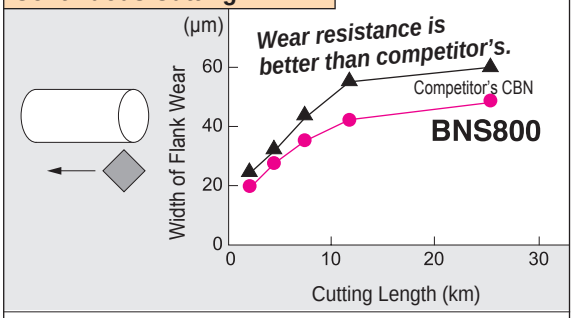
Solid inserts for roughing with high depth of cut and also for finishing of cast iron and alloyed cast iron at wet and dry conditions.

### 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.

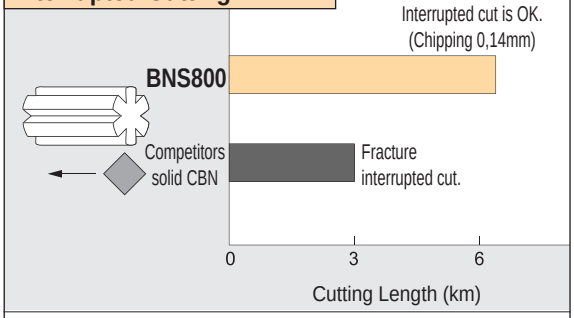
### Performance

**Continuous Cutting**




Work material: Round Bar (GG30)
Insert type: SNGN 090308
Cutting data: $v_c$ = 800 m/min, f = 0,2 mm/rev, $d_{oc}$ = 0,5 mm, Dry

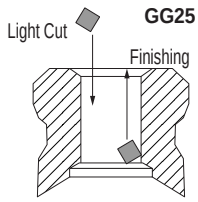
**Interrupted Cutting**



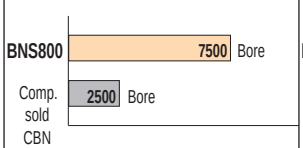

Work material: Round Bar- 6V, grooved (GG30)
Insert type: SNGN 090308
Cutting data: $v_c$ = 600 m/min, f = 0,3 mm/rev, $d_{oc}$ = 0,5 mm, Dry

### Application Example

**Cylinder Bore**

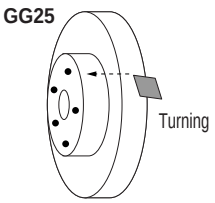



(Tool life criteria : Finishing)

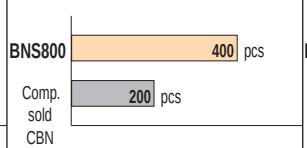



| Tooling | Light Cut | Finishing |
|---|---|---|
| Grade | BNS800 | |
| Insert | SNGN090308 | |
| $v_c$ | 1000m/min | |
| f | 0,3mm/rev | 0,25mm/rev |
| $d_{oc}$ | 0,2mm | |
| Coolant | Wet | |

**Brake Disc**

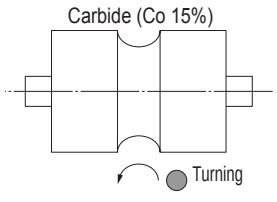



(Tool life criteria : Breakage)

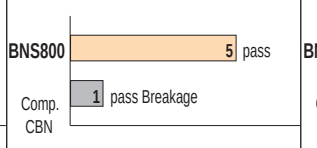



| Tooling | Finishing |
|---|---|
| Grade | BNS800 |
| Insert | DNGN110312 |
| $v_c$ | 600m/min |
| f | 0,3mm/rev |
| $d_{oc}$ | 0,5mm |
| Coolant | Dry |

**Carbide Roll**

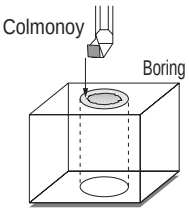



(Tool life criteria : Breakage)

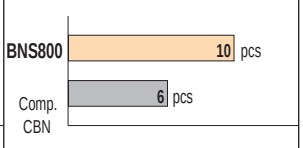



| Tooling | Finishing |
|---|---|
| Grade | |
| Insert | RNGN090300 |
| $v_c$ | 40m/min |
| f | 0,15mm/rev |
| $d_{oc}$ | 0,2mm |
| Coolant | Wet |

**Sprayed Face Bore**

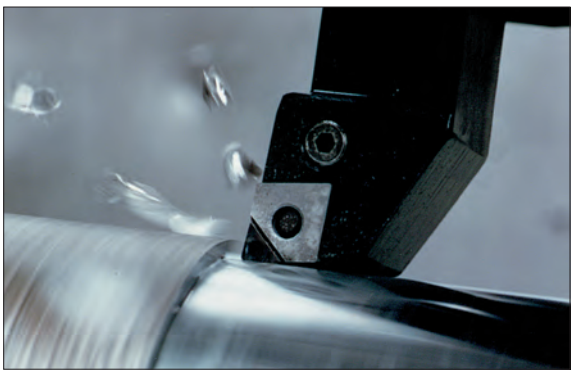



(Tool life criteria : Breakage)




| Tooling | Roughing | Finishing |
|---|---|---|
| Grade | BNS800 | |
| Insert | SNGN090312 | SNGN090308 |
| $v_c$ | 80m/min | |
| f | 0,04mm/rev | 0,03mm/rev |
| $d_{oc}$ | ~3mm | 0,5mm |
| Coolant | Wet | |

# 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 sence of broadening the cutting application range.

## Production Process

In the production process of **SUMIBORON / SUMIDIA**, CBN powder / diamond powder is firstly synthesized under the ultra - high pressure, and secondly, the synthesized crystalline grains are sintered.

Fig. 2 shows a diagram of high temperature high pressure apparatus for processing the ultra - high pressure sintering operation.
This apparatus is basically composed of a piston and a cylinder to generate ultra - high pressure as high as 5000 N/mm$^2$ with a special device. The piston and cylinder are made of cemented carbide.

To manufacture final products round discs of SUMIBORON and SUMIDIA material are cut into specific shapes and brazed on to tool bodies made of cemented carbide, or steel, etc., and after that finished by grinding the edge.
In another process the final product can be obtained only by cutting blanks and finishing them.

Fig. 1

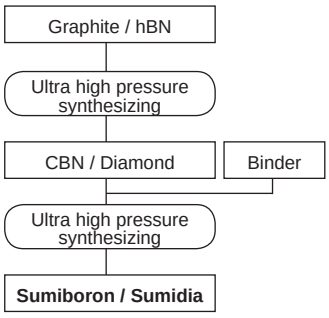
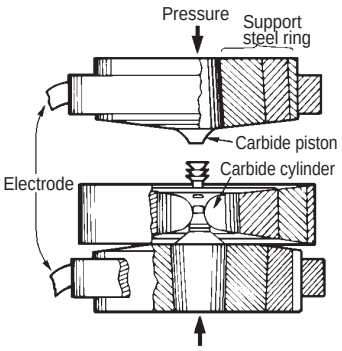
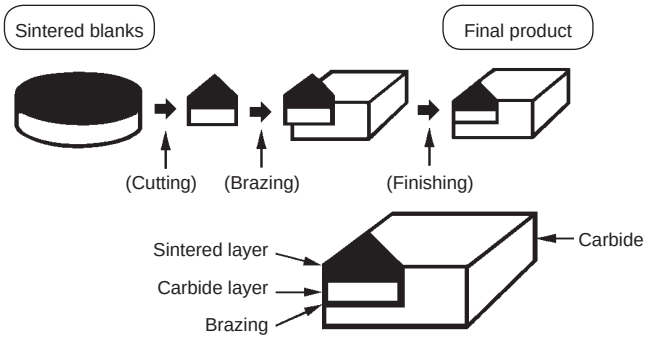



Fig. 2




## SumiBoron / SumiDia Grinding Method

| Items | | SumiBoron | SumiDia |
|---|---|---|---|
| Grinding machine | – | 1) Carbide grinding machine is applicable.<br>2) R Pointer should be used.<br>3) Should be wet grinding. | 1) Special-purpose high rigidity grinding machine is desirable.<br>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)<br>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.<br>2) Blank surface cut by EDM should be ground more than 0,05 mm | 1) Rake surface is lapped generally<br>2) Inspect with microscope of magnification of 30-50 times if there is edge chipping.<br>3) Edge treatment of tool should be sharp for cutting non-ferrous metals.<br>4) Remove the wire-cut surface of blank by 0,05 mm or more in grinding operation. |

# SUMIDIA DA1000




## General Features

SumiDia DA1000 is a high density, ultra fine grained sintered PCD with high toughness similar to that of cemented carbides.

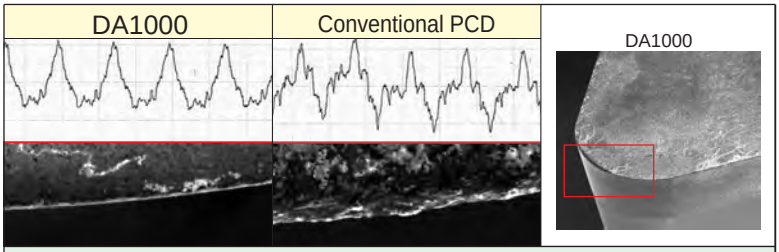
SumiDia DA1000, with its great improvement in fracture resistance, eliminates the breakage problems faced by conventional PCD tools especially during the milling of Aluminium alloys and achieves a longer and more stable tool life.

Furthermore, the NF type inserts maskes it even more cost effective.

## Series • Features • Application

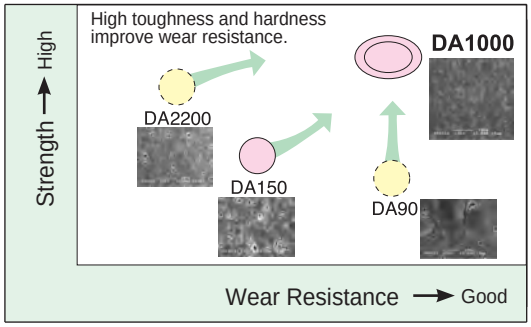
| Grade | Features | Application | Average size of Diamond grains (µm) | Hardness Hv | Transverse Rupture Strenghth (kg/mm²) |
|---|---|---|---|---|---|
| **DA1000** | High density sintered material made of ultra-fine diamond particles that demonstrates optimum wear resistance, andexcellent edge sharpness. | • High Silicon Aluminum Alloy Cutting<br>• Rough, Interrupted and Finishing of Al-alloy<br>• Wood or Wooden Board Cutting<br>• Non-Ferrous Metal finishing (Aluminium, Copper Alloy) | ~ 0,5 | 110 ~ 120 | ≈ 2,6 |
| DA2200 | Sintered material made of ultra-micro diamond particles.<br>Superior hardness and wear resistance with sharp edge. | • Rough, Interrupted and Finishing of Al-alloy<br>• Wood or Wooden Board Cutting | 0,5 | 90 ~ 100 | ≈ 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. | • Non-Ferrous Metal finishing (Aluminium, Copper Alloy)<br>• Green or Semi-Sintered Carbide & Ceramic Roughing<br>• FRP, Hard Rubber & Carbon Cutting<br>• Wooden or Inorganic Material Board Cutting | 5 | 100 ~ 120 | ≈ 1,95 |

## Comparison of cutting edges after machining Aluminum alloy

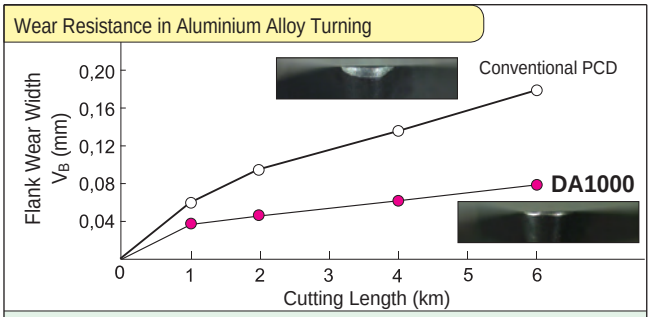



Work material: Al-17% Si alloy
Insert used: TPGW 160308
Cutting conditions: $v_c$= 1.000m/min, f=0,15mm/rev, $d_{oc}$= 0,2mm, Wet

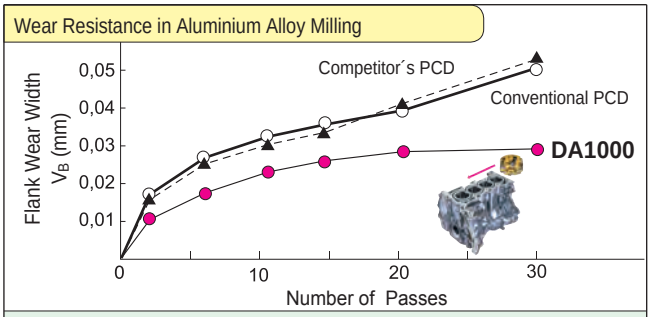
## Position of DA1000




## Cutting Performance




Work material: Al-17% Si alloy
Insert used: TPGN 160304
Cutting conditions: $v_c$= 800m/min, f= 0,12mm/rev, $d_{oc}$= 0,5mm, Wet



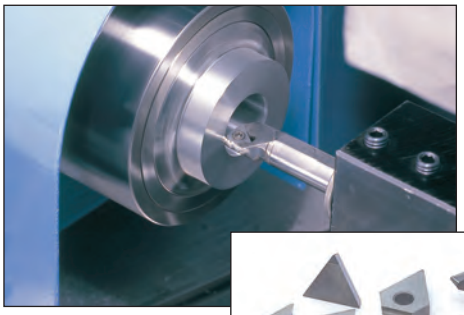

Work material: Al-12% Si alloy
Insert (Cutter): SNEW 1204 ADFR-FN, (RF 4100R)
Cutting conditions: $v_c$= 2.000m/min, f= 0,15mm/rev, $d_{oc}$= 3,0mm, Wet

## Recommended Cutting Conditions

| 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 |

# 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.

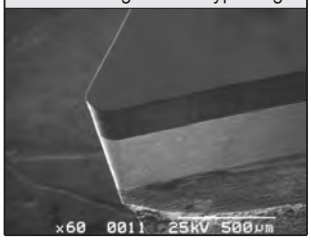
### Wide Application Range

- 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.

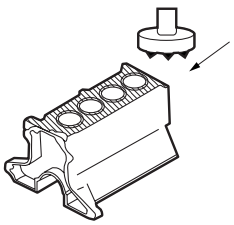
● SEM Image of NF-Type Edge



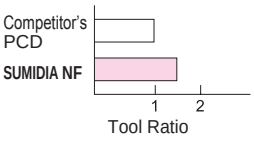

(NF-type is precision ground just like conventional inserts.)

## Application Examples

### ● Milling of Aluminum Cylinder Block

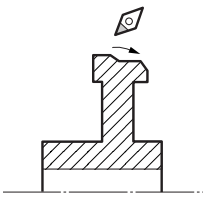


Results:
Burrs are not formed due to the edge sharpness of DA2200.
1,5 times longer tool life than competitor's.

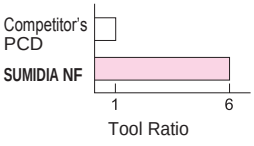



Work material: ADC12 (Al-12% Si alloy)
Insert used: 20° positive milling inserts (12 teeth)
Cutting conditions: $v_c$= 1.000m/min, $f_t$ = 0,025mm/t, $d_{oc}$= 1,2mm

### ● OD Turning of Aluminum Alloy Electronics Part

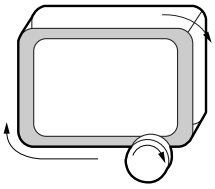


Results:
6 times tool life with relatively no chipping.

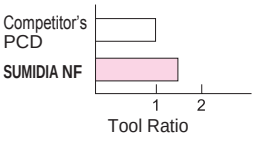



Work material: ADC12 (Al-12% Si alloy)
Insert used: VCMT 110301 NF
Cutting conditions: $v_c$= 800m/min, f=0,1mm/rev, $d_{oc}$= 0,02mm

### ● Milling of Aluminum Oil Pump Cover

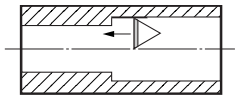


Results:
1,5 times longer tool life than competitor's with higher cost effectiveness.

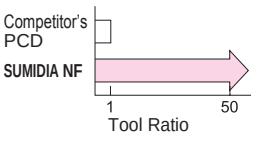



Work material: ADC12 (Al-12% Si alloy)
Insert used: TEEN32R NF
Cutting conditions: $v_c$= 3.000m/min, $f_t$ = 0,06mm/rev, $d_{oc}$= 0,2mm

### ● Boring of Aluminum Valve Bore

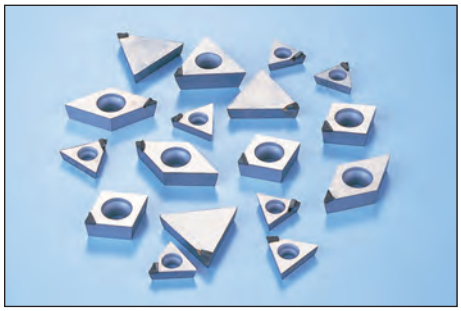


Results:
No initial chipping, tool life is more than 50 times that of carbides.




Work material: ADC12 (Al-12% Si alloy)
Insert used: TPGN 110304 NF
Cutting conditions: $v_c$= 530m/min, f=0,05mm/rev, $d_{oc}$= 0,2mm

# SUMIDIA One-Use Inserts
# Break Master DM Type



## General Features

**Economy One-Use Insert**

- Similar to SumiBoron One-Use type inserts

**With Built-in Chipbreaker for Effective Chip Removal**

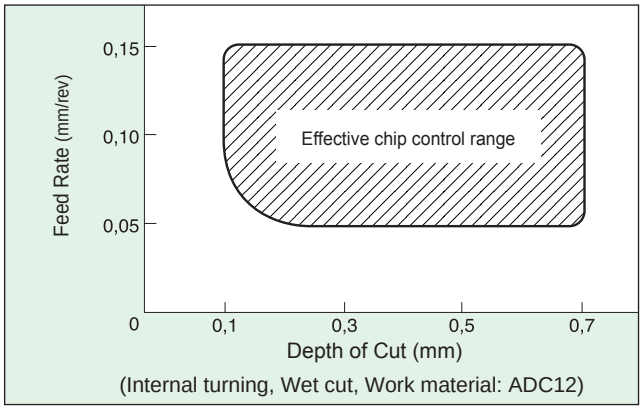
- Solving chip control problems and improving efficiency with DM-type chipbreaker.

**Extensive Insert Range for External and Facing Operation**

- 80° and 55° diamond shaped inserts are added to expand the application range of this series.

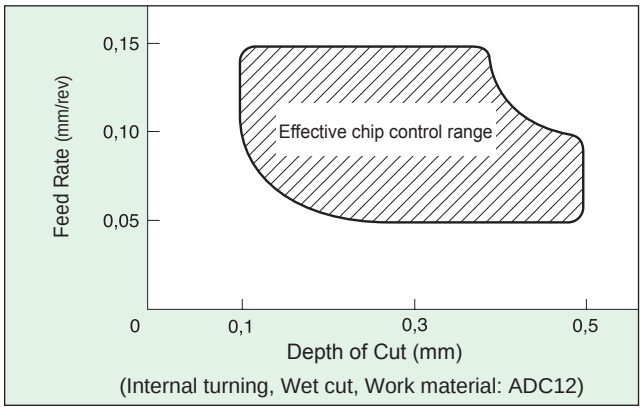
## Application Range

● Triangular Type Insert (Boring)

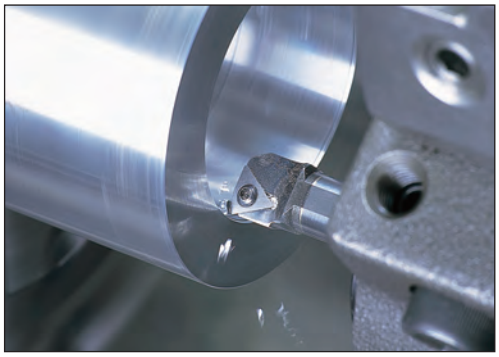



(Internal turning, Wet cut, Work material: ADC12)

● CCMT/DCMT Type (External Turning & Facing)

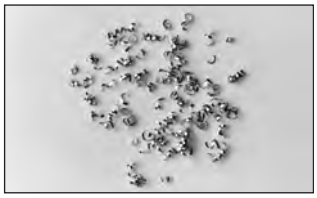



(Internal turning, Wet cut, Work material: ADC12)



## Chip Control

● Break Master



● No Chipbreaker



## Application

| Types of holder | Cutting Conditions | Results |
|---|---|---|
| Work Material: AC2A-T6<br><br>Operation: Internal Boring | $v_c$ =300 m/min<br>f =0,06 mm/rev<br>$d_{oc}$ =0,35 mm<br>Wet cut | Surface finish of the bore hole was less than Ra=1µm.<br>Chips formed was of a uniform curl of about 2mm in length.<br>There was almost no chips left inside the bore hole. |

## Recommended Conditions

● Boring (Triangular Insert)

| Feed Rate | Depth of Cut | Type |
|---|---|---|
| ~ 0.15 mm/rev. | ~ 0,7 mm | Wet cut |

● External Copying (55°, 80° Diamond Shaped Inserts)

| Feed Rate | Depth of Cut | Type |
|---|---|---|
| ~ 0.15 mm/rev. | ~ 0,5 mm | Wet cut |

For facing process, D.O.C. should be less than 0,4mm

## Series

| External Turning & Facing | | Boring | |
|---|---|---|---|
|  | CCMT 0602_ _ L/R-DM NU |  | 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

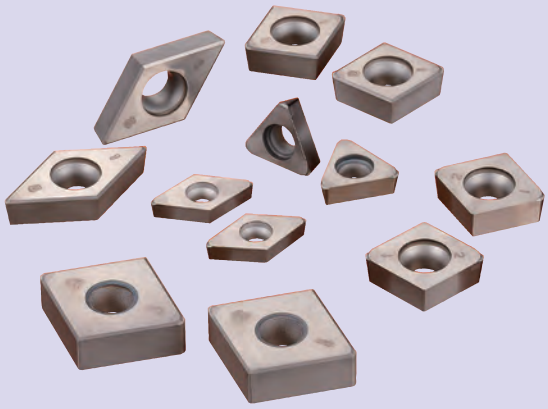
# SUMIBORON / SUMIDIA
## Indexable Inserts & Tools

**M1 ~ M38**

M








SUMIBORON / SUMIDIA Insert

C / 80° Diamond
- **CC**_ _ 7° pos. Type ..... M2 - 4
- **CN**_ _ neg. Type ..... M5 - 7
- **CP**_ _ 11° pos. Type ..... M7

D / 55° Diamond
- **DC**_ _ 7° pos. Type ..... M8 -10
- **DN**_ _ neg. Type ..... M11-12

R / Round
- **RN**_ _ neg. Type ..... M13

S / Square
- **SC**_ _ 7° pos. Type ..... M13
- **SN**_ _ neg. Type ..... M14-15

T / Triangle
- **TB**_ _ 5° pos. Type ..... M15
- **TC**_ _ 7° pos. Type ..... M16
- **TN**_ _ neg. Type ..... M17-18
- **TP**_ _ 11° pos. Type (Without Hole) ..... M18
- **TP**_ _ 11° pos. Type (With Hole) ..... M19

V / 35° Diamond
- **VB**_ _ 5° pos. Type ..... M20
- **VC**_ _ 7° pos. Type ..... M20
- **VN**_ _ neg. Type ..... M21

W / Polygon
- **WN**_ _ neg. Type ..... M22

Special
- **ZNEX** neg.-pos. Type ..... M22

SUMIBORON / SUMIDIA Precision Tools

SUMIBORON
- Guidance ..... M23
- **BNBB** Type Small Hole Boring Bars ..... M24
- **BNZ / BNB** Type Small Hole Boring Bars ..... M25
- **GWB** Type Grooving Holder ..... M26-27
- **BNGG** Type Threading Holder ..... M28

SUMIDIA
- **DABB** Type Small Hole Boring Bars ..... M29
- **RF** Type Face Mill ..... M30
- **SRF** Type Face Mill ..... M31

SUMIBORON "BN Finish Mill"
- **FMU** Type Face Mill ..... M32-33

"Helical Master"
- **BNES** Type Endmill ..... M34

"Mould Finish Master"
- **BNBP** Type Micro Ball Nose Endmill ..... M35

SUMIDIA
- **DAL / DDL / DML** Type Drills ..... M36-37

80° Diamond Type | 7° Relief With Insert Hole

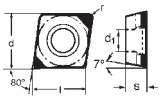
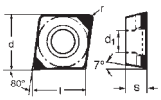
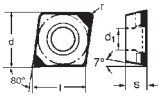
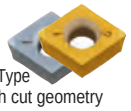
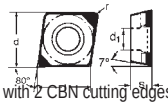
Coated

| Dimensions (mm) | | | | |
|---|---|---|---|---|
| CC_ _ | ℓ | ød (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
PM Sintered Compoment

# CCGT / CCGW

● G-Class SumiBoron (CBN, One-Use Multi-Corner Type)

| Shape | | ISO Cat. No. | r | H Coated BNC100 | H Coated BNC160 | H Coated BNC200 | K Coated BNC300 | K Coated BNC500 | H Uncoated CBN BN1000 | H Uncoated CBN BN2000 | BNX10 | BNX20 | BNX25 | BN250 | BN300 | BN350 | BN700 | K PM BN7000 | K PM BN7500 | BNS800 | N PCD DA150 | DA1000 | DA2200 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Break Master - FV, LV<br>New<br>  <br>CBN with chipbreaker |  <br>with 2 CBN cutting edges | CCGT 060204 N-FV NC2 | 0,4 | | ● | ● | | | | | | | | | | | | | | | | | |
| | | CCGT 09T304 N-FV NC2<br>CCGT 09T308 N-FV NC2 | 0,4<br>0,8 | | ●<br>● | ●<br>● | | | | | | | | | | | | | | | | | |
| | | CCGT 09T304 N-LV NC2<br>CCGT 09T308 N-LV NC2 | 0,4<br>0,8 | | ●<br>● | ●<br>● | | | | | | | | | | | | | | | | | |
|  <br>Standard -<br>Normal cut geometry |  <br>with 2 CBN cutting edges | CCGW 060202 NC-2<br>CCGW 060204 NC-2<br>CCGW 060208 NC-2 | 0,2<br>0,4<br>0,8 | ●<br>● | ●<br>● | ●<br>●<br>● | ●<br>● | ●<br>● | | | | | | | | | | | | | | | |
| | | CCGW 09T302 NC-2<br>CCGW 09T304 NC-2<br>CCGW 09T308 NC-2 | 0,2<br>0,4<br>0,8 | <br>●<br>● | <br>●<br>● | ●<br>●<br>● | <br>●<br>● | <br>●<br>● | | | | | | | | | | | | | | | |
| |  <br>(Wiper Type)<br>New | CCGW 09T304 NC-W2<br>CCGW 09T308 NC-W2 | 0,4<br>0,8 | ●<br>● | ●<br>● | ●<br>● | | | | | | | | | | | | | | | | | |
| | | CCGW 09T304 NC-WG2<br>CCGW 09T308 NC-WG2 | 0,4<br>0,8 | | ●<br>● | ●<br>● | | | | | | | | | | | | | | | | | |
| | New | CCGW 09T304 NC-WH2<br>CCGW 09T308 NC-WH2 | 0,4<br>0,8 | | ●<br>● | ●<br>● | | | | | | | | | | | | | | | | | |
|  <br>LS - Type<br>Light cut geometry |  <br>with 2 CBN cutting edges | CCGW 060202 LS-NC2<br>CCGW 060204 LS-NC2 | 0,2<br>0,4 | ●<br>● | ●<br>● | ●<br>● | | | | | | | | | | | | | | | | | |
| | | CCGW 09T304 LS-NC2<br>CCGW 09T308 LS-NC2 | 0,4<br>0,8 | ●<br>● | ●<br>● | ●<br>● | | | | | | | | | | | | | | | | | |
|  <br>HS - Type<br>Tough cut geometry |  <br>with 2 CBN cutting edges | CCGW 09T304 HS-NC2<br>CCGW 09T308 HS-NC2 | 0,4<br>0,8 | | | ●<br>● | ●<br>● | | | | | | | | | | | | | | | | |



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

Packing unit and ordering example; 1 pce CCGT 060204 N-FV NC2, BNC160

80° Diamond Type | 7° Relief With Insert Hole

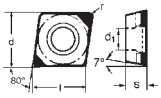
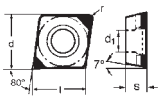
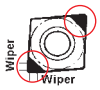
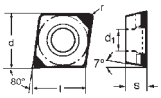
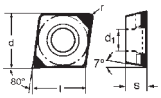
Uncoated

| Dimensions (mm) | | | | |
|---|---|---|---|---|
| CC_ _ | ℓ | ød (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
PM Sintered Compoment

# CCGT / CCGW ●●●●●●

● G-Class SumiBoron (CBN, Regrindable Type)

| Shape | | ISO Cat. No. | r | H Coated BNC100 | BNC160 | BNC200 | BNC300 | K BNC500 | H Uncoated BN1000 | BN2000 | BNX10 | BNX20 | BNX25 | BN250 | BN300 | BN350 | K BN700 | K PM BN7000 | BN7500 | BNS800 | N PCD DA150 | DA1000 | DA2200 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Break Master - FV, LV<br>New<br>  <br>CBN with chipbreaker |  <br>with 2 CBN cutting edges | CCGT 060204 N-FV NU2 | 0,4 | | | | | | | ● | | | | | | | | | | | | | |
| | | CCGT 09T304 N-FV NU2<br>CCGT 09T308 N-FV NU2 | 0,4<br>0,8 | | | | | | | ●<br>● | | | | | | | | | | | | | |
| | | CCGT 09T304 N-LV NU2<br>CCGT 09T308 N-LV NU2 | 0,4<br>0,8 | | | | | | | ●<br>● | | | | | | | | | | | | | |
| |  <br>with 2 CBN cutting edges | CCGW 060204 NU-2<br>CCGW 060208 NU-2 | 0,4<br>0,8 | | | | | | | | | | | | | | | | ●<br>● | | | | |
| | | CCGW 09T304 NU-2<br>CCGW 09T308 NU-2 | 0,4<br>0,8 | | | | | | ●<br>● | ●<br>● | ▲<br>▲ | ●<br>● | | ▲<br>▲ | ●<br>● | ●<br>● | | | ●<br>● | | | | |
|  |  <br>(Wiper Type) | | | | | | | | | | | | | | | | | | | | | | |
| | New | CCGW 09T304 NU-WG2<br>CCGW 09T308 NU-WG2 | 0,4<br>0,8 | | | | | | | ●<br>● | | | | | | | | | | | | | |
| | New | CCGW 09T304 NU-WH2<br>CCGW 09T308 NU-WH2 | 0,4<br>0,8 | | | | | | | ●<br>● | | | | | | | | | | | | | |
|  <br>**LF** - Type<br>Light cut geometry |  <br>with 2 CBN cutting edges | CCGW 09T304 LF-NU2<br>CCGW 09T308 LF-NU2 | 0,4<br>0,8 | | | | | | | | | | | | | | | | ●<br>● | | | | |
|  <br>**HS** - Type<br>Tough cut geometry |  <br>with 2 CBN cutting edges | CCGW 09T304 HS-NU2<br>CCGW 09T308 HS-NU2 | 0,4<br>0,8 | | | | | | | | | | | | | | | | ●<br>● | | | | |

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

Packing unit and ordering example; 1 pce CCGT 060204 N-FV NU2, BN2000

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

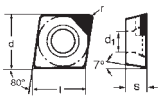
Uncoated

| Dimensions (mm) | | | | |
|---|---|---|---|---|
| CC_ _ | ℓ | ød (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 |

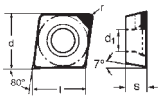
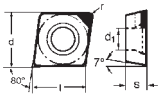
H Hardened Steel
K Cast Iron
N Non-Ferrous Metal
PM Sintered Compoment

## CCGW ●●●●●●

● G-Class SumiBoron (CBN, Regrindable Type)

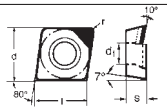
| Shape | ISO Cat. No. | r | BNC100 | BNC160 | BNC200 | BNC300 | BNC500 | BN1000 | BN2000 | BNX10 | BNX20 | BNX25 | BN250 | BN300 | BN350 | BN700 | BN7000 | BN7500 | BNS800 | DA150 | DA1000 | DA2200 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|   | **CCGW 09T304**<br>**CCGW 09T308** | 0,4<br>0,8 | | | | | | | | | ●<br>● | | | ●<br>● | | | | | | | | |

● G-Class SumiBoron (CBN, One-Use Type)

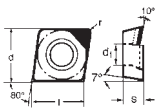
| Shape | ISO Cat. No. | r | BNC100 | BNC160 | BNC200 | BNC300 | BNC500 | BN1000 | BN2000 | BNX10 | BNX20 | BNX25 | BN250 | BN300 | BN350 | BN700 | BN7000 | BN7500 | BNS800 | DA150 | DA1000 | DA2200 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|   | **CCGW 060204 NS**<br>**CCGW 060208 NS** | 0,4<br>0,8 | | | | | | | | | | ●<br>● | | | | | | | | | | |
| | **CCGW 09T304 NS**<br>**CCGW 09T308 NS** | 0,4<br>0,8 | | | | | | | | | | ●<br>● | | | | | | | | | | |
|  | **CCGW 060202 NU**<br>**CCGW 060204 NU**<br>**CCGW 060208 NU** | 0,2<br>0,4<br>0,8 | | | | | | ●<br>●<br>● | ●<br>●<br>● | ▲ | ●<br>●<br>● | <br><br>▲ | | ●<br>● | ●<br>● | ●<br>●<br>● | ●<br>●<br>● | | | | | |
| | **CCGW 09T302 NU**<br>**CCGW 09T304 NU**<br>**CCGW 09T308 NU** | 0,2<br>0,4<br>0,8 | | | | | | ●<br>●<br>● | ●<br>●<br>● | ▲<br>▲<br>▲ | ●<br>●<br>● | ▲<br>▲ | ●<br>● | ●<br>●<br>● | ●<br>●<br>● | ●<br>●<br>● | ●<br>●<br>● | | | | | |
| | **CCGW 120408 NU** | 0,8 | | | | | | ● | | ▲ | ● | | | | | | | | | | | |

## CCMT ●●●●●●

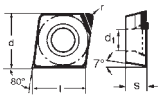
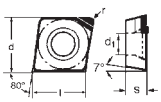
● M-Class SumiDia (PCD, Regrindable Type)

| Shape | ISO Cat. No. | r | BNC100 | BNC160 | BNC200 | BNC300 | BNC500 | BN1000 | BN2000 | BNX10 | BNX20 | BNX25 | BN250 | BN300 | BN350 | BN700 | BN7000 | BN7500 | BNS800 | DA150 | DA1000 | DA2200 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|   | **CCMT 060202**<br>**CCMT 060204** | 0,2<br>0,4 | | | | | | | | | | | | | | | | | | ●<br>● | | |
| | **CCMT 09T302** | 0,2 | | | | | | | | | | | | | | | | | | ● | | |

● M-Class SumiDia (PCD, NF Type)

| Shape | ISO Cat. No. | r | BNC100 | BNC160 | BNC200 | BNC300 | BNC500 | BN1000 | BN2000 | BNX10 | BNX20 | BNX25 | BN250 | BN300 | BN350 | BN700 | BN7000 | BN7500 | BNS800 | DA150 | DA1000 | DA2200 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|   | **CCMT 060201 NF**<br>**CCMT 060202 NF**<br>**CCMT 060204 NF** | 0,1<br>0,2<br>0,4 | | | | | | | | | | | | | | | | | | | ●<br>●<br>● | ▲<br>▲<br>▲ |
| | **CCMT 09T301 NF**<br>**CCMT 09T302 NF**<br>**CCMT 09T304 NF**<br>**CCMT 09T308 NF** | 0,1<br>0,2<br>0,4<br>0,8 | | | | | | | | | | | | | | | | | | | ●<br>●<br>●<br>● | ▲<br>▲<br>▲<br>▲ |

● M-Class SumiDia (PCD, One-Use "Break Master" Type)

| Shape | ISO Cat. No. | r | BNC100 | BNC160 | BNC200 | BNC300 | BNC500 | BN1000 | BN2000 | BNX10 | BNX20 | BNX25 | BN250 | BN300 | BN350 | BN700 | BN7000 | BN7500 | BNS800 | DA150 | DA1000 | DA2200 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Break Master - DM   | **CCMT 060202 L-DM NU**<br>**CCMT 060204 L-DM NU** | 0,2<br>0,4 | | | | | | | | | | | | | | | | | | ● | | |
| | **CCMT 09T302 L-DM NU**<br>**CCMT 09T304 L-DM NU** | 0,2<br>0,4 | | | | | | | | | | | | | | | | | | ● | | |
| Break Master - DM   | **CCMT 060202 R-DM NU**<br>**CCMT 060204 R-DM NU** | 0,2<br>0,4 | | | | | | | | | | | | | | | | | | ○<br>● | | |
| | **CCMT 09T302 R-DM NU**<br>**CCMT 09T304 R-DM NU** | 0,2<br>0,4 | | | | | | | | | | | | | | | | | | ●<br>● | | |

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

Packing unit and ordering example; 1 pce CCGW 09T304, BNX20

80° Diamond Type | 0° Relief With Insert Hole

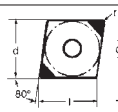
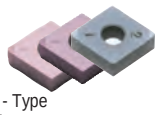
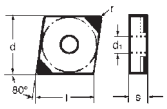
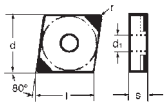
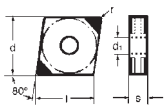
Coated

| Dimensions (mm) | | | | |
|---|---|---|---|---|
| CN_ _ | ℓ | ød (IC) | s | $d_1$ |
| 0903-- | 9,7 | 9,525 | 3,18 | 4,4 |
| 1204-- | 12,9 | 12,7 | 4,76 | 5,16 |

H Hardened Steel
K Cast Iron
N Non-Ferrous Metal
PM Sintered Compoment

# CNGA / CNGG ●●●●●●

● G-Class SumiBoron (CBN, One-Use Multi-Corner Type)

| Shape | | ISO Cat. No. | r | H Coated BNC100 | H Coated BNC160 | H Coated BNC200 | H Coated BNC300 | H Coated BNC500 | H Uncoated BN1000 | H Uncoated BN2000 | H Uncoated BNX10 | H Uncoated BNX20 | H Uncoated BNX25 | H Uncoated BN250 | H Uncoated BN300 | H Uncoated BN350 | K Uncoated BN700 | K PM BN7000 | K PM BN7500 | K PM BNS800 | N PCD DA150 | N PCD DA1000 | N PCD DA2200 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  Standard - Normal cut geometry |  with 4 CBN cutting edges | CNGA 120404 NC-4<br>CNGA 120408 NC-4<br>CNGA 120412 NC-4 | 0,4<br>0,8<br>1,2 | ●<br>●<br>● | ●<br>●<br>● | ●<br>●<br>● | ●<br>●<br>● | ○<br>○<br>○ | | | | | | | | | | | | | | |
| |  (Wiper Type) | CNGA 120404 NC-W4<br>CNGA 120408 NC-W4 | 0,4<br>0,8 | ●<br>● | ●<br>● | ●<br>● | | ○ | | | | | | | | | | | | | | |
| | New | CNGA 120404 NC-WG4<br>CNGA 120408 NC-WG4<br>CNGA 120412 NC-WG4 | 0,4<br>0,8<br>1,2 | | ●<br>●<br>● | ●<br>●<br>● | | | | | | | | | | | | | | | | |
| | New | CNGA 120404 NC-WH4<br>CNGA 120408 NC-WH4<br>CNGA 120412 NC-WH4 | 0,4<br>0,8<br>1,2 | | ●<br>●<br>● | ●<br>●<br>● | | | | | | | | | | | | | | | | |
|  **LS** - Type Light cut geometry |  with 2 CBN cutting edges | CNGA 120404 LS-NC2<br>CNGA 120408 LS-NC2<br>CNGA 120412 LS-NC2 | 0,4<br>0,8<br>1,2 | ●<br>●<br>● | ●<br>●<br>● | ●<br>●<br>● | | | | | | | | | | | | | | | | |
|  **HS** - Type Tough cut geometry |  with 2 CBN cutting edges | CNGA 120404 HS-NC2<br>CNGA 120408 HS-NC2<br>CNGA 120412 HS-NC2 | 0,4<br>0,8<br>1,2 | | ●<br>●<br>● | ●<br>●<br>● | ●<br>●<br>● | | | | | | | | | | | | | | | |
| Break Master - FV, LV, SV<br>New  CBN with chipbreaker |  with 4 CBN cutting edges | CNGG 120404 N-FV NC4<br>CNGG 120408 N-FV NC4<br>CNGG 120412 N-FV NC4 | 0,4<br>0,8<br>1,2 | | ●<br>●<br>● | ●<br>●<br>● | | | | | | | | | | | | | | | | |
| | | CNGG 120404 N-LV NC4<br>CNGG 120408 N-LV NC4<br>CNGG 120412 N-LV NC4 | 0,4<br>0,8<br>1,2 | | ●<br>●<br>● | ●<br>●<br>● | | | | | | | | | | | | | | | | |
| | | CNGG 120408 N-SV NC4<br>CNGG 120412 N-SV NC4 | 0,8<br>1,2 | | | ●<br>● | | | | | | | | | | | | | | | | |

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

Packing unit and ordering example; 1 pce CNGA 120404 NC-4, BNC100

80° Diamond Type | 0° Relief With Insert Hole

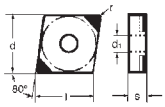
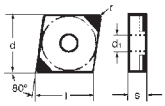
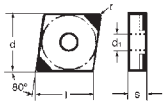
Uncoated

| Dimensions (mm) | | | | |
|---|---|---|---|---|
| CN_ _ | ℓ | ød (IC) | s | $d_1$ |
| 0903-- | 9,7 | 9,525 | 3,18 | 4,4 |
| 1204-- | 12,9 | 12,7 | 4,76 | 5,16 |

H Hardened Steel
K Cast Iron
N Non-Ferrous Metal
PM Sintered Compoment

# CNGA / CNGM

● G-Class SumiBoron (CBN, One-Use Multi-Corner Type)

| Shape | | ISO Cat. No. | r | H Coated CBN BNC100 | BNC160 | BNC200 | BNC300 | K Coated CBN BNC500 | H Uncoated CBN BN1000 | BN2000 | BNX10 | BNX20 | BNX25 | BN250 | BN300 | BN350 | K Uncoated CBN BN700 | K PM BN7000 | BN7500 | BNS800 | N PCD DA150 | DA1000 | DA2200 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| |  with 2 CBN cutting edges | CNGA 120408 NS-2 | 0,8 | | | | | | | | | | ● | | | | | | | | | | |
| | | CNGA 120412 NS-2 | 1,2 | | | | | | | | | | ● | | | | | | | | | | |
| | | CNGA 120404 NU-2 | 0,4 | | | | | | | ● | | ● | | ▲ | ● | ● | | | ❍ | | | | |
| | | CNGA 120408 NU-2 | 0,8 | | | | | | ● | ● | ▲ | ● | | ▲ | ● | ● | ● | ● | ● | | | | |
| | | CNGA 120412 NU-2 | 1,2 | | | | | | ● | ● | ▲ | ● | | ▲ | ● | ● | | | ❍ | | | | |
|  |  (Wiper Type) | CNGA 120404 NU-W2 | 0,4 | | | | | | ● | ● | | | | | | | | | | | | | |
| | | CNGA 120408 NU-W2 | 0,8 | | | | | | ● | ● | | | | | | | | | | | | | |
| | New | CNGA 120404 NU-WG2 | 0,4 | | | | | | | ● | | | | | | | | | | | | | |
| | | CNGA 120408 NU-WG2 | 0,8 | | | | | | | ● | | | | | | | | | | | | | |
| | | CNGA 120408 NU-WG2 | 1,2 | | | | | | | ● | | | | | | | | | | | | | |
| | New | CNGA 120404 NU-WH2 | 0,4 | | | | | | | ● | | | | | | | | | | | | | |
| | | CNGA 120408 NU-WH2 | 0,8 | | | | | | | ● | | | | | | | | | | | | | |
| | | CNGA 120412 NU-WH2 | 1,2 | | | | | | | ● | | | | | | | | | | | | | |
|  **LF** - Type Light cut geometry |  with 2 CBN cutting edges | CNGA 120404 LF-NU2 | 0,4 | | | | | | | | | | | | | | | | ❍ | | | | |
| | | CNGA 120408 LF-NU2 | 0,8 | | | | | | | | | | | | | | | | ❍ | | | | |
|  **HS** - Type Tough cut geometry |  with 2 CBN cutting edges | CNGA 120408 HS-NU2 | 0,8 | | | | | | | | | | | | | | | | ● | | | | |
| Break Master - LV New  CBN with chipbreaker |  with 2 CBN cutting edges | CNGM 120404 N-LV NU2 | 0,4 | | | | | | | ● | | | | | | | | | | | | | |
| | | CNGM 120408 N-LV NU2 | 0,8 | | | | | | | ● | | | | | | | | | | | | | |
| | | CNGM 120412 N-LV NU2 | 1,2 | | | | | | | ● | | | | | | | | | | | | | |

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

Packing unit and ordering example; 1 pce CNGA 120404 NS-4, BNX25

## 80° Diamond Type

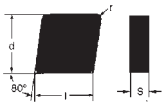
0° & 11°

| Dimensions (mm) | | | | |
|---|---|---|---|---|
| CN/CP__ | 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 | 5,16 |

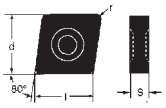
H Hardened Steel
K Cast Iron
N Non-Ferrous Metal
PM Sintered Compoment

## CNGN / CNGX

● G-Class SumiBoron (Solid CBN Type)

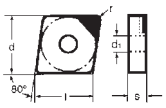
| Shape | ISO Cat. No. | r | H Coated CBN BNC100 | BNC160 | BNC200 | BNC300 | BNC500 | H Uncoated CBN BN1000 | BN2000 | BNX10 | BNX20 | BNX25 | BN250 | BN300 | BN350 | K Uncoated CBN BN700 | K PM BN7000 | BN7500 | BNS800 | N PCD DA150 | DA1000 | DA2200 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  | **CNGN 090308** | 0,8 | | | | | | | | | | | | | | | | | ● | | | |
|  | **CNGN 090312** | 1,2 | | | | | | | | | | | | | | | | | ● | | | |
| | **CNGN 120412** | 1,2 | | | | | | | | | | | | | | | | | ● | | | |
| | **CNGN 120416** | 1,6 | | | | | | | | | | | | | | | | | ● | | | |

● G-Class SumiBoron (Solid CBN, "Dimple" Type)

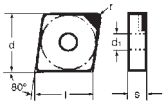
| Shape | ISO Cat. No. | r | H Coated CBN BNC100 | BNC160 | BNC200 | BNC300 | BNC500 | H Uncoated CBN BN1000 | BN2000 | BNX10 | BNX20 | BNX25 | BN250 | BN300 | BN350 | K Uncoated CBN BN700 | K PM BN7000 | BN7500 | BNS800 | N PCD DA150 | DA1000 | DA2200 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  | **CNGX 120412** | 1,2 | | | | | | | | | | | | | | | | | ● | | | |
|  | **CNGX 120416** | 1,6 | | | | | | | | | | | | | | | | | ● | | | |

## CNMA / CNMX

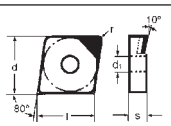
● M-Class SumiBoron (CBN, Regrindable Type)

| Shape | ISO Cat. No. | r | H Coated CBN BNC100 | BNC160 | BNC200 | BNC300 | BNC500 | H Uncoated CBN BN1000 | BN2000 | BNX10 | BNX20 | BNX25 | BN250 | BN300 | BN350 | K Uncoated CBN BN700 | K PM BN7000 | BN7500 | BNS800 | N PCD DA150 | DA1000 | DA2200 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  | **CNMA 120404** | 0,4 | | | | | | | | | ● | | | ● | | ● | | | | | | |
|  | **CNMA 120408** | 0,8 | | | | | | | | | ● | | | ● | | ● | | | | | | |
| | **CNMA 120412** | 1,2 | | | | | | | | | ● | | | ● | | | | | | | | |

● M-Class SumiBoron (CBN, One-use Type)

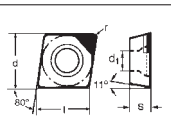
| Shape | ISO Cat. No. | r | H Coated CBN BNC100 | BNC160 | BNC200 | BNC300 | BNC500 | H Uncoated CBN BN1000 | BN2000 | BNX10 | BNX20 | BNX25 | BN250 | BN300 | BN350 | K Uncoated CBN BN700 | K PM BN7000 | BN7500 | BNS800 | N PCD DA150 | DA1000 | DA2200 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  | **CNMA 120404 NS** | 0,4 | | | | | | | | | | ● | | | | | | | | | | |
|  | **CNMA 120408 NS** | 0,8 | | | | | | | | | | ● | | | | | | | | | | |
| | **CNMA 120412 NS** | 1,2 | | | | | | | | | | ● | | | | | | | | | | |
| | **CNMA 120404 NU** | 0,4 | | | | | | ● | ● | ▲ | ● | | ▲ | ● | ● | ● | ● | | | | | |
| | **CNMA 120408 NU** | 0,8 | | | | | | ● | ● | ▲ | ● | | ▲ | ● | ● | ● | ● | | | | | |
| | **CNMA 120412 NU** | 1,2 | | | | | | ● | ● | ▲ | ● | | ▲ | ● | ● | ● | ● | | | | | |
| (Wiper Type)  | **CNMA 120408 NU-W** | 0,8 | | | | | | | | ▲ | ● | | | | | | | | | | | |

● M-Class SumiDIA (PCD, NF Type)

| Shape | ISO Cat. No. | r | H Coated CBN BNC100 | BNC160 | BNC200 | BNC300 | BNC500 | H Uncoated CBN BN1000 | BN2000 | BNX10 | BNX20 | BNX25 | BN250 | BN300 | BN350 | K Uncoated CBN BN700 | K PM BN7000 | BN7500 | BNS800 | N PCD DA150 | DA1000 | DA2200 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  | **CNMX 120402 NF** | 0,2 | | | | | | | | | | | | | | | | | | ● | | ▲ |
|  | **CNMX 120404 NF** | 0,4 | | | | | | | | | | | | | | | | | | ● | | ▲ |
| | **CNMX 120408 NF** | 0,8 | | | | | | | | | | | | | | | | | | ● | | ▲ |

## CPMW

● M-Class SumiDIA (PCD, NF Type)

| Shape | ISO Cat. No. | r | H Coated CBN BNC100 | BNC160 | BNC200 | BNC300 | BNC500 | H Uncoated CBN BN1000 | BN2000 | BNX10 | BNX20 | BNX25 | BN250 | BN300 | BN350 | K Uncoated CBN BN700 | K PM BN7000 | BN7500 | BNS800 | N PCD DA150 | DA1000 | DA2200 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  | **CPMW 060202 NF** | 0,2 | | | | | | | | | | | | | | | | | | ● | | |
|  | **CPMW 060204 NF** | 0,4 | | | | | | | | | | | | | | | | | | ● | | ▲ |
| | **CPMW 060208 NF** | 0,8 | | | | | | | | | | | | | | | | | | ● | | ▲ |

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

Packing unit and ordering example; 1 pce CNGN 090308, BNS800

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

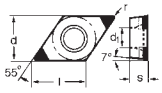
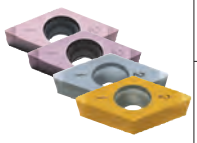
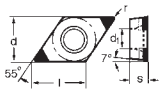
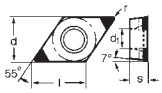
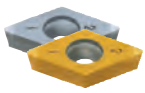
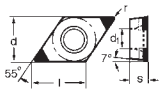
Coated

| Dimensions (mm) | | | | |
|---|---|---|---|---|
| DC_ _ | ℓ | ød (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
PM Sintered Compoment

# DCGT / DCGW

● G-Class SumiBoron (CBN, One-Use Multi-Corner Type)

| Shape | | ISO Cat. No. | r | H Coated BNC100 | BNC160 | BNC200 | BNC300 | K Coated BNC500 | H Uncoated CBN BN1000 | BN2000 | BNX10 | BNX20 | BNX25 | BN250 | BN300 | BN350 | K Uncoated CBN BN700 | K PM BN7000 | BN7500 | BNS800 | N PCD DA150 | DA1000 | DA2200 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Break Master - FV, LV<br>New<br>  <br>CBN with chipbreaker |  <br>with 2 CBN cutting edges | DCGT 070204 N-FV NC2 | 0,4 | | ● | ● | | | | | | | | | | | | | | | | | |
| | | DCGT 11T304 N-FV NC2 | 0,4 | | ● | ● | | | | | | | | | | | | | | | | | |
| | | DCGT 11T308 N-FV NC2 | 0,8 | | ● | ● | | | | | | | | | | | | | | | | | |
| | | DCGT 11T304 N-LV NC2 | 0,4 | | ● | ● | | | | | | | | | | | | | | | | | |
| | | DCGT 11T308 N-LV NC2 | 0,8 | | ● | ● | | | | | | | | | | | | | | | | | |
|  <br>Standard -<br>Normal cut geometry |  <br>with 2 CBN cutting edges | DCGW 070202 NC-2 | 0,2 | ● | ● | ● | ● | | | | | | | | | | | | | | | | |
| | | DCGW 070204 NC-2 | 0,4 | ● | ● | ● | ● | | | | | | | | | | | | | | | | |
| | | DCGW 070208 NC-2 | 0,8 | | | ● | ● | | | | | | | | | | | | | | | | |
| | | DCGW 11T302 NC-2 | 0,2 | ● | ● | ● | ● | | | | | | | | | | | | | | | | |
| | | DCGW 11T304 NC-2 | 0,4 | ● | ● | ● | ● | ● | | | | | | | | | | | | | | | |
| | | DCGW 11T308 NC-2 | 0,8 | ● | ● | ● | ● | ● | | | | | | | | | | | | | | | |
| | New<br>  <br>(Wiper Type) | DCGW 11T304 NC-WG2 | 0,4 | | ● | ● | | | | | | | | | | | | | | | | | |
| | | DCGW 11T308 NC-WG2 | 0,8 | | ● | ● | | | | | | | | | | | | | | | | | |
| | New | DCGW 11T304 NC-WH2 | 0,4 | | ● | ● | | | | | | | | | | | | | | | | | |
| | | DCGW 11T308 NC-WH2 | 0,8 | | ● | ● | | | | | | | | | | | | | | | | | |
|  <br>**LS** - Type<br>Light cut geometry |  <br>with 2 CBN cutting edges | DCGW 070202 LS-NC2 | 0,2 | ● | ● | ● | | | | | | | | | | | | | | | | | |
| | | DCGW 070204 LS-NC2 | 0,4 | ● | ● | ● | | | | | | | | | | | | | | | | | |
| | | DCGW 11T304 LS-NC2 | 0,4 | ● | ● | ● | | | | | | | | | | | | | | | | | |
| | | DCGW 11T308 LS-NC2 | 0,8 | ● | ● | ● | | | | | | | | | | | | | | | | | |
|  <br>**HS** - Type<br>Tough cut geometry |  <br>with 2 CBN cutting edges | DCGW 11T304 HS-NC2 | 0,4 | | | ● | ● | | | | | | | | | | | | | | | | |
| | | DCGW 11T308 HS-NC2 | 0,8 | | | ● | ● | | | | | | | | | | | | | | | | |

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

Packing unit and ordering example; 1 pce DCGW 070202 NC-2, BNC100

55° Diamond Type | 7° Relief With Insert Hole

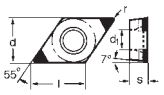
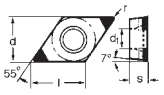
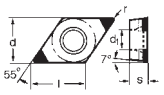
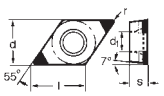
Uncoated

| Dimensions (mm) | | | | |
|---|---|---|---|---|
| DC_ _ | ℓ | ød (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
PM Sintered Compoment

# DCGT / DCGW

● G-Class SumiBoron (CBN, One-Use Multi-Corner Type)

| Shape | | ISO Cat. No. | r | H Coated CBN BNC100 | BNC160 | BNC200 | BNC300 | BNC500 | H Uncoated CBN BN1000 | BN2000 | BNX10 | BNX20 | BNX25 | BN250 | BN300 | BN350 | BN700 | K PM BN7000 | BN7500 | BNS800 | N PCD DA150 | DA1000 | DA2200 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Break Master - FV, LV<br>New<br>  <br>CBN with chipbreaker |  <br>with 2 CBN cutting edges | DCGT 070204 N-FV NU2 | 0,4 | | | | | | | ● | | | | | | | | | | | | | |
| | | DCGT 11T304 N-FV NU2<br>DCGT 11T308 N-FV NU2 | 0,4<br>0,8 | | | | | | | ●<br>● | | | | | | | | | | | | | |
| | | DCGT 11T304 N-LV NU2<br>DCGT 11T308 N-LV NU2 | 0,4<br>0,8 | | | | | | | ●<br>● | | | | | | | | | | | | | |
|  |  <br>with 2 CBN cutting edges | DCGW 070202 NU-2<br>DCGW 070204 NU-2<br>DCGW 070208 NU-2 | 0,2<br>0,4<br>0,8 | | | | | | ●<br>● | ●<br>●<br>● | ▲<br>▲ | ●<br>●<br>● | | ▲<br>▲ | ●<br>● | ●<br>● | | | ●<br>● | | | | | |
| | | DCGW 11T304 NU-2<br>DCGW 11T308 NU-2 | 0,4<br>0,8 | | | | | | ●<br>● | ●<br>● | ▲<br>▲ | ●<br>● | | ▲<br>▲ | ●<br>● | ●<br>● | ●<br>● | ●<br>● | ●<br>● | | | | | |
| | New<br>  <br>(Wiper Type) | DCGW 11T304 NU-WG2<br>DCGW 11T308 NU-WG2 | 0,4<br>0,8 | | | | | | | ●<br>● | | | | | | | | | | | | | |
| | New | DCGW 11T304 NU-WH2<br>DCGW 11T308 NU-WH2 | 0,4<br>0,8 | | | | | | | ●<br>● | | | | | | | | | | | | | |
|  <br>**LF** - Type<br>Light cut geometry |  <br>with 2 CBN cutting edges | DCGW 070202 LF-NU2<br>DCGW 070204 LF-NU2 | 0,2<br>0,4 | | | | | | | | | | | | | | | ●<br>● | | | | | |
| | | DCGW 11T304 LF-NU2<br>DCGW 11T308 LF-NU2 | 0,4<br>0,8 | | | | | | | | | | | | | | | ●<br>● | | | | | |
|  <br>**HS** - Type<br>Tough cut geometry |  <br>with 2 CBN cutting edges | DCGW 070202 HS-NU2<br>DCGW 070204 HS-NU2 | 0,2<br>0,4 | | | | | | | | | | | | | | | ●<br>● | | | | | |
| | | DCGW 11T304 HS-NU2<br>DCGW 11T308 HS-NU2 | 0,4<br>0,8 | | | | | | | | | | | | | | | ●<br>● | | | | | |

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

Packing unit and ordering example; 1 pce RNGN 090300, BNS800

55° Diamond Type | 7° Relief With Insert Hole

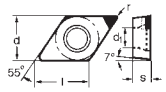
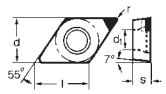
Uncoated

| Dimensions (mm) | | | | |
|---|---|---|---|---|
| DC_ _ | ℓ | ød (IC) | s | $d_1$ |
| 0702-- | 7,75 | 6,35 | 2,38 | 2,8 |
| 11T3-- | 11,6 | 9,525 | 3,97 | 4,4 |
| | | | | |

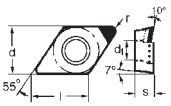
H Hardened Steel
K Cast Iron
N Non-Ferrous Metal
PM Sintered Compoment

## DCGW / DCMT ●●●●●●

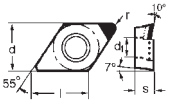
### ● G-Class SumiBoron (CBN, One-Use Type)

| Shape | ISO Cat. No. | r | BNC100 | BNC160 | BNC200 | BNC300 | BNC500 | BN1000 | BN2000 | BNX10 | BNX20 | BNX25 | BN250 | BN300 | BN350 | BN700 | BN7000 | BN7500 | BNS800 | DA150 | DA1000 | DA2200 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  | **DCGW 11T304 NS** | 0,4 | | | | | | | | | | ● | | | | | | | | | | |
|  | **DCGW 11T308 NS** | 0,8 | | | | | | | | | | ● | | | | | | | | | | |
| | **DCGW 070202 NU** | 0,2 | | | | | | ● | ● | ▲ | ● | | ▲ | ● | ● | ● | ● | | | | | |
|  | **DCGW 070204 NU** | 0,4 | | | | | | ● | ● | ▲ | ● | | ▲ | ● | ● | ● | ● | | | | | |
| | **DCGW 070208 NU** | 0,8 | | | | | | ● | ● | ▲ | ● | | ▲ | | | ● | ● | | | | | |
| | **DCGW 11T302 NU** | 0,2 | | | | | | ● | ● | ▲ | ● | | ▲ | ● | ● | ● | ● | | | | | |
| | **DCGW 11T304 NU** | 0,4 | | | | | | ● | ● | ▲ | ● | | ▲ | ● | ● | ● | ● | | | | | |
| | **DCGW 11T308 NU** | 0,8 | | | | | | ● | ● | ▲ | ● | | ▲ | ● | ● | ● | ● | | | | | |

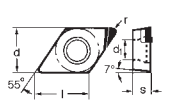
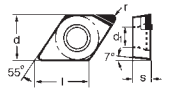
### ● M-Class SumiDia (PCD, Regrindable Type)

| Shape | ISO Cat. No. | r | DA150 | DA1000 | DA2200 |
|---|---|---|---|---|---|
|  | **DCMT 070202** | 0,2 | ● | | |
|  | **DCMT 070204** | 0,4 | ● | | |
| | **DCMT 11T302** | 0,2 | ● | | |
| | **DCMT 11T304** | 0,4 | ● | | |
| | **DCMT 11T308** | 0,8 | ● | | |

### ● G-Class SumiDia (PCD, NF Type)

| Shape | ISO Cat. No. | r | DA1000 | DA2200 |
|---|---|---|---|---|
|  | **DCMT 070201 NF** | 0,1 | ● | ▲ |
|  | **DCMT 070202 NF** | 0,2 | ● | ▲ |
| | **DCMT 070204 NF** | 0,4 | ● | ▲ |
| | **DCMT 070208 NF** | 0,8 | ● | ▲ |
| | **DCMT 11T301 NF** | 0,1 | ● | ▲ |
| | **DCMT 11T302 NF** | 0,2 | ● | ▲ |
| | **DCMT 11T304 NF** | 0,4 | ● | ▲ |
| | **DCMT 11T308 NF** | 0,8 | ● | ▲ |

### ● M-Class SumiDIA (PCD, One-Use "Break Master" Type)

| Shape | ISO Cat. No. | r | DA150 |
|---|---|---|---|
| Break Master - DM  | **DCMT 070202 L-DM NU** | 0,2 | ○ |
|  | **DCMT 070204 L-DM NU** | 0,4 | ○ |
| | **DCMT 11T302 L-DM NU** | 0,2 | ● |
| | **DCMT 11T304 L-DM NU** | 0,4 | ● |
| Break Master - DM  | **DCMT 070202 R-DM NU** | 0,2 | ○ |
|  | **DCMT 070204 R-DM NU** | 0,4 | ● |
| | **DCMT 11T302 R-DM NU** | 0,2 | ● |
| | **DCMT 11T304 R-DM NU** | 0,4 | ● |

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

Packing unit and ordering example; 1 pce DCGW 110304 NS, BNX25

# SUMIBORON / SUMIDIA
# Indexable Inserts

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

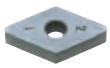
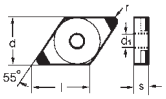
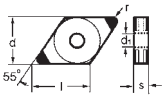
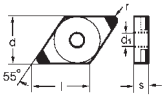
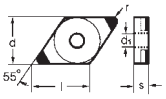
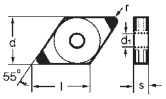
Coated

| 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
PM Sintered Compoment

## DNGA / DNGG

● G-Class SumiBoron (CBN, One-Use Multi-Corner Type)

| Shape | | ISO Cat. No. | r | H Coated CBN BNC100 | BNC160 | BNC200 | BNC300 | BNC500 | H Uncoated CBN BN1000 | BN2000 | BNX10 | BNX20 | BNX25 | BN250 | BN300 | BN350 | K CBN BN700 | K PM BN7000 | BN7500 | BNS800 | N PCD DA150 | DA1000 | DA2200 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  Standard - Normal cut geometry |  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 | ● | ● | ● | ● | ● | | | | | | | | | | | | | | | |
|  Standard - Normal cut geometry |  (Wiper Type) | **DNGA 150404 NC-WG4** | 0,4 | | ❍ | ❍ | | | | | | | | | | | | | | | | | |
| | | **DNGA 150408 NC-WG4** | 0,8 | | ❍ | ❍ | | | | | | | | | | | | | | | | | |
| | New | **DNGA 150604 NC-WG4** | 0,4 | | ● | ● | | | | | | | | | | | | | | | | | |
| | | **DNGA 150608 NC-WG4** | 0,8 | | ● | ● | | | | | | | | | | | | | | | | | |
| | | **DNGA 150612 NC-WG4** | 1,2 | | ● | ● | | | | | | | | | | | | | | | | | |
| | | **DNGA 150404 NC-WH4** | 0,4 | | ❍ | ❍ | | | | | | | | | | | | | | | | | |
| | New | **DNGA 150408 NC-WH4** | 0,8 | | ❍ | ❍ | | | | | | | | | | | | | | | | | |
| | | **DNGA 150604 NC-WH4** | 0,4 | | ● | ● | | | | | | | | | | | | | | | | | |
| | | **DNGA 150608 NC-WH4** | 0,8 | | ● | ● | | | | | | | | | | | | | | | | | |
| | | **DNGA 150612 NC-WH4** | 1,2 | | ● | ● | | | | | | | | | | | | | | | | | |
|  **LS** - Type Light cut geometry |  with 2 CBN cutting edges | **DNGA 150604 LS-NC2** | 0,4 | ● | ● | ● | | | | | | | | | | | | | | | | | |
| | | **DNGA 150608 LS-NC2** | 0,8 | ● | ● | ● | | | | | | | | | | | | | | | | | |
| | | **DNGA 150612 LS-NC2** | 1,2 | ● | ● | ● | | | | | | | | | | | | | | | | | |
|  **HS** - Type Tough cut geometry |  with 2 CBN cutting edges | **DNGA 150604 HS-NC2** | 0,4 | | ● | ● | ● | | | | | | | | | | | | | | | | |
| | | **DNGA 150608 HS-NC2** | 0,8 | | ● | ● | ● | | | | | | | | | | | | | | | | |
| | | **DNGA 150612 HS-NC2** | 1,2 | | ● | ● | ● | | | | | | | | | | | | | | | | |
| Break Master - FV, LV, SV  CBN with chipbreaker |  with 4 CBN cutting edges | DNGG 150404 N-FV NC4 | 0,4 | | ❍ | ❍ | | | | | | | | | | | | | | | | | |
| | | DNGG 150408 N-FV NC4 | 0,8 | | ❍ | ❍ | | | | | | | | | | | | | | | | | |
| | | DNGG 150412 N-FV NC4 | 1,2 | | ❍ | ❍ | | | | | | | | | | | | | | | | | |
| | | **DNGG 150604 N-FV NC4** | 0,4 | | ● | ● | | | | | | | | | | | | | | | | | |
| | | **DNGG 150608 N-FV NC4** | 0,8 | | ● | ● | | | | | | | | | | | | | | | | | |
| | | **DNGG 150612 N-FV NC4** | 1,2 | | ● | ● | | | | | | | | | | | | | | | | | |
| | | DNGG 150404 N-LV NC4 | 0,4 | | ❍ | ❍ | | | | | | | | | | | | | | | | | |
| | | DNGG 150408 N-LV NC4 | 0,8 | | ❍ | ❍ | | | | | | | | | | | | | | | | | |
| | | DNGG 150412 N-LV NC4 | 1,2 | | ❍ | ❍ | | | | | | | | | | | | | | | | | |
| | | **DNGG 150604 N-LV NC4** | 0,4 | | ● | ● | | | | | | | | | | | | | | | | | |
| | | **DNGG 150608 N-LV NC4** | 0,8 | | ● | ● | | | | | | | | | | | | | | | | | |
| | | **DNGG 150612 N-LV NC4** | 1,2 | | ● | ● | | | | | | | | | | | | | | | | | |
| | | **DNGG 150608 N-SV NC4** | 0,8 | | | ● | | | | | | | | | | | | | | | | | |
| | | **DNGG 150612 N-SV NC4** | 1,2 | | | ● | | | | | | | | | | | | | | | | | |

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

Packing unit and ordering example; 1 pce DNGA 110404 NC-2, BNC200

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

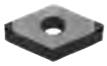
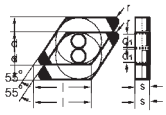
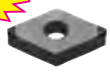
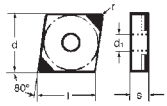
| Dimensions (mm) | | | | |
|---|---|---|---|---|
| DN_ _ | ℓ | ød (IC) | s | $d_1$ |
| 1104-- | 11,6 | 9,525 | 4,76 | 3,81 |
| 1504-- | 15,5 | 12,7 | 4,76 | 5,16 |
| 1506-- | 15,5 | 12,7 | 6,35 | 5,16 |

H Hardened Steel
K Cast Iron
N Non-Ferrous Metal
PM Sintered Compoment

# DNGA / DNGM

Uncoated

● G-Class SumiBoron (CBN, One-Use Multi-Corner Type)

| Shape | ISO Cat. No. | r | H Coated CBN BNC100 | BNC160 | BNC200 | BNC300 | K Coated CBN BNC500 | H Uncoated CBN BN1000 | BN2000 | BNX10 | BNX20 | BNX25 | BN250 | BN300 | BN350 | K Uncoated CBN BN700 | K PM BN7000 | BN7500 | BNS800 | N PCD DA150 | DA1000 | DA2200 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|   with 2 CBN cutting edges | **DNGA 150604 NU-2** | 0,4 | | | | | | ● | ● | | ● | | ▲ | ● | ● | | | | | | | |
| | **DNGA 150608 NU-2** | 0,8 | | | | | | ● | ● | ▲ | ● | | ▲ | ● | ● | | | ● | | | | |
| | **DNGA 150612 NU-2** | 1,2 | | | | | | ● | | ▲ | | | | | | | | | | | | |
|  (Wiper Type) | **DNGA 150404 NU-WG2** | 0,4 | | | | | | | ❍ | | | | | | | | | | | | | |
| | **DNGA 150408 NU-WG2** | 0,8 | | | | | | | ❍ | | | | | | | | | | | | | |
| New | **DNGA 150604 NU-WG2** | 0,4 | | | | | | | ● | | | | | | | | | | | | | |
| | **DNGA 150608 NU-WG2** | 0,8 | | | | | | | ● | | | | | | | | | | | | | |
| | **DNGA 150612 NU-WG2** | 1,2 | | | | | | | ● | | | | | | | | | | | | | |
| New | **DNGA 150404 NU-WH2** | 0,4 | | | | | | | ❍ | | | | | | | | | | | | | |
| | **DNGA 150408 NU-WH2** | 0,8 | | | | | | | ❍ | | | | | | | | | | | | | |
| | **DNGA 150604 NU-WH2** | 0,4 | | | | | | | ● | | | | | | | | | | | | | |
| | **DNGA 150608 NU-WH2** | 0,8 | | | | | | | ● | | | | | | | | | | | | | |
| | **DNGA 150612 NU-WH2** | 1,2 | | | | | | | ● | | | | | | | | | | | | | |
| Break Master - LV New  |  **DNGM 150404 N-LV NU2** | 0,4 | | | | | | | ❍ | | | | | | | | | | | | | |
| | **DNGM 150408 N-LV NU2** | 0,8 | | | | | | | ❍ | | | | | | | | | | | | | |
| | **DNGM 150412 N-LV NU2** | 1,2 | | | | | | | ❍ | | | | | | | | | | | | | |
| | **DNGM 150604 N-LV NU2** | 0,4 | | | | | | | ● | | | | | | | | | | | | | |
| | **DNGM 150608 N-LV NU2** | 0,8 | | | | | | | ● | | | | | | | | | | | | | |
| | **DNGM 150612 N-LV NU2** | 1,2 | | | | | | | ● | | | | | | | | | | | | | |

● =
❍ =
▲ =

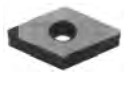
## 55° Diamond Type — 0° Relief, With Insert Hole

| 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 |

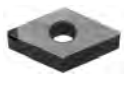
H Hardened Steel
K Cast Iron
N Non-Ferrous Metal
PM Sintered Compoment

### DNMA ●●●●●●

● M-Class SumiBoron (CBN, Regrindable Type)

| Shape | ISO Cat. No. | r | H Coated CBN BNC100 | BNC160 | BNC200 | BNC300 | BNC500 | H Uncoated CBN BN1000 | BN2000 | BNX10 | BNX20 | BNX25 | BN250 | BN300 | BN350 | K Uncoated CBN BN700 | K PM BN7000 | BN7500 | BNS800 | N PCD DA150 | DA1000 | DA2200 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  | **DNMA 150604** | 0,4 | | | | | | | | | ● | | | ● | | | | | | | | |
| | **DNMA 150608** | 0,8 | | | | | | | | | ● | | | ● | | | | | | | | |
| | **DNMA 150612** | 1,2 | | | | | | | | | ● | | | ● | | | | | | | | |

● M-Class SumiBoron (CBN, One-Use Type)

| Shape | ISO Cat. No. | r | H Coated CBN BNC100 | BNC160 | BNC200 | BNC300 | BNC500 | H Uncoated CBN BN1000 | BN2000 | BNX10 | BNX20 | BNX25 | BN250 | BN300 | BN350 | K Uncoated CBN BN700 | K PM BN7000 | BN7500 | BNS800 | N PCD DA150 | DA1000 | DA2200 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  | **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 | | | | | | | | ▲ | ● | | | | | | | | | | | |

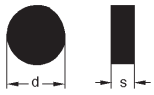
## Round Type — 0° Relief, Without Insert Hole

| 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
PM Sintered Compoment

### RNGN ●●●●●●

● G-Class SumiBoron (Solid CBN Type)

| Shape | ISO Cat. No. | r | H Coated CBN BNC100 | BNC160 | BNC200 | BNC300 | BNC500 | H Uncoated CBN BN1000 | BN2000 | BNX10 | BNX20 | BNX25 | BN250 | BN300 | BN350 | K Uncoated CBN BN700 | K PM BN7000 | BN7500 | BNS800 | N PCD DA150 | DA1000 | DA2200 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  | **RNGN 090300** | – | | | | | | | | | | | | | | | | | ● | | | |
|  Solid CBN | **RNGN 120300** | – | | | | | | | | | | | | | | | | | ● | | | |
| | **RNGN 120400** | – | | | | | | | | | | | | | | | | | ● | | | |

● G-Class SumiBoron (CBN, Full Top Type)

| Shape | ISO Cat. No. | r | H Coated CBN BNC100 | BNC160 | BNC200 | BNC300 | BNC500 | H Uncoated CBN BN1000 | BN2000 | BNX10 | BNX20 | BNX25 | BN250 | BN300 | BN350 | K Uncoated CBN BN700 | K PM BN7000 | BN7500 | BNS800 | N PCD DA150 | DA1000 | DA2200 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  | **RNGN 090300 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
PM Sintered Compoment

### SCGW ●●●●●●

● G-Class SumiBoron (CBN, One-Use Type)

| Shape | ISO Cat. No. | r | H Coated CBN BNC100 | BNC160 | BNC200 | BNC300 | BNC500 | H Uncoated CBN BN1000 | BN2000 | BNX10 | BNX20 | BNX25 | BN250 | BN300 | BN350 | K Uncoated CBN BN700 | K PM BN7000 | BN7500 | BNS800 | N PCD DA150 | DA1000 | DA2200 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  | **SCGW 09T304 NU** | 0,4 | | | | | | | | | ● | | | | | ● | ● | | | | | |
| | **SCGW 09T308 NU** | 0,8 | | | | | | | | | ● | | | | | ● | ● | | | | | |

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

Packing unit and ordering example; 1 pce RNGN 090300, BNS800

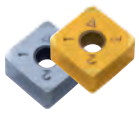
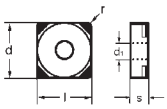
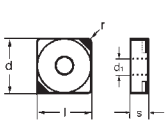
## Square Type — 0° Relief — With Insert Hole

| 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
PM Sintered Compoment

## SNGA ●●●●●●

● G-Class SumiBoron (CBN, One-Use Multi-Corner Type)

| Shape | | ISO Cat. No. | r | BNC100 | BNC160 | BNC200 | BNC300 | BNC500 | BN1000 | BN2000 | BNX10 | BNX20 | BNX25 | BN250 | BN300 | BN350 | BN700 | BN7000 | BN7500 | BNS800 | DA150 | DA1000 | DA2200 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | H | | K | | | H | | | | | | | | | K | PM | | N | | |
| | | | | Coated | | | | | Uncoated | | | | | | | | | | | | | | |
| | | | | CBN | | | | | | | | | | | | | | | | | PCD | | |
|  Standard - Normal cut geometry |  with 4 CBN cutting edges | **SNGA 120408 NC-4**<br>**SNGA 120412 NC-4** | 0,8<br>1,2 | | | ●<br>● | ●<br>● | | | | | | | | | | | | | | | | |
|  **HS** - Type Tough cut geometry |  with 2 CBN cutting edges | **SNGA 120408 HS-NC2**<br>**SNGA 120412 HS-NC2** | 0,8<br>1,2 | | | ●<br>● | ●<br>● | | | | | | | | | | | | | | | | |

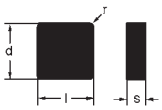
## Square Type — 0° Relief — Without Insert Hole

| Dimensions (mm) | | | | |
|---|---|---|---|---|
| SN_ _ | ℓ | ød (IC) | s | $d_1$ |
| 0903-- | 9,525 | 9,525 | 3,18 | – |
| 1204-- | 12,7 | 12,7 | 4,76 | – |
| | | | | |

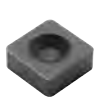
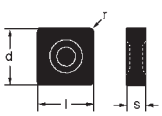
H Hardened Steel
K Cast Iron
N Non-Ferrous Metal
PM Sintered Compoment

## SNGN / SNGX ●●●●●●

● G-Class SumiBoron (Solid CBN Type)

| Shape | | ISO Cat. No. | r | BNC100 | BNC160 | BNC200 | BNC300 | BNC500 | BN1000 | BN2000 | BNX10 | BNX20 | BNX25 | BN250 | BN300 | BN350 | BN700 | BN7000 | BN7500 | BNS800 | DA150 | DA1000 | DA2200 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | H | | K | | | H | | | | | | | | | K | PM | | N | | |
| | | | | Coated | | | | | Uncoated | | | | | | | | | | | | | | |
| | | | | CBN | | | | | | | | | | | | | | | | | PCD | | |
|  |  | **SNGN 090308**<br>**SNGN 090312** | 0,8<br>1,2 | | | | | | | | | | | | | | | | | ●<br>● | | | |
| | | **SNGN 120412**<br>**SNGN 120416** | 1,2<br>1,6 | | | | | | | | | | | | | | | | | ●<br>● | | | |

● G-Class SumiBoron (Solid CBN, "Dimple" Type)

| | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  |  | **SNGX 120412**<br>**SNGX 120416** | 1,2<br>1,6 | | | | | | | | | | | | | | | | | ●<br>● | | | |

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

Packing unit and ordering example; 1 pce SNGA 120408 NC-4, BNC200

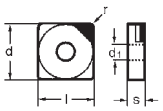
## Square Type — 0° Relief / With Insert Hole

| 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
PM Sintered Compoment

# SNMA ●●●●●●

● M-Class SumiBoron (CBN, One-Use Type)

| Shape | | ISO Cat. No. | r | BNC100 | BNC160 | BNC200 | BNC300 | BNC500 | BN1000 | BN2000 | BNX10 | BNX20 | BNX25 | BN250 | BN300 | BN350 | BN700 | BN7000 | BN7500 | BNS800 | DA150 | DA1000 | DA2200 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | H Coated | | | | K Coated | H Uncoated | | | | | | | | K Uncoated | | | | N PCD | | |
| | | | | CBN | | | | | CBN | | | | | | | | CBN | | | | PCD | | |
| | | | | | | | | | | | | | | | | | K PM | K PM | K PM | | | | |
|  |  | **SNMA 120408 NS** | 0,8 | | | | | | | | | | ● | | | | | | | | | | |
| | | **SNMA 120412 NS** | 1,2 | | | | | | | | | | ● | | | | | | | | | | |
| | | **SNMA 120408 NU** | 0,8 | | | | | | | ● | | | | ▲ | ● | ● | ● | ● | | | | | |
| | | **SNMA 120412 NU** | 1,2 | | | | | | | ● | | | | ▲ | ● | ● | ● | ● | | | | | |

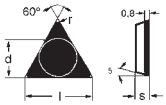
## 60° Triangle Type — 5° Relief

| 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 |

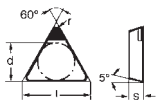
H Hardened Steel
K Cast Iron
N Non-Ferrous Metal
PM Sintered Compoment

# TBGN / TBGW ●●●●●●

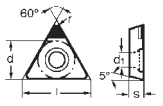
● G-Class SumiBoron (CBN, Full Top Type)

| Shape | | ISO Cat. No. | r | BNC100 | BNC160 | BNC200 | BNC300 | BNC500 | BN1000 | BN2000 | BNX10 | BNX20 | BNX25 | BN250 | BN300 | BN350 | BN700 | BN7000 | BN7500 | BNS800 | DA150 | DA1000 | DA2200 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | H Coated | | | | K Coated | H Uncoated | | | | | | | | K Uncoated | | | | N PCD | | |
| | | | | CBN | | | | | CBN | | | | | | | | CBN | | | | PCD | | |
| | | | | | | | | | | | | | | | | | K PM | K PM | K PM | | | | |
|  |  | **TBGN 060102 B** | 0,2 | ● | ● | ● | | | | ● | ▲ | ● | | ▲ | | | | | | | | | |
| | | **TBGN 060104 B** | 0,4 | ● | ● | ● | | | | ● | ▲ | ● | | ▲ | | | | | | | | | |

● G-Class SumiDIA (PCD, NF Type)

| | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  |  | **TBGN 060102 NF** | 0,2 | | | | | | | | | | | | | | | | | | ● | ▲ | |
| | | **TBGN 060104 NF** | 0,4 | | | | | | | | | | | | | | | | | | ● | ▲ | |

● G-Class SumiDIA (PCD, NF Type)

| | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  |  | **TBGW 060102 NF** | 0,2 | | | | | | | | | | | | | | | | | | ● | ▲ | |
| | | **TBGW 060104 NF** | 0,4 | | | | | | | | | | | | | | | | | | ● | ▲ | |

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

Packing unit and ordering example; 1 pce SNMA 120408 NS, BNX25

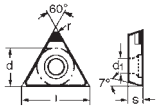
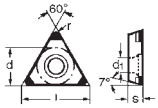
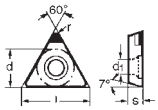
60° Triangle Type | 7° Relief With Insert Hole

| 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 |

H Hardened Steel
K Cast Iron
N Non-Ferrous Metal
PM Sintered Compoment

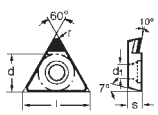
## TCGW ●●●●●●

● G-Class SumiBoron (CBN, One-Use Type)

| Shape | ISO Cat. No. | r | H Coated BNC100 | H Coated BNC160 | H Coated BNC200 | H Coated BNC300 | K Coated BNC500 | H Uncoated CBN BN1000 | H Uncoated CBN BN2000 | H Uncoated CBN BNX10 | H Uncoated CBN BNX20 | H Uncoated CBN BNX25 | H Uncoated CBN BN250 | H Uncoated CBN BN300 | H Uncoated CBN BN350 | K Uncoated CBN BN700 | K PM BN7000 | K PM BN7500 | K Uncoated CBN BNS800 | N Uncoated PCD DA150 | N Uncoated PCD DA1000 | N Uncoated PCD DA2200 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  | **TCGW 090204 NC** | 0,4 | | | ● | | | | | | | | | | | | | | | | | |
|  | **TCGW 090208 NC** | 0,8 | | | ● | | | | | | | | | | | | | | | | | |
| | **TCGW 110202 NC** | 0,2 | | | ● | | | | | | | | | | | | | | | | | |
| | **TCGW 110204 NC** | 0,4 | | | ● | | ● | | | | | | | | | | | | | | | |
| | **TCGW 110208 NC** | 0,8 | | | ● | | | | | | | | | | | | | | | | | |
|  | **TCGW 16T304 NC-3** | 0,4 | | | ● | | | | | | | | | | | | | | | | | |
|  with 3 CBN cutting edges | **TCGW 16T308 NC-3** | 0,8 | | | ● | | | | | | | | | | | | | | | | | |
|  | **TCGW 090204 NU** | 0,4 | | | | | | | | | | | | | | ● | ● | | | | | |
|  | **TCGW 090208 NU** | 0,8 | | | | | | | | | | | | | | ● | ● | | | | | |
| | **TCGW 110202 NU** | 0,2 | | | | | | ● | | ▲ | ● | | | | | ● | ● | | | | | |
| | **TCGW 110204 NU** | 0,4 | | | | | | ● | ● | ▲ | ● | | ▲ | | | ● | ● | | | | | |
| | **TCGW 110208 NU** | 0,8 | | | | | | ● | | ▲ | | | | | | ● | ● | | | | | |
| | **TCGW 16T304 NU** | 0,4 | | | | | | ● | | ▲ | ● | | | | | ● | ● | | | | | |
| | **TCGW 16T308 NU** | 0,8 | | | | | | | | | ● | | | | | ● | ● | | | | | |

## TCMT ●●●●●●

● M-Class SumiDia (PCD, NF Type)

| Shape | ISO Cat. No. | r | H Coated BNC100 | H Coated BNC160 | H Coated BNC200 | H Coated BNC300 | K Coated BNC500 | H Uncoated CBN BN1000 | H Uncoated CBN BN2000 | H Uncoated CBN BNX10 | H Uncoated CBN BNX20 | H Uncoated CBN BNX25 | H Uncoated CBN BN250 | H Uncoated CBN BN300 | H Uncoated CBN BN350 | K Uncoated CBN BN700 | K PM BN7000 | K PM BN7500 | K Uncoated CBN BNS800 | N Uncoated PCD DA150 | N Uncoated PCD DA1000 | N Uncoated PCD DA2200 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  | **TCMT 090202 NF** | 0,2 | | | | | | | | | | | | | | | | | | | ● | ▲ |
|  | **TCMT 090204 NF** | 0,4 | | | | | | | | | | | | | | | | | | | ● | ▲ |
| | **TCMT 110201 NF** | 0,1 | | | | | | | | | | | | | | | | | | | ● | ▲ |
| | **TCMT 110202 NF** | 0,2 | | | | | | | | | | | | | | | | | | | ● | ▲ |
| | **TCMT 110204 NF** | 0,4 | | | | | | | | | | | | | | | | | | | ● | ▲ |

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

Packing unit and ordering example; 1 pce TCGW 090204 NC, BNC200

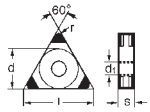
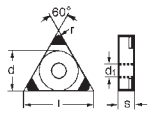
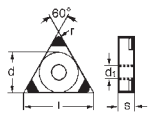
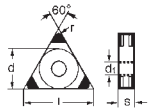
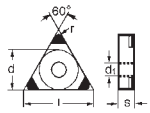
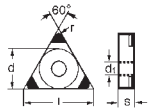
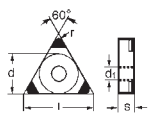
60° Triangle Type | 0° Relief With Insert Hole

| 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
PM Sintered Compoment

# TNGA / TNGG / TNGM

● G-Class SumiBoron (CBN, One-Use Multi-Corner Type)

| Shape | | ISO Cat. No. | r | H Coated CBN BNC100 | BNC160 | BNC200 | BNC300 | K Coated CBN BNC500 | H Uncoated CBN BN1000 | BN2000 | BNX10 | BNX20 | BNX25 | BN250 | BN300 | BN350 | K Uncoated CBN BN700 | K PM CBN BN7000 | BN7500 | BNS800 | N PCD DA150 | DA1000 | DA2200 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  Standard - Normal cut geometry |  with 6 CBN cutting edges | **TNGA 160404 NC-6** | 0,4 | ● | ● | ● | ● | | | | | | | | | | | | | | | | |
| | | **TNGA 160408 NC-6** | 0,8 | ● | ● | ● | ● | | | | | | | | | | | | | | | | |
| | | **TNGA 160412 NC-6** | 1,2 | ● | ● | ● | ● | | | | | | | | | | | | | | | | |
|  **LS** - Type Light cut geometry |  with 3 CBN cutting edges | **TNGA 160404 LS-NC3** | 0,4 | ● | ● | ● | | | | | | | | | | | | | | | | | |
| | | **TNGA 160408 LS-NC3** | 0,8 | ● | ● | ● | | | | | | | | | | | | | | | | | |
| | | **TNGA 160412 LS-NC3** | 1,2 | ● | ● | ● | | | | | | | | | | | | | | | | | |
|  **HS** - Type Tough cut geometry |  with 3 CBN cutting edges | **TNGA 160404 HS-NC3** | 0,4 | | ● | ● | ● | | | | | | | | | | | | | | | | |
| | | **TNGA 160408 HS-NC3** | 0,8 | | ● | ● | ● | | | | | | | | | | | | | | | | |
| | | **TNGA 160412 HS-NC3** | 1,2 | | ● | ● | ● | | | | | | | | | | | | | | | | |
| Break Master - FV, LV, SV New  CBN with chipbreaker |  with 6 CBN cutting edges | **TNGG 160404 N-FV NC6** | 0,4 | | ● | ● | | | | | | | | | | | | | | | | | |
| | | **TNGG 160408 N-FV NC6** | 0,8 | | ● | ● | | | | | | | | | | | | | | | | | |
| | | **TNGG 160412 N-FV NC6** | 1,2 | | ● | ● | | | | | | | | | | | | | | | | | |
| | | **TNGG 160404 N-LV NC6** | 0,4 | | ● | ● | | | | | | | | | | | | | | | | | |
| | | **TNGG 160408 N-LV NC6** | 0,8 | | ● | ● | | | | | | | | | | | | | | | | | |
| | | **TNGG 160412 N-LV NC6** | 1,2 | | ● | ● | | | | | | | | | | | | | | | | | |
| | | **TNGG 160408 N-SV NC6** | 0,8 | | | ● | | | | | | | | | | | | | | | | | |
|  |  with 3 CBN cutting edges | **TNGA 160404 NU-3** | 0,4 | | | | | | | | | | | | | | | | ○ | | | | |
| | | **TNGA 160408 NU-3** | 0,8 | | | | | | | | | | | | | | | | ○ | | | | |
| | | **TNGA 160412 NU-3** | 1,2 | | | | | | | | | | | | | | | | ○ | | | | |
|  **LS** - Type Light cut geometry **HS** - Type Tough cut geometry |  with 3 CBN cutting edges | **TNGA 160404 LS-NU3** | 0,4 | | | | | | | | | | | | | | | | ○ | | | | |
| | | **TNGA 160408 LS-NU3** | 0,8 | | | | | | | | | | | | | | | | ○ | | | | |
| | | **TNGA 160404 HS-NU3** | 0,4 | | | | | | | | | | | | | | | | ○ | | | | |
| | | **TNGA 160408 HS-NU3** | 0,8 | | | | | | | | | | | | | | | | ○ | | | | |
| Break Master - LV New  |  with 3 CBN cutting edges | **TNGM 160404 N-LV NU3** | 0,4 | | | | | | | ● | | | | | | | | | | | | | |
| | | **TNGM 160408 N-LV NU3** | 0,8 | | | | | | | ● | | | | | | | | | | | | | |
| | | **TNGM 160412 N-LV NU3** | 1,2 | | | | | | | ● | | | | | | | | | | | | | |

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

Packing unit and ordering example; 1 pce TNGA 160404 NC-6, BNC100

TN_ _ Type neg. Inserts

TP_ _ Type 11° pos. 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 |
| | | | | |

H Hardened Steel
K Cast Iron
N Non-Ferrous Metal
PM Sintered Compoment

# TNMA ●●●●●●

● M-Class SumiBoron (CBN, Regrindable Type)

| Shape | ISO Cat. No. | r | BNC100 | BNC160 | BNC200 | BNC300 | BNC500 | BN1000 | BN2000 | BNX10 | BNX20 | BNX25 | BN250 | BN300 | BN350 | BN700 | BN7000 | BN7500 | BNS800 | DA150 | DA1000 | DA2200 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **TNMA 160404** | 0,4 | | | | | | | | | ● | | | ● | | | | | | | | |
| | **TNMA 160408** | 0,8 | | | | | | | | | ● | | | ● | | | | | | | | |

● M-Class SumiBoron (CBN, One-Use Type)

| Shape | ISO Cat. No. | r | BNC100 | BNC160 | BNC200 | BNC300 | BNC500 | BN1000 | BN2000 | BNX10 | BNX20 | BNX25 | BN250 | BN300 | BN350 | BN700 | BN7000 | BN7500 | BNS800 | DA150 | DA1000 | DA2200 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **TNMA 160404 NU** | 0,4 | | | | | | | ● | | ● | | ▲ | | | | | | | | | |
| | **TNMA 160408 NU** | 0,8 | | | | | | ● | ● | ▲ | ● | | ▲ | ● | ● | | | | | | | |
| | **TNMA 160412 NU** | 1,2 | | | | | | ● | | ▲ | ● | | | | | | | | | | | |

## 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 | – |
| | | | | |

H Hardened Steel
K Cast Iron
N Non-Ferrous Metal
PM Sintered Compoment

# TPGN ●●●●●●

● G-Class SumiBoron (CBN, One-Use Type)

| Shape | ISO Cat. No. | r | BNC100 | BNC160 | BNC200 | BNC300 | BNC500 | BN1000 | BN2000 | BNX10 | BNX20 | BNX25 | BN250 | BN300 | BN350 | BN700 | BN7000 | BN7500 | BNS800 | DA150 | DA1000 | DA2200 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **TPGN 110304 NU** | 0,4 | | | | | | | | | ● | | | | | ● | ● | | | | | |
| | **TPGN 110308 NU** | 0,8 | | | | | | | | | ● | | | | | ● | ● | | | | | |
| | **TPGN 160304 NU** | 0,4 | | | | | | | | | ● | | | | | ● | ● | | | | | |
| | **TPGN 160308 NU** | 0,8 | | | | | | | | | ● | | | | | ● | ● | | | | | |

● G-Class SumiDia (PCD, NF Type)

| Shape | ISO Cat. No. | r | BNC100 | BNC160 | BNC200 | BNC300 | BNC500 | BN1000 | BN2000 | BNX10 | BNX20 | BNX25 | BN250 | BN300 | BN350 | BN700 | BN7000 | BN7500 | BNS800 | DA150 | DA1000 | DA2200 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **TPGN 110304 NF** | 0,4 | | | | | | | | | | | | | | | | | | | ● | ▲ |
| | **TPGN 110308 NF** | 0,8 | | | | | | | | | | | | | | | | | | | ● | ▲ |
| | **TPGN 160302 NF** | 0,2 | | | | | | | | | | | | | | | | | | | ● | ▲ |
| | **TPGN 160304 NF** | 0,4 | | | | | | | | | | | | | | | | | | | ● | ▲ |
| | **TPGN 160308 NF** | 0,8 | | | | | | | | | | | | | | | | | | | ● | ▲ |

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

Packing unit and ordering example; 1 pce TPGN 110304 NU, BNX20

60° Triangle Type | 11° Relief With Insert Hole

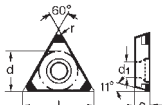
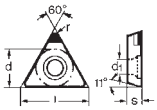
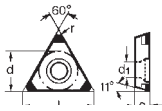
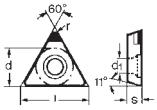
Dimensions (mm)

| TP_ _ | ℓ | ød (IC) | s | $d_1$ |
|---|---|---|---|---|
| 0802-- | 8,2 | 4,76 | 2,39 | 2,3 |
| 0902-- | 9,62 | 5,56 | 2,38 | 2,5 |
| 1102-- | 11,0 | 6,35 | 2,38 | 2,8 |
| 1103-- | | | 3,18 | 3,4 |
| 1604-- | 16,5 | 9,525 | 4,76 | 4,3 |

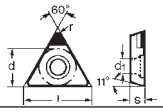
H Hardened Steel
K Cast Iron
N Non-Ferrous Metal
PM Sintered Compoment

# TPGT / TPGW ●●●●●●

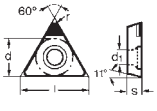
● G-Class SumiBoron (CBN, One-Use Type)

| Shape | ISO Cat. No. | r | BNC100 | BNC160 | BNC200 | BNC300 | BNC500 | BN1000 | BN2000 | BNX10 | BNX20 | BNX25 | BN250 | BN300 | BN350 | BN700 | BN7000 | BN7500 | BNS800 | DA150 | DA1000 | DA2200 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Break Master - FV (New)  CBN with chipbreaker |  with 3 CBN cutting edges | TPGT 110304 N-FV NC3 | 0,4 | | ● | ● | | | | | | | | | | | | | | | | |
| | | TPGT 110308 N-FV NC3 | 0,8 | | ● | ● | | | | | | | | | | | | | | | | |
|  Standard - Normal cut geometry |  | TPGW 080202 NC | 0,2 | | | ● | | | | | | | | | | | | | | | | |
| | | TPGW 080204 NC | 0,4 | | | ● | | | | | | | | | | | | | | | | |
| | | TPGW 110304 NC | 0,4 | | | ● | | | | | | | | | | | | | | | | |
| | | TPGW 110308 NC | 0,8 | | | ● | | | | | | | | | | | | | | | | |
| Break Master - FV (New)  CBN with chipbreaker |  with 3 CBN cutting edges | TPGT 110304 N-FV NU3 | 0,4 | | | | | | ● | | | | | | | | | | | | | |
| | | TPGT 110308 N-FV NU3 | 0,8 | | | | | | ● | | | | | | | | | | | | | |
|  |  | TPGW 080202 NU | 0,2 | | | | | | ● | | ● | | ▲ | | | | | | | | | |
| | | TPGW 080204 NU | 0,4 | | | | | ● | ● | ▲ | ● | | ▲ | | | | | | | | | |
| | | TPGW 110304 NU | 0,4 | | | | | | ● | | ● | | ▲ | ● | ● | | | | | | | |
| | | TPGW 110308 NU | 0,8 | | | | | | ● | | ● | | ▲ | ● | ● | | | | | | | |

● M-Class SumiBoron (CBN, Regrindable Type)

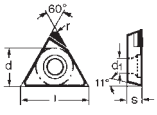
| Shape | ISO Cat. No. | r | BNC100 | BNC160 | BNC200 | BNC300 | BNC500 | BN1000 | BN2000 | BNX10 | BNX20 | BNX25 | BN250 | BN300 | BN350 | BN700 | BN7000 | BN7500 | BNS800 | DA150 | DA1000 | DA2200 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  |  | TPGW 110304 | 0,4 | | | | | | | | ● | | ▲ | | | | | | | | | |
| | | TPGW 110308 | 0,8 | | | | | | | | ● | | ▲ | | | | | | | | | |

● G-Class SumiDia (PCD, NF Type)

| Shape | ISO Cat. No. | r | BNC100 | BNC160 | BNC200 | BNC300 | BNC500 | BN1000 | BN2000 | BNX10 | BNX20 | BNX25 | BN250 | BN300 | BN350 | BN700 | BN7000 | BN7500 | BNS800 | DA150 | DA1000 | DA2200 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  |  | TPGW 080202 NF | 0,2 | | | | | | | | | | | | | | | | | ● | ▲ | |
| | | TPGW 080204 NF | 0,4 | | | | | | | | | | | | | | | | | ● | ▲ | |
| | | TPGW 110202 NF | 0,2 | | | | | | | | | | | | | | | | | ● | ▲ | |
| | | TPGW 110204 NF | 0,4 | | | | | | | | | | | | | | | | | ● | ▲ | |
| | | TPGW 110208 NF | 0,8 | | | | | | | | | | | | | | | | | ● | ▲ | |
| | | TPGW 110302 NF | 0,2 | | | | | | | | | | | | | | | | | ● | ▲ | |
| | | TPGW 110304 NF | 0,4 | | | | | | | | | | | | | | | | | ● | ▲ | |
| | | TPGW 110308 NF | 0,8 | | | | | | | | | | | | | | | | | ● | ▲ | |
| | | TPGW 160402 NF | 0,2 | | | | | | | | | | | | | | | | | ● | ▲ | |
| | | TPGW 160404 NF | 0,4 | | | | | | | | | | | | | | | | | ● | ▲ | |
| | | TPGW 160408 NF | 0,8 | | | | | | | | | | | | | | | | | ● | ▲ | |

# TPMT ●●●●●●

● M-Class SumiDia (PCD, One-Use "Break Master" Type)

| Shape | ISO Cat. No. | r | BNC100 | BNC160 | BNC200 | BNC300 | BNC500 | BN1000 | BN2000 | BNX10 | BNX20 | BNX25 | BN250 | BN300 | BN350 | BN700 | BN7000 | BN7500 | BNS800 | DA150 | DA1000 | DA2200 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Break Master - DM  |  | TPMT 080202 L-DM NU | 0,2 | | | | | | | | | | | | | | | | | ○ | | |
| | | TPMT 080204 L-DM NU | 0,4 | | | | | | | | | | | | | | | | | ● | | |
| | | TPMT 090202 L-DM NU | 0,2 | | | | | | | | | | | | | | | | | ○ | | |
| | | TPMT 090204 L-DM NU | 0,4 | | | | | | | | | | | | | | | | | ● | | |

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

Packing unit and ordering example; 1 pce TPGW 110304, BNX20

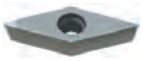
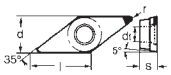
## 35° Diamond Type — 5° & 7° Relief, With Insert Hole

| 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 |

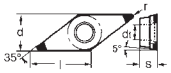
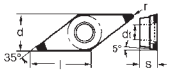
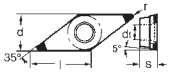
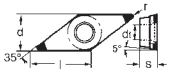
H Hardened Steel
K Cast Iron
N Non-Ferrous Metal
PM Sintered Compoment

## VBGW ●●●●●●

### ● G-Class SumiBoron (CBN, One-Use Type)

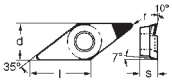
| Shape | ISO Cat. No. | r | H Coated BNC100 | H Coated BNC160 | H Coated BNC200 | H Coated BNC300 | H Coated BNC500 | H Uncoated CBN BN1000 | H Uncoated CBN BN2000 | H Uncoated CBN BNX10 | H Uncoated CBN BNX20 | H Uncoated CBN BNX25 | K Uncoated CBN BN250 | K Uncoated CBN BN300 | K Uncoated CBN BN350 | K Uncoated CBN BN700 | K PM BN7000 | K PM BN7500 | K Uncoated CBN BNS800 | N PCD DA150 | N PCD DA1000 | N PCD DA2200 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  Standard - Normal cut geometry | **VBGW 110202 NC** | 0,2 | | | ● | | | | | | | | | | | | | | | | | |
| | **VBGW 110204 NC** | 0,4 | | | ● | | | | | | | | | | | | | | | | | |
| | **VBGW 110208 NC** | 0,8 | | | ● | | | | | | | | | | | | | | | | | |
|  | **VBGW 110202 NU** | 0,2 | | | | | | | | | ● | | | | | | | | | | | |
|  | **VBGW 110204 NU** | 0,4 | | | | | | | ● | | ● | | | | | | | | | | | |
| | **VBGW 110208 NU** | 0,8 | | | | | | | | | ● | | | | | | | | | | | |
|  | **VBGW 160402 NU** | 0,2 | | | | | | | | | ● | | | | | | | | | | | |
| | **VBGW 160404 NU** | 0,4 | | | | | | ● | ● | ▲ | ● | | ▲ | ● | ● | ● | ● | | | | | |
| | **VBGW 160408 NU** | 0,8 | | | | | | ● | ● | ▲ | ● | | ▲ | ● | ● | ● | ● | | | | | |

### ● G-Class SumiBoron (CBN, One-Use Multi-Corner Type)

| Shape | ISO Cat. No. | r | H Coated BNC100 | H Coated BNC160 | H Coated BNC200 | H Coated BNC300 | H Coated BNC500 | H Uncoated CBN BN1000 | H Uncoated CBN BN2000 | H Uncoated CBN BNX10 | H Uncoated CBN BNX20 | H Uncoated CBN BNX25 | K Uncoated CBN BN250 | K Uncoated CBN BN300 | K Uncoated CBN BN350 | K Uncoated CBN BN700 | K PM BN7000 | K PM BN7500 | K Uncoated CBN BNS800 | N PCD DA150 | N PCD DA1000 | N PCD DA2200 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  Standard - Normal cut geometry  with 2 CBN cutting edges | **VBGW 160404 NC-2** | 0,4 | ● | ● | ● | ● | ● | | | | | | | | | | | | | | | |
| | **VBGW 160408 NC-2** | 0,8 | ● | ● | ● | ● | ● | | | | | | | | | | | | | | | |
|  **LS** - Type Light cut geometry  with 2 CBN cutting edges | **VBGW 160404 LS-NC2** | 0,4 | ● | ● | ● | | | | | | | | | | | | | | | | | |
| | **VBGW 160408 LS-NC2** | 0,8 | ● | ● | ● | | | | | | | | | | | | | | | | | |
|  **HS** - Type Tough cut geometry  with 2 CBN cutting edges | **VBGW 160404 HS-NC2** | 0,4 | | | ● | ● | | | | | | | | | | | | | | | | |
| | **VBGW 160408 HS-NC2** | 0,8 | | | ● | ● | | | | | | | | | | | | | | | | |
|   with 2 CBN cutting edges | **VBGW 160404 NU-2** | 0,4 | | | | | | ● | ● | ▲ | ● | | ▲ | | | | | | | | | |
| | **VBGW 160408 NU-2** | 0,8 | | | | | | ● | ● | ▲ | ● | | ▲ | | | | | | | | | |

## VCMT ●●●●●●

### ● M-Class SumiDia (PCD, NF Type)

| Shape | ISO Cat. No. | r | H Coated BNC100 | H Coated BNC160 | H Coated BNC200 | H Coated BNC300 | H Coated BNC500 | H Uncoated CBN BN1000 | H Uncoated CBN BN2000 | H Uncoated CBN BNX10 | H Uncoated CBN BNX20 | H Uncoated CBN BNX25 | K Uncoated CBN BN250 | K Uncoated CBN BN300 | K Uncoated CBN BN350 | K Uncoated CBN BN700 | K PM BN7000 | K PM BN7500 | K Uncoated CBN BNS800 | N PCD DA150 | N PCD DA1000 | N PCD DA2200 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|   | **VCMT 110301 NF** | 0,1 | | | | | | | | | | | | | | | | | | | ● | ▲ |
| | **VCMT 110302 NF** | 0,2 | | | | | | | | | | | | | | | | | | | ● | ▲ |
| | **VCMT 110304 NF** | 0,4 | | | | | | | | | | | | | | | | | | | ● | ▲ |
| | **VCMT 160404 NF** | 0,4 | | | | | | | | | | | | | | | | | | | ● | ▲ |
| | **VCMT 160408 NF** | 0,8 | | | | | | | | | | | | | | | | | | | ● | ▲ |
| | **VCMT 160412 NF** | 1,2 | | | | | | | | | | | | | | | | | | | ● | ▲ |

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

Packing unit and ordering example; 1 pce VBGW 110202 NC, BNC200

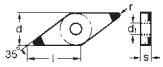
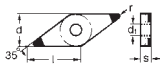
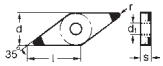
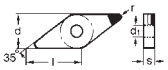
**35° Diamond Type** | 0° Relief / With Insert Hole

| Dimensions (mm) | | | | |
|---|---|---|---|---|
| VN__ | ℓ | ød (IC) | s | $d_1$ |
| 1604-- | 16,6 | 9,525 | 4,76 | 3,81 |

H Hardened Steel
K Cast Iron
N Non-Ferrous Metal
PM Sintered Compoment

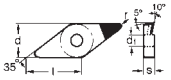
# VNGA / VNGG / VNMA

## ● G-Class SumiBoron (CBN, One-Use Multi-Corner Type)

| Shape | | ISO Cat. No. | r | H Coated CBN BNC100 | BNC160 | BNC200 | BNC300 | BNC500 | H Uncoated CBN BN1000 | BN2000 | BNX10 | BNX20 | BNX25 | BN250 | BN300 | BN350 | BN700 | K PM BN7000 | BN7500 | BNS800 | N PCD DA150 | DA1000 | DA2200 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  |  with 2 CBN cutting edges | **VNGA 160404 NU-2**<br>**VNGA 160408 NU-2** | 0,4<br>0,8 | | | | | | ●<br>● | ●<br>● | | | | | | | | | ○<br>○ | | | | |
| Break Master - $FV_1$ - LV<br>New<br>  CBN with chipbreaker |  with 2 CBN cutting edges | **VNGG 160404 N-FV NC2**<br>**VNGG 160408 N-FV NC2** | 0,4<br>0,8 | ●<br>● | ●<br>● | | | | | | | | | | | | | | | | | | |
| | | **VNGG 160404 N-LV NC2**<br>**VNGG 160408 N-LV NC2** | 0,4<br>0,8 | ●<br>● | ●<br>● | | | | | | | | | | | | | | | | | | |
| Break Master - LV<br>New<br>  CBN with chipbreaker |  with 2 CBN cutting edges | **VNGM 160404 N-LV NU2**<br>**VNGM 160408 N-LV NU2** | 0,4<br>0,8 | | | | | | ●<br>● | | | | | | | | | | | | | | |
| ● M-Class SumiBoron (CBN, Regrindable Type) | | | | | | | | | | | | | | | | | | | | | | | |
|  |  | **VNMA 160404**<br>**VNMA 160408** | 0,4<br>0,8 | | | | | | | | ●<br>● | | | | ●<br>● | | | | | | | | |
| ● M-Class SumiBoron (CBN, One-Use Type) | | | | | | | | | | | | | | | | | | | | | | | |
|  |  | **VNMA 160404 NU**<br>**VNMA 160408 NU** | 0,4<br>0,8 | | | | | | ●<br>● | ●<br>● | ▲<br>▲ | ●<br>● | | ▲<br>▲ | ●<br>● | ●<br>● | | | | | | | |

# VNMX ●●●●●●

## ● M-Class SumiDia (PCD, Regrindable Type)

| Shape | | ISO Cat. No. | r | H Coated CBN BNC100 | BNC160 | BNC200 | BNC300 | BNC500 | H Uncoated CBN BN1000 | BN2000 | BNX10 | BNX20 | BNX25 | BN250 | BN300 | BN350 | BN700 | K PM BN7000 | BN7500 | BNS800 | N PCD DA150 | DA1000 | DA2200 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  |  | **VNMX 160404 NF**<br>**VNMX 160408 NF** | 0,4<br>0,8 | | | | | | | | | | | | | | | | | | | ●<br>● | ▲<br>▲ |



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

Packing unit and ordering example; 1 pce VNGA 160404 NU2, BN1000

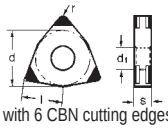
## 80° Trigon Type — 0° Relief, With Insert Hole

| Dimensions (mm) | | | | |
|---|---|---|---|---|
| VN__ | 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
PM Sintered Compoment

## WNGA

● G-Class SumiBoron (CBN, One-Use Multi-Corner Type)

| Shape | ISO Cat. No. | r | BNC100 | BNC160 | BNC200 | BNC300 | BNC500 | BN1000 | BN2000 | BNX10 | BNX20 | BNX25 | BN250 | BN300 | BN350 | BN700 | BN7000 | BN7500 | BNS800 | DA150 | DA1000 | DA2200 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|   with 6 CBN cutting edges | WNGA 080404 NC-6 | 0,4 | | | ● | | | | | | | | | | | | | | | | | |
| | WNGA 080408 NC-6 | 0,8 | | | ● | | | | | | | | | | | | | | | | | |
| | WNGA 080412 NC-6 | 1,2 | | | ● | | | | | | | | | | | | | | | | | |
|  (Wiper Type) | WNGA 080408 NC-WG6 | 0,8 | | ● | ● | | | | | | | | | | | | | | | | | |
| | WNGA 080408 NC-WH6 | 0,8 | | ● | ● | | | | | | | | | | | | | | | | | |

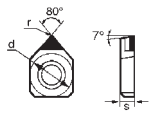
## 80° Special Type — 7° Relief, With Insert Hole

| 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
PM Sintered Compoment

## ZNEX

● G-Class SumiBoron (CBN, One-Use Type)

| Shape | ISO Cat. No. | r | BNC100 | BNC160 | BNC200 | BNC300 | BNC500 | BN1000 | BN2000 | BNX10 | BNX20 | BNX25 | BN250 | BN300 | BN350 | BN700 | BN7000 | BN7500 | BNS800 | DA150 | DA1000 | DA2200 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|   | ZNEX 040102 NC | 0,2 | ● | ● | ● | | | | | | | | | | | | | | | | | |
| | ZNEX 040104 NC | 0,4 | ● | ● | ● | | | | | | | | | | | | | | | | | |
|  | ZNEX 040102 NU | 0,2 | | | | | | ● | ● | ▲ | ● | | ▲ | | | | | | | | | |
| | ZNEX 040104 NU | 0,4 | | | | | | ● | ● | ▲ | ● | | ▲ | | | | | | | | | |

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

Packing unit and ordering example; 1 pce WNGA 080404 NC-6, BNC200



**BNBB** ☞ M24

**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 ø 3,5 mm.



**BNZ** ☞ M25

**Small hole boring bars**

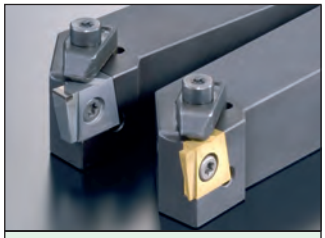
- Solid carbide boring bars with economical CBN insert.
- Small hole boring for hardened steels.
- Min. boring dia. is ø 7,0 mm.



**BNB** ☞ M25

**Small hole boring bars**

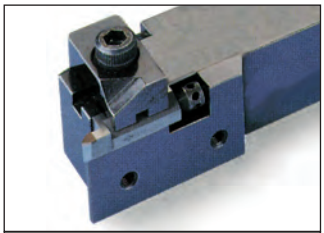
- Solid carbide boring bars with economical CBN and PCD insert.
- Min. boring dia. is ø 10,0 mm.



**GWB** ☞ M26

**CBN Grooving System for Hardened Steels**

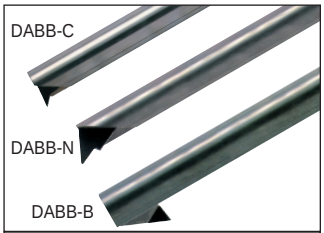
- Tangential Inserts – Double clamp holder
- Groove Widths from 1,5 – 6,0mm
- New CBN grade for interrupted grooving



**BNGG** ☞ M28

**Threading holders**

- CBN cutting edge for hardened steel
- Adjustable threading after regrinding.




**DABB** ☞ M29

**Small hole boring tools**

- PCD cutting edge for finishing of small non-ferrous parts
- Min. boring dia. is ø 3,0 mm.
- DABB-C for boring
  DABB-N for profiling and corner grooving
  DABB-B for back boring



**DAL / DDL / DML** ☞ M36

**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** ☞ M30

**High speed face mill for Aluminium**

- Finishing and roughing aluminium alloys and non-ferrous materials
- High precision and highspeed machining vc= 5000 m/min
- Alumimum alloy body
- Run-out less than 10µm
- Easy assembling



**SRF** ☞ M31

**High speed face mill for Aluminium**

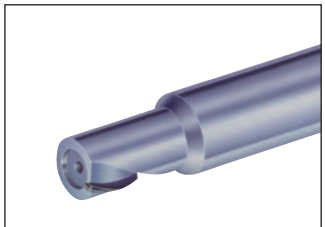
- Small diameter cutter for small machines
- High speed roughing and finishing with SumiDia DA2200
- High speed capability of rpm = 20.000
- Economical PCD insert NF type



**FMU** ☞ M32

**"BN Finish Mill" for finishing grey cast iron**

- High speed machining vc= 1500 m/min
- Excellent surface roughness Rz=3,2
- Run-out less than 10µm
- Easy assembling



**BNES** ☞ M34

**"Helical Master" SUMIBORON Endmill**

- Spiral CBN brazed cutting edge for super finishing hardened steel (HRC50~60)
- Dry machining
- Stable cutting
- High accuracy
- Excellent swarf evacuation



**BNBP** ☞ M35

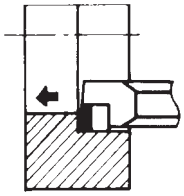
**"Mould Finish Master" Micro Ball Nose Endmills**

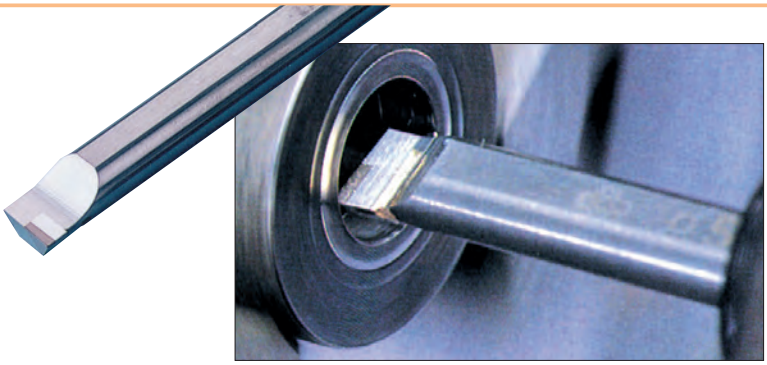
- High precision machining of hardened steels < HRC70 with long tool life
- Super tough grade SUMIBORON BN350 prevents chipping of the cutting edge
- R accuracy : ±0,005mm

# BNBB Type

For Hardened Steel

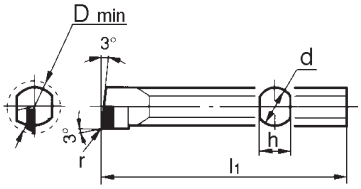
**BNBB** type small hole boring tools for hardened work pieces up to diameter 3,5 mm



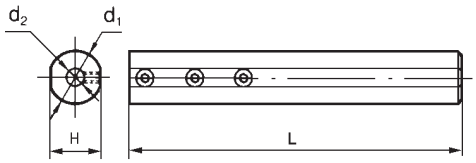


## „Sumiboron“ Brazed Boring Tools for Small Hole Boring

| | 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 | |

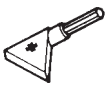



## Holder




| 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 | |

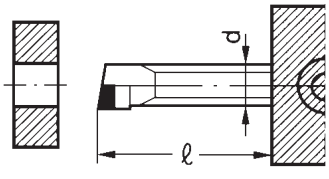
## Spare Parts

| 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 occurence 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

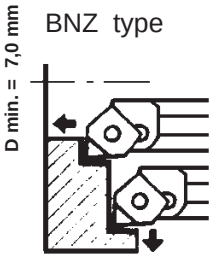



( ℓ max. = 5 x d )

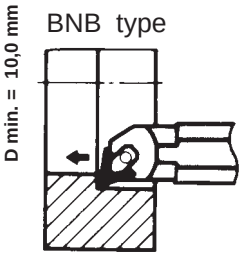
- Adjust overhang to achieve absolute minimum.
- For use of a small diameter brazed boring tool, select high speed and small feed rate, as much as possible.

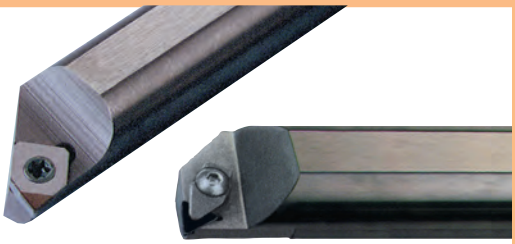
# SUMIBORON Small Hole Boring Bars
# BNZ / BNB Type

BNZ type

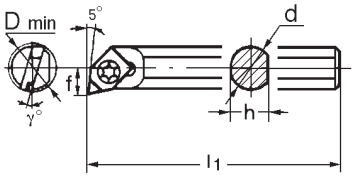
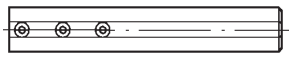
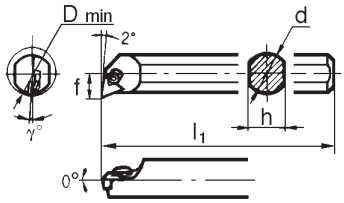



BNB type

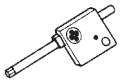


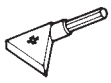
## Boring Bars for Small Hole Boring

| | Cat. No. | Stock | Dimensions (mm) | | | | | | Applicable insert | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | $D_{min}$ | 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 | | |
| | Holder "HBB616" 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 | BFTX 0204 N | TRX 06 |
| BNZ 608 R | | |
| BNZ 610 R | | |
| | | |

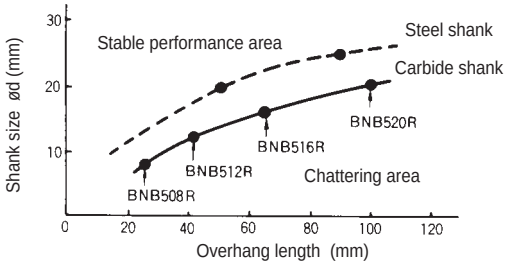
## Spare Parts for BNB

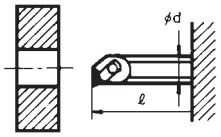
| Holder | Clamp | Clamp bold | Nut | Wrench |
|---|---|---|---|---|
| |  |  |  |  |
| BNB 508 R/L | BNBC | BH 0306 | BNBW-2 | TH 020 |
| BNB 512 R/L | BNBC | FBUP-3-A0-9 | BNBW-4 | TH 020 |
| BNB 516 R/L | BNBC | BH 0310 | BNBW-4 | TH 020 |
| BNB 520 R/L | BNBC | BH 0310 | BNBW-7 | TH 020 |

## 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 |

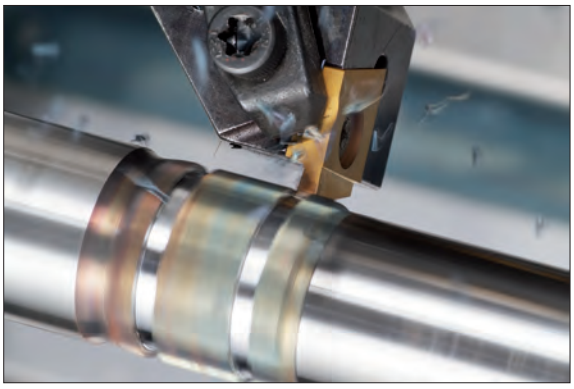
## Holders Performance Area




Work material: Alloy steel ($H_RC$ 60)
Cutting conditions: $v_c$ = 100 m/min
f = 0,1 mm/rev
$d_{oc}$ = 0,2 mm

# GWB Type



**New CBN Grooving System for Hardened Steels**

## Features

### Tangential insert

80 degree tangentially mounted insert improves rigidity



### Double clamping system

The double clamping system increases stability so even axial feeds are possible.

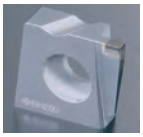
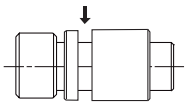
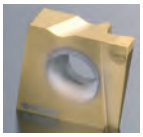
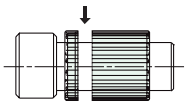
### New coated CBN grade BNC30G

Tough new coated CBN grade for interrupted hard grooving

### Wide insert range 1,5 – 6,0mm

Wide range of width's and grades for continuous and interrupted cut grooving operations

## Grades

| Grade | Application | Features |
|---|---|---|
| BN250  | Continuous grooving  | Uncoated CBN grade for continuous cut grooving applications |
| **BNC30G**  | Interrupted grooving  | Tough new CBN coated grade developed for interrupted cut grooving applications |

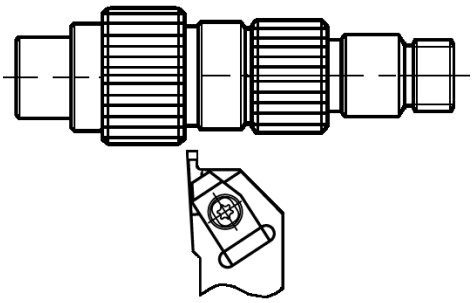
## Recommended cutting Conditions

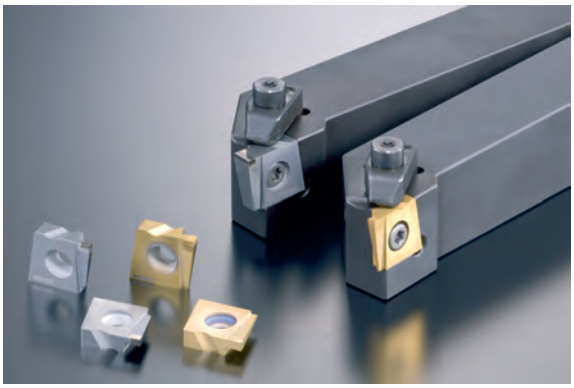
| Material | Hardened steel |
|---|---|
| Cutting speed (m/min) | 60 80 120 150 |
| Feed rate (mm/rev) | 0,03 0,04 0,08 0,1 |
| Grade | BN250, BNC30G |

**Coolant:**
Dry / Wet (for continuous cut)
Dry only (for interrupted cut)

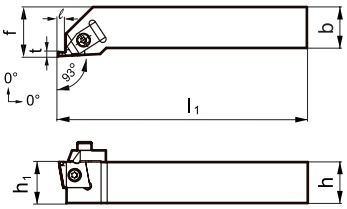
**Remarks:**
To avoid thermal cracking of the cutting edge when interrupted cutting please ensure workpiece remains dry.

# GWB Type





## Holders

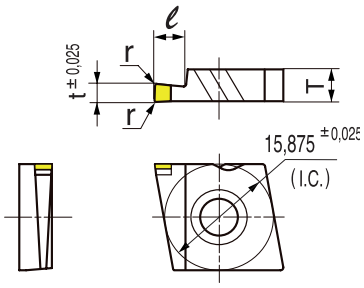



| Cat. No. | Stock | | Dimensions (mm) | | | | | | | Applicable Insert |
|---|---|---|---|---|---|---|---|---|---|---|
| | R | L | h | $h_1$ | b | f | $l_1$ | t (*) | ℓ | |
| **GWB** R/L **2020 - 45** | ❍ | ❍ | 20 | 25 | 20 | 24 | 150 | 1,5 < t ≤ 2,0 | 3,5 | CGA R/L 1504 ○○○ |
| | | | | | | | | 2,0 < t ≤ 3,0 | 4,0 | |
| | | | | | | | 151 | 3,0 < t ≤ 4,5 | 5,0 | |
| **GWB** R/L **2525 - 45** | ● | ● | 25 | 25 | 25 | 30 | 150 | 1,5 < t ≤ 2,0 | 3,5 | |
| | | | | | | | | 2,0 < t ≤ 3,0 | 4,0 | |
| | | | | | | | 151 | 3,0 < t ≤ 4,5 | 5,0 | |
| **GWB** R/L **2525 - 60** | ● | ● | 25 | 25 | 25 | 30 | 151 | 4,5 < t ≤ 6,0 | 5,0 | CGA R/L 1506 ○○○ |

Remark: Inserts are not included.

● = Euro stock
❍ = Delivery on request

## Inserts



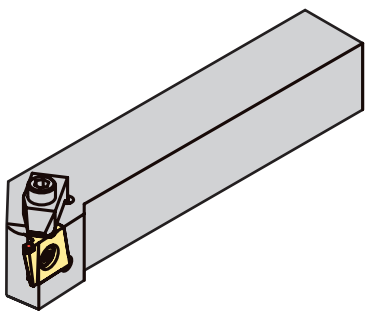

| Cat. No. | Stock | | | | Dimensions (mm) | | | | | Applicable Holder |
|---|---|---|---|---|---|---|---|---|---|---|
| | BN250 | | BNC30G | | | | | | | |
| | R | L | R | L | t (*) | ℓ | r | I.C. | T | |
| **CGA** R/L **1504 150** | ● | ● | ● | ● | 1,5 | 3,5 | 0,2 | 15,875 | 4,76 | GWB R/L 2020 - 45<br>GWB R/L 2525 - 45 |
| **CGA** R/L **1504 200** | ● | ● | ● | ● | 2,0 | | | | | |
| **CGA** R/L **1504 250** | ● | ● | ● | ● | 2,5 | 4,0 | | | | |
| **CGA** R/L **1504 300** | ● | ● | ● | ● | 3,0 | | | | | |
| **CGA** R/L **1504 350** | ● | ● | ● | ● | 3,5 | 5,0 | | | | |
| **CGA** R/L **1504 400** | ● | ● | ● | ● | 4,0 | | | | | |
| **CGA** R/L **1504 450** | ● | ● | ● | ● | 4,5 | | | | | |
| **CGA** R/L **1506 500** | ● | ● | ● | ● | 5,0 | | | | 6,35 | GWB R/L 2525 - 60 |
| **CGA** R/L **1506 550** | ● | ● | ● | ● | 5,5 | | | | | |
| **CGA** R/L **1506 600** | ● | ● | ● | ● | 6,0 | | | | | |

*) Special widths available on request

● = Euro stock

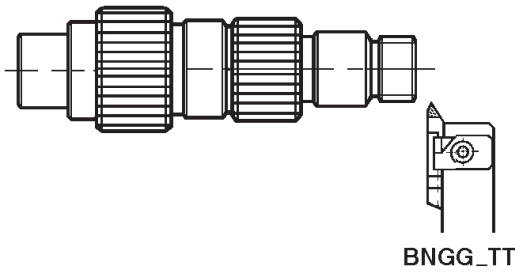
## Spare Parts

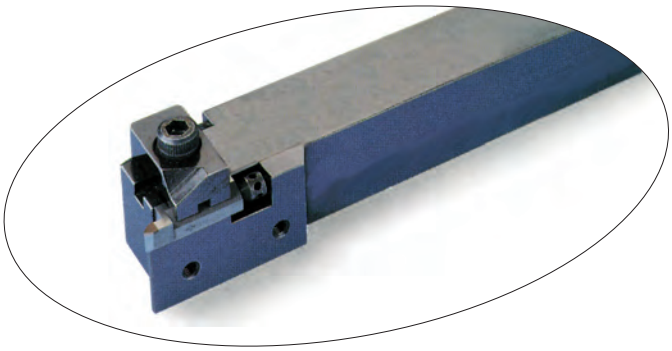
| Holder | Clamp finger | Clamp screw | Insert screw | Spring | Wrench |
|---|---|---|---|---|---|
| |  |  |  |  |  |
| **GWB** R/L **2020 - 45** | TF 72 (Right handed)<br>TF 73 (Left handed) | BX 0520 T | BFTX 0511 N | GSP 06 | TRX 20 |
| **GWB** R/L **2525 - 45** | | | | | |
| **GWB** R/L **2525 - 60** | | | | | |



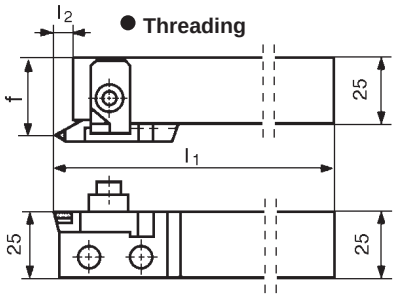
# BNGG Type

For Hardened Steel



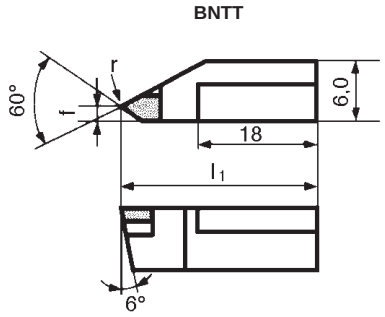



## „Sumiboron“ Holders




| Cat. No. | Stock | | Dimensions (mm) | | | Applicable Insert |
|---|---|---|---|---|---|---|
| | R | L | f | $l_2$ | $l_1$ | |
| **BNGG** R/L **2525-TT** | ● | ❍ | 28,5 | 5 | 150 | BNTT 1020 R/L<br>BNTT 1530 R/L |

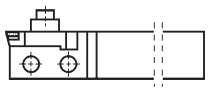
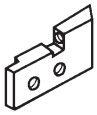
## Inserts




| Cat. No. | Stock | | | | | | Dimensions (mm) | | | | Applicable Holder |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | BN250 | | BN300 | | BNX20 | | | | | | |
| | R | L | R | L | R | L | Pitch | r | $l_1$ | s | |
| **BNTT 1020 R/L** | ● | ❍ | | | ● | ❍ | 1,0 ~ 2,0 | 0,13 | 25 | 6,0 | BNGG R/L 2525 -TT |
| **BNTT 1530 R/L** | ● | ❍ | | | ● | ❍ | 1,5 ~ 3,0 | 0,13 | 25 | 6,0 | |

● Inserts also suitable for existing BNG2525R type holders

## Spare Parts

| Holder | Support | Clamp | Adjust screw | Spring | Screw | Wrench | |
|---|---|---|---|---|---|---|---|
|  |  |  |  |  |  |  |  |
| BNGG R/L 2525 - TT | BNGS R/L TT | BNGC R/L | FMJ | GSP 6 | BX 0615 (for Clamp )<br>BX 0414 (for support) | LH 050<br>LH 030 | ø1,8x45 |

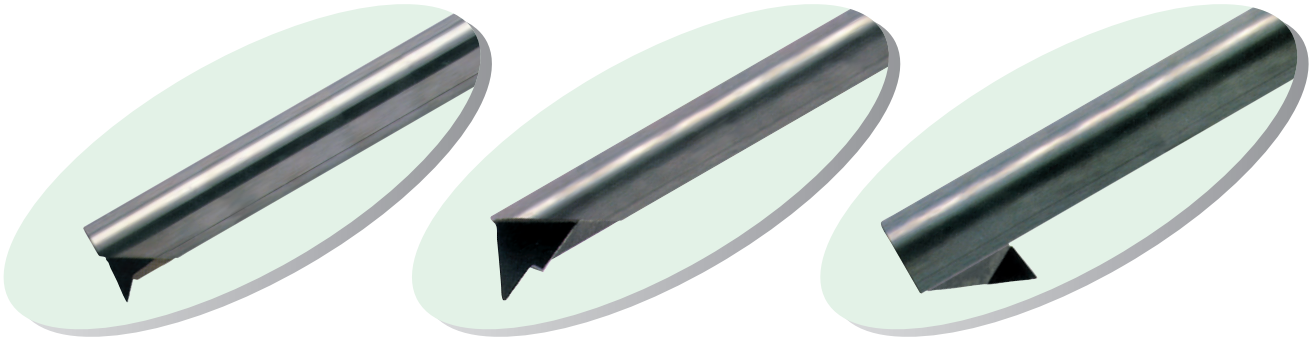
## Recommended Cutting Conditions

● **Threading**

| | |
|---|---|
| Cutting speed ($v_c$) | 80 ~ 120 m/min |
| Feed rate (f) | Max. pitch: 3,0 mm |

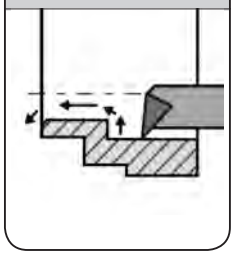
SUMIDIA Small Hole Boring Bars

# DABB Type

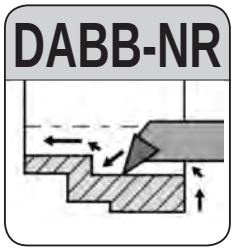


## „Sumidia“ Brazed Boring Tools for Small Hole Boring

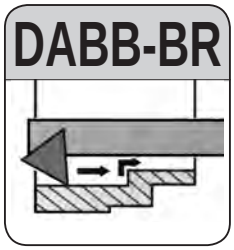
**DABB-CR**

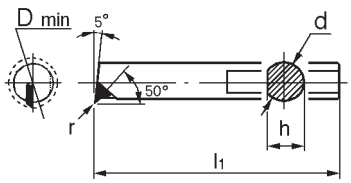
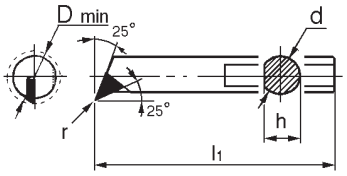
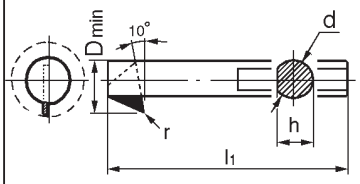


**DABB-NR**



**DABB-BR**

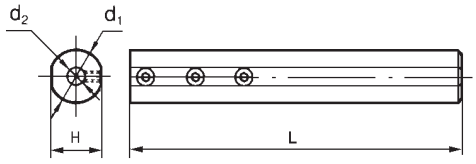


| DABB (Solid carbide shank) | Cat. No. | Stock | Dimensions (mm) | | | | | Applicable Holder |
|---|---|---|---|---|---|---|---|---|
| | | DA2200 | $D_{min}$ | d | $l_1$ | h | r | |
| For small boring   | **DABB 025 CR** | ● | 3,0 | 2,5 | 60 | 2,2 | 0,1 | HBB 2516 |
| | **DABB 035 CR** | ❍ | 4,0 | 3,5 | 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

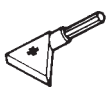
| Spindle revolution | Feed rate | Depth of cut | Coolant |
|---|---|---|---|
| > 2000 rpm | 0,03 ~ 0,1 mm/rev | 0,03 ~ 0,2 mm | Wet |

## 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 |

# RF Type

## High Speed Finishing of Aluminium Alloy

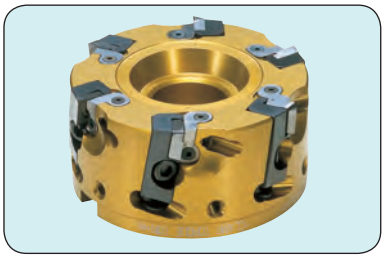


Fig. 1

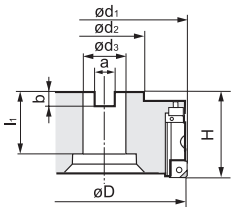



Fig. 2

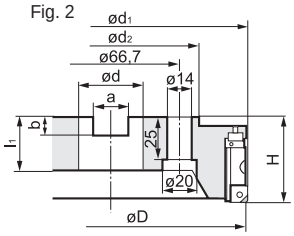
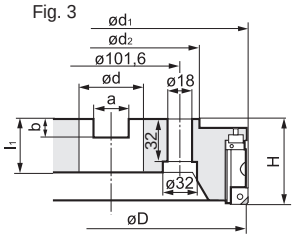



Fig. 3

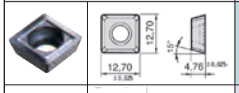
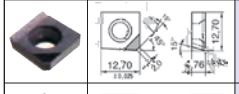
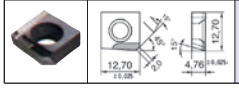



### Body

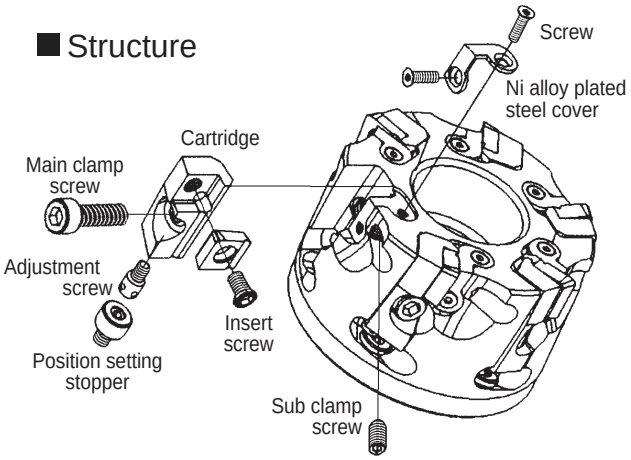
| Type | Cat. No. | Stock | Dimensions (mm) | | | | Mounting | | | | Number of teeth | max. depth of cut | Weight (Kg) | Fig. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | ø D | ø $d_1$ | ø $d_2$ | H | ø $d_3$ | a | b | $l_1$ | | | | |
| RF 4000 | RF 4080 R-S | ● | 80 | 82 | 60 | 50 | 27 | 12,4 | 7,0 | 29 | 6 | 3,0 | 0,7 | |
| | RF 4100 R-S | ● | 100 | 102 | 75 | 50 | 32 | 14,4 | 8,5 | 29 | 6 | | 1,0 | 1. |
| | 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 | |
| | RF 4250 R-S | | 250 | 252 | 130 | 63 | 60 | 25,7 | 14,0 | 38 | 16 | | 6,0 | 3. |
| | 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.

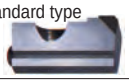
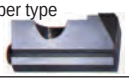
### Insert for Roughing and Finishing

| Shape | Cat. No. | Grade | Stock |
|---|---|---|---|
|  | Carbide insert **SDET 1204 ZDFR** | **H1** | ● |
|  | PCD insert **SNEW 1204 ADFR-NF** | **DA1000**<br>DA2200 | ■<br>▲ |
|  | PCD insert wiper type **SNEW 1204 ADFR-W-NF** | **DA1000**<br>DA2200 | ■<br>▲ |

### Structure




### "Sumidia" Blade

| PCD grade DA2200 | Cat. No. | Stock |
|---|---|---|
| Standard type  | **RFB** | ❍ |
| Wiper type  | **RFBW** | ❍ |

### Dummy Blade

| | | |
|---|---|---|
|  | **RFD** | ❍ |

### Cartridge

| Shape | Cat. No. | Stock |
|---|---|---|
| For carbide insert  | **RFR** | ▲ |
| For Sumidia insert  | **RFF** | ▲ |

●, ■ = Euro stock
❍, ▲ = Delivery on request

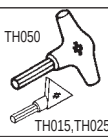
### Cutting Insert Selection

**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 stoper | 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 | TH015, TH025 TH050 | TTX20 |

### Setting Gauge



RF-SET
Dial-gauge is not included.

# High Speed Finishing of Aluminium Alloy



Fig. 1

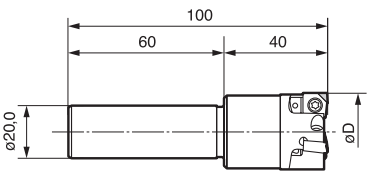
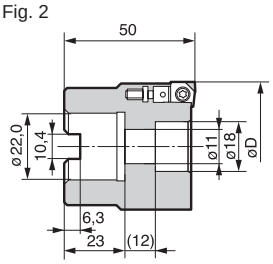



Fig. 2

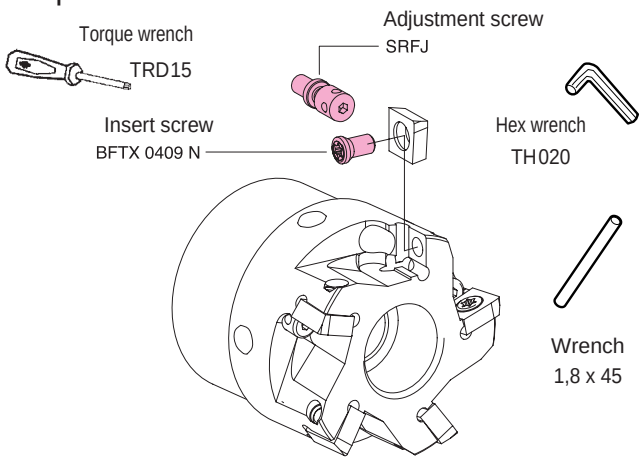



## Body

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

Inserts are sold seperately.
❍ = Delivery on request

## Spare Parts




## Insert

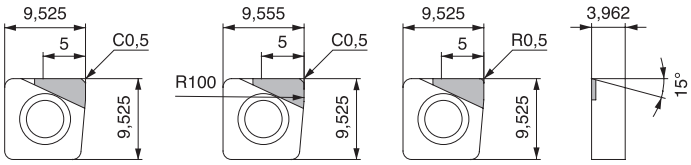



Fig. 1 Fig. 2 Fig. 3

| Cat. No. | Cutting Edge | SUMIDIA DA2200 | Fig |
|---|---|---|---|
| **SNEW 09T3 ADTR-NF** | Standard | ❍ | 1 |
| **SNEW 09T3 ADTR-U-NF** | Wiper | ❍ | 2 |
| **SNEW 09T3 ADTR-R-NF** | Nose Radius | ❍ | 3 |

❍ = Delivery on request

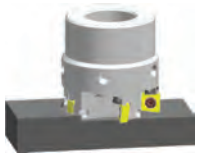
- Standard inserts and Wiper inserts can be used on the same cutter body.
- Standard inserts with nose radius should be used where vibration is present. As such, Wiper-inserts will not be applicable.
- Inserts can be regrind 3 times (up to minimum IC diameter 9,225mm).
- When using reground inserts, it is advisable to reconfirm insert height and cutting diameter with a tool pre-setter.
- Do not mix new and reground inserts, or even inserts with different regrind amount on the same cutter.

## 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.

| 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

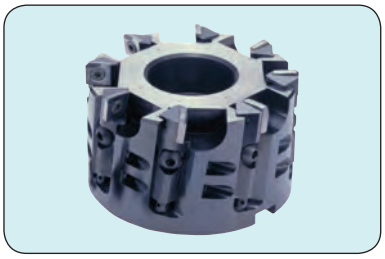


## Recommended Cutting Conditions for RF and SRF Type Cutters

| Work Material | | 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 | – | | | |

# FMU Type

## High Speed Finishing of Grey Cast Iron



### Features

- High speed machining $v_c$ = **1.500** m/min
- Excellent surface roughness Rz=3,2 (Ra=1,0)
- Safety structure for the centrifugal force under high speed cutting conditions
- Run-out is less than 10µm
- 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

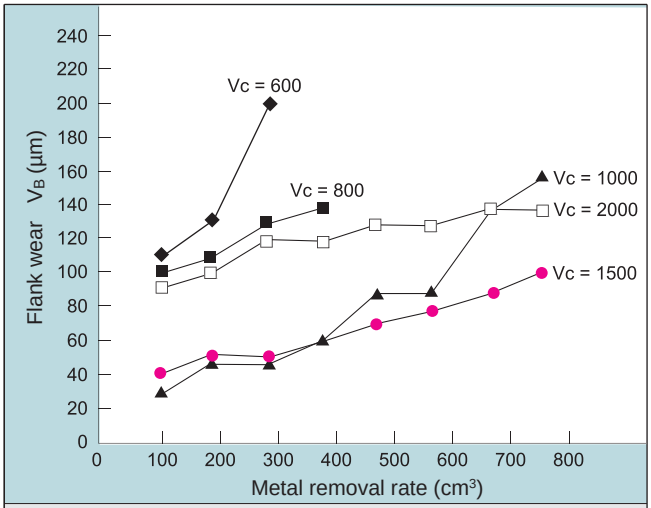
FMU Type: ø80 ~ ø315 mm
Insert: SNEW1203ADTR/L
Low cutting force type: SNEW1203ADTR/L-S

### Recommended Cutting Conditions

Speed: $v_c$ = 800 ~ 2000 m/min
Feed: $f_t$ = 0,1 ~ 0,3 mm/tooth
Depth: $d_{oc}$ = 0,5 mm or less
Dry cutting

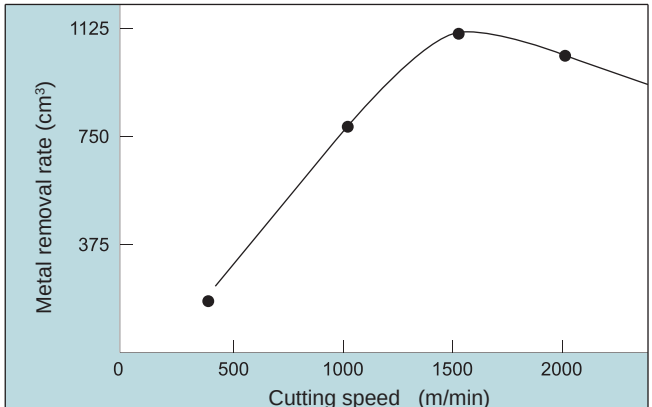
### Performance

● Tool Life Diagram




Work material : GG25 $H_B$240 (Pearlite)
Cutting speed : $v_c$ = 600 ~ 4000 m/min
Feed rate : $f_t$ = 0,15 mm/tooth
Depth of cut : $d_{oc}$ = 0,5 mm, Dry

● Estimated Tool Life



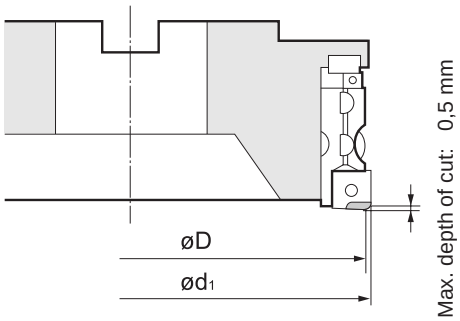

Work material : GG25 $H_B$240 (Pearlite)
Cutting speed : $v_c$ = 400 ~ 4000 m/min
Feed rate : $f_t$ = 0,15 mm/tooth
Depth of cut : $d_{oc}$ = 0,5 mm, Dry

- 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.

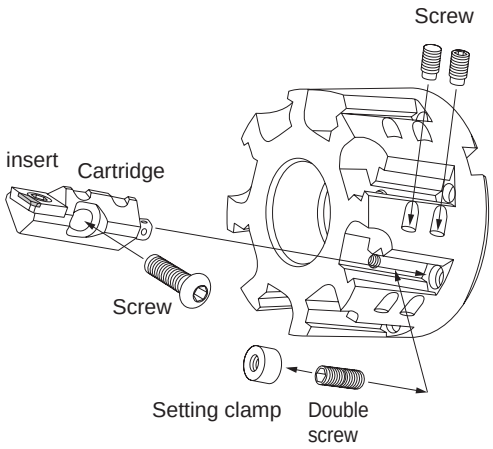
# FMU Type

## Specifications

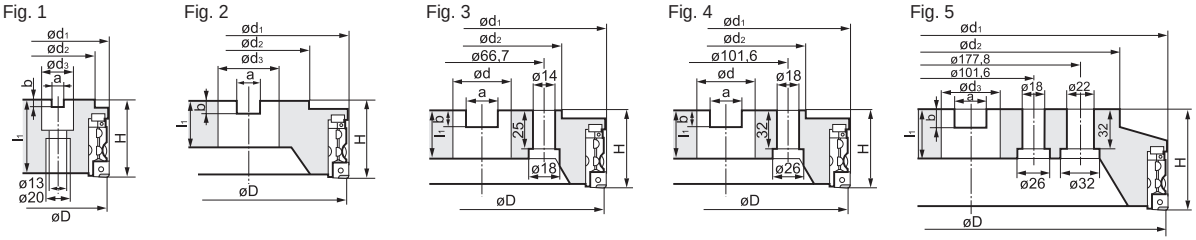
Approach angle: 90°
Axial rake angle: + 8°
Radial rake angle: + 2°




## Structure



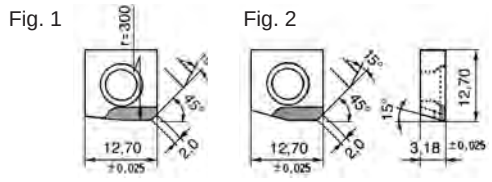

## Body




| Type | Cat. No. | Stock R | Stock L | Dimensions (mm) ø D | ø d1 | ø d2 | H | Mounting ø d3 | a | b | l1 | Number of teeth | max. depth of cut | Weight (Kg) | Fig. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 | |
| | **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 | 24 | | 27,8 | 5. |

● = Euro stock
❍ = Delivery on request

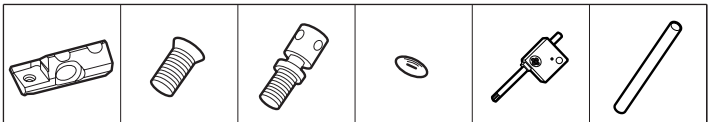
## Inserts




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

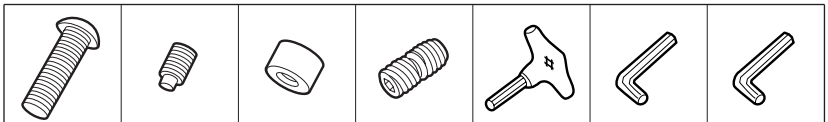
● = Euro stock

## Cartridge



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

## Spare Parts



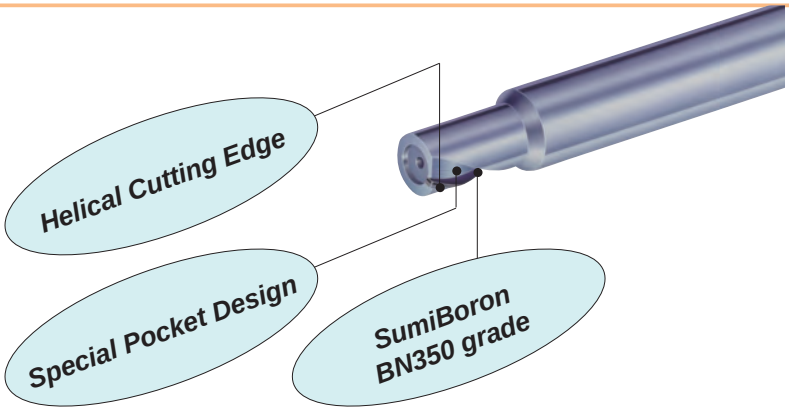
| Screw | Screw | Setting clamp | Double screw | Wrench | Wrench | Wrench |
|---|---|---|---|---|---|---|
| BH0620 | BTD0609 | FMUE | WB5-10 | TH040 | LH030 | LH025 |

## Gauge

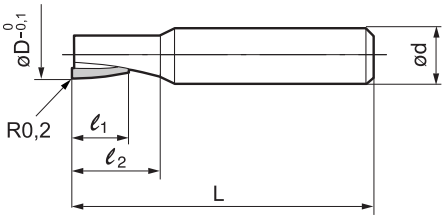


RF-SET
Dial-gauge is not included.






## ■ Endmills BNES Type with 1 Spiral Flute



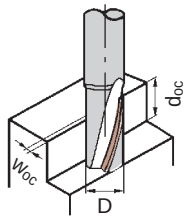

Helix angle : 15°
right-hand cut, right-hand helix

| Cat. No. | Stock | Dimensions (mm) | | | | |
|---|---|---|---|---|---|---|
| | BN350 | øD | ød | $\ell_1$ | $\ell_2$ | 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 |

❍ = Delivery on request

## ■ Recommended Cutting Conditions

Cutting speed: $v_c$ (m/min), Spindle revolutions: n (rpm), Feed per tooth: $f_t$ (mm/tooth), Feed speed: $v_f$ (mm/min)

| Tooling example | ø D | Hardened steel ($H_RC$ 50 ~ 57) $v_c$ = 100 ~ 170 m/min | | | Hardened steel ($H_RC$ 58 ~ 65) $v_c$ = 80 ~ 150 m/min | | |
|---|---|---|---|---|---|---|---|
|  | ø 6 ~ 8 | $w_{oc}$ ≤ 0,1 mm | n = 4000 ~ 9000 | $v_f$ (mm/min) = 240 ~ 540 | $w_{oc}$ ≤ 0,08 mm | n = 3200 ~ 8000 | $v_f$ (mm/min) = 150 ~ 370 |
| | ø 10 ~ 12 | $w_{oc}$ ≤ 0,15 mm | n = 2700 ~ 5400 | $v_f$ (mm/min) = 180 ~ 360 | $w_{oc}$ ≤ 0,12 mm | n = 2100 ~ 4800 | $v_f$ (mm/min) 120 ~ 270 |
| | ø 14 ~ 16 | $w_{oc}$ ≤ 0,2 mm | n = 2000 ~ 3800 | $v_f$ (mm/min) = 140 ~ 260 | $w_{oc}$ ≤ 0,15 mm | n = 1600 ~ 3400 | $v_f$ (mm/min) = 110 ~ 230 |

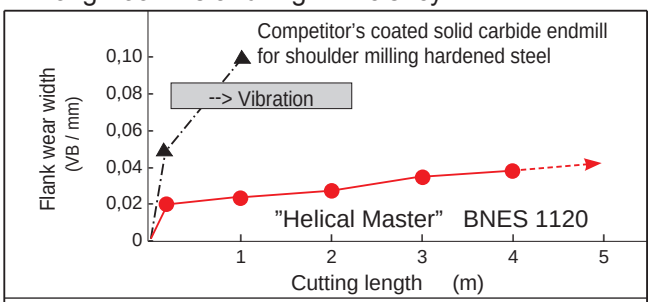


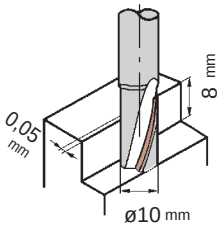
Depth of cut : $d_{oc}$ ≤ D

Recommendation: Dry cutting (Air coolant)
Down-cut milling
Minimise the overhang
Use a rigid machine

## ■ Performance

### ● Long Tool Life and High Efficiency



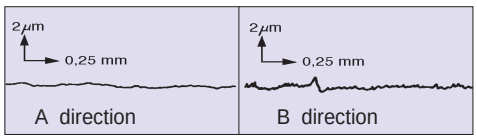

Work material: X155CrVMo12-1
Hardness: $H_RC$ 60

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

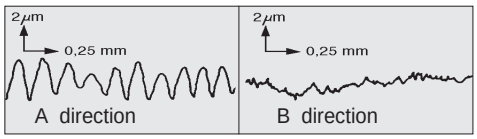
Down-cut milling
Dry cutting

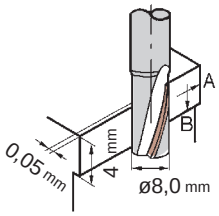
### ● Excellent Surface Roughness

"**Helical Master**" **BNES 1080** ø 8,0




Conventional straight flute CBN endmill, ø 8,0

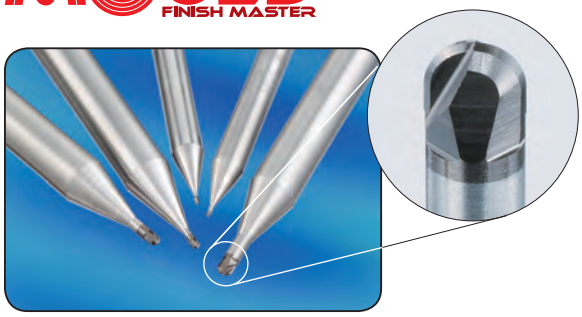



Work material: 15Cr3
Hardness: $H_RC$ 55~58
Cutting data: $v_c$ = 130 m/min
$v_f$ = 310 mm/min

Down-cut milling
Dry cutting

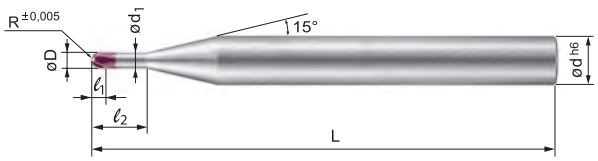
# SUMIBORON "MOULD Finish Master" BNBP



## Characteristics / Application

- High precision machining of hardened steels < HRC70 with long tool life
- Super tough grade SUMIBORON BN350 prevents chipping of the cutting edge
- R accuracy : ±0,005mm

## Endmills




※ Endmill Identification

BNBP 2 R020 - 012 4

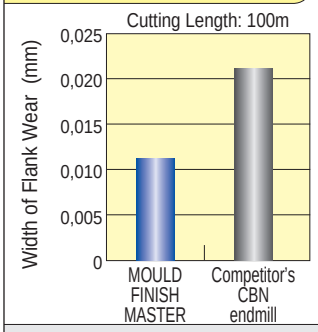
- MOULD FINISH MASTER
- Number of teeth
- Radius of ball nose
- Neck length ($\ell_2$)
- Shank Diam.

| | Cat. No. | Stock | Dimensions (mm) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | BN350 | R | øD | L | ød1 | ød | ℓ1 | ℓ2 |
| 4,0 mm (Shank Diam.) | BNBP 2 R020-012 4 | ● | 0,2 | 0,4 | 50 | 0,37 | 4 | 0,3 | 1,2 |
| | BNBP 2 R030-015 4 | ● | 0,3 | 0,6 | 50 | 0,57 | 4 | 0,4 | 1,5 |
| | BNBP 2 R050-025 4 | ● | 0,5 | 1,0 | 50 | 0,97 | 4 | 0,6 | 2,5 |
| | BNBP 2 R075-040 4 | ● | 0,75 | 1,5 | 50 | 1,47 | 4 | 0,9 | 4,0 |
| | BNBP 2 R100-055 4 | ● | 1,0 | 2,0 | 50 | 1,97 | 4 | 1,4 | 5,5 |
| 6,0 mm (Shank Diam.) | BNBP 2 R020-012 6 | ● | 0,2 | 0,4 | 50 | 0,37 | 6 | 0,3 | 1,2 |
| | BNBP 2 R030-015 6 | ● | 0,3 | 0,6 | 50 | 0,57 | 6 | 0,4 | 1,5 |
| | BNBP 2 R050-025 6 | ● | 0,5 | 1,0 | 50 | 0,97 | 6 | 0,6 | 2,5 |
| | BNBP 2 R075-040 6 | ● | 0,75 | 1,5 | 50 | 1,47 | 6 | 0,9 | 4,0 |
| | BNBP 2 R100-055 6 | ● | 1,0 | 2,0 | 50 | 1,97 | 6 | 1,4 | 5,5 |

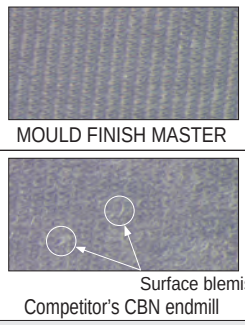
● = Euro stock

## Performance

### Wear Resistance

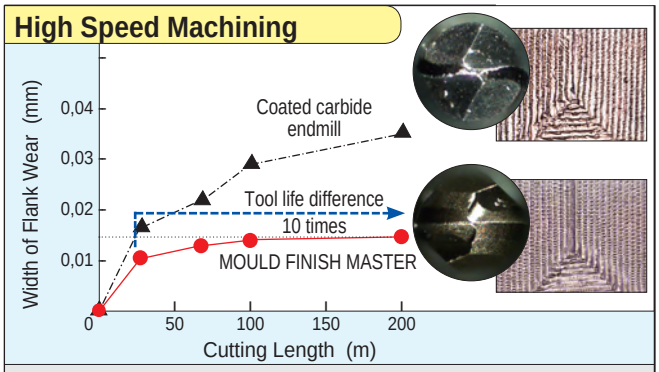



### Machined Surface




R1,0 Ball endmill, Cutting data: Work material: X155CrVMo12-1 ($H_RC60$)
n = 20.000 rpm, $f_t$ = 0,05 mm/tooth ($v_f$ = 2.000mm/min)
$d_{oc}$ = 0,05 mm, $w_{oc}$ = 0,05 mm, Air blast

### High Speed Machining




R1,0 Ball endmill, Cutting data: Work material: X155CrVMo12-1 ($H_RC60$)
n = 40.000 rpm, $f_t$ = 0,05 mm/tooth ($v_f$ = 4.000mm/min)
$d_{oc}$ = 0,05 mm, $w_{oc}$ = 0,05 mm, Oil mist

● Excellent surface finish compared with competitor's CBN and coated carbide endmills

## Recommended Cutting Conditions

Spindle revolutions: N (rpm), Feed rate per tooth: $f_t$ (mm/tooth), Depth of cut: $d_{oc}$ (mm), Wide of cut: $w_{oc}$ (mm)

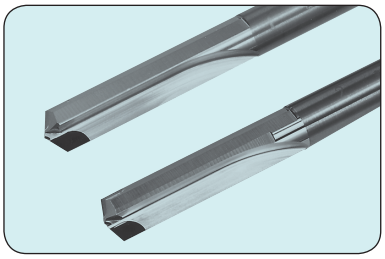
| Material / Cutting data / Radius (mm) | Pre-hardened steel, Die steel ( ~ HRC52) | | | | Die steel ( ~ HRC62) | | | | High speed tool steel ( ~ HRC70) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | n (rpm) | $f_t$ (mm/tooth) | $d_{oc}$ (mm) | $W_{oc}$ (mm) | n (rpm) | $f_t$ (mm/tooth) | $d_{oc}$ (mm) | $W_{oc}$ (mm) | n (rpm) | $f_t$ (mm/tooth) | $d_{oc}$ (mm) | $W_{oc}$ (mm) |
| R 0,2 | 20.000~50.000 | 0,02 | 0,03 | 0,03 | 20.000~50.000 | 0,02 | 0,01 | 0,02 | 20.000~50.000 | 0,015 | 0,01 | 0,02 |
| R 0,3 | 20.000~50.000 | 0,02 | 0,03 | 0,03 | 20.000~50.000 | 0,02 | 0,01 | 0,02 | 20.000~50.000 | 0,015 | 0,01 | 0,02 |
| R 0,5 | 20.000~50.000 | 0,03 | 0,05 | 0,05 | 20.000~50.000 | 0,03 | 0,03 | 0,04 | 20.000~50.000 | 0,02 | 0,02 | 0,03 |
| R 0,75 | 20.000~50.000 | 0,04 | 0,08 | 0,1 | 20.000~50.000 | 0,04 | 0,05 | 0,05 | 20.000~50.000 | 0,03 | 0,02 | 0,05 |
| R 1,0 | 20.000~50.000 | 0,05 | 0,1 | 0,1 | 17.000~50.000 | 0,05 | 0,05 | 0,05 | 17.000~50.000 | 0,03 | 0,03 | 0,05 |




## Important Notes

(1) For stable machining, a more rigid machine is recommended.
(2) Air blast or oil mist coolant is recommended.
(3) Shorten overhang as much as possible.

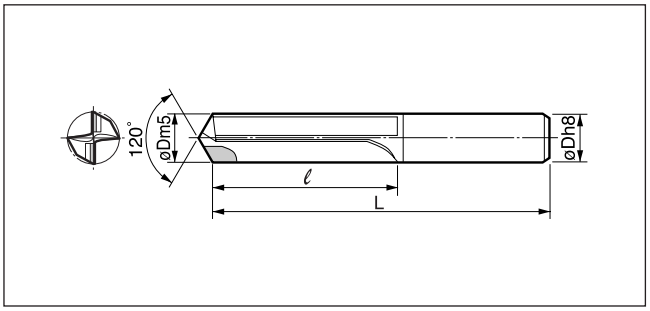
# DAL/DDL/DML Type



**From general to High Precision Drilling of Aluminum Alloys!**

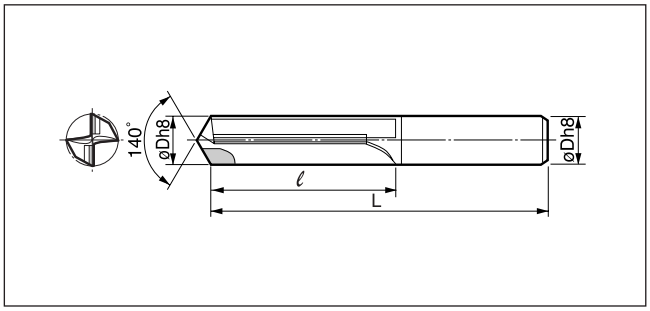
- High precision DAL type is able to produce holes of IT Class of 7~8.
- General DDL type is able to produce holes of IT class of 11~12, mainly for drilling of pre-tap holes.
- DML type is DDL type with a chamfer edge, incorporating 2 processes in one operation.

## DAL Type




| Cat. No. | Stock DA2200 | øD | L | ℓ |
|---|---|---|---|---|
| DAL 0500H ~ 0600H | | ø5 ≤ D ≤ ø6 | 80 | 30 |
| DAL 0601H ~ 0700H | | ø6 < D ≤ ø7 | 90 | 35 |
| DAL 0701H ~ 0800H | | ø7 < D ≤ ø8 | 90 | 35 |
| DAL 0801H ~ 0900H | | ø8 < D ≤ ø9 | 100 | 40 |
| DAL 0901H ~ 1000H | | ø9 < D ≤ ø10 | 100 | 40 |
| DAL 1001H ~ 1100H | | ø10 < D ≤ ø11 | 110 | 50 |
| DAL 1101H ~ 1200H | | ø11 < D ≤ ø12 | 110 | 50 |

## DDL Type




| Cat. No. | Stock DA2200 | øD | L | ℓ |
|---|---|---|---|---|
| DDL 050V ~ 060V | | ø5 ≤ D ≤ ø6 | 80 | 30 |
| DDL 061V ~ 070V | | ø6 < D ≤ ø7 | 90 | 35 |
| DDL 071V ~ 080V | | ø7 < D ≤ ø8 | 90 | 35 |
| DDL 081V ~ 090V | | ø8 < D ≤ ø9 | 100 | 40 |
| DDL 091V ~ 100V | | ø9 < D ≤ ø10 | 100 | 40 |
| DDL 101V ~ 110V | | ø10 < D ≤ ø11 | 110 | 50 |
| DDL 111V ~ 120V | | ø11 < D ≤ ø12 | 110 | 50 |

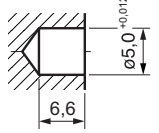
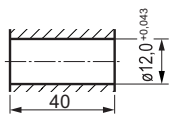
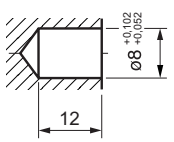
## Recommended Conditions

| | Cutting Speed (m/min) | Feed Rate (mm/rev) | Drilling Length L/D | Oil |
|---|---|---|---|---|
| øD < 8 | 80 ~ 250 | 0,05 ~ 0,2 | Below 3 x D | Water soluble |
| 8 ≤ øD | | 0,1 ~ 0,3 | | |

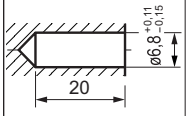
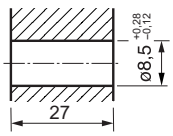
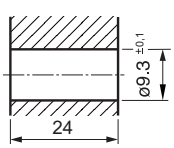
## Important Notes

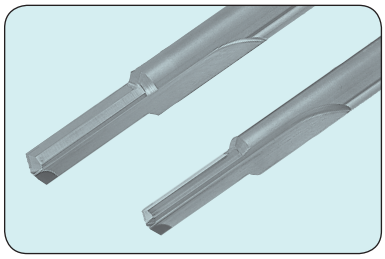
- Select a high rigidity machine and high precison tool holder.
- Enough coolant to drilled hole.

## Application Examples (DAL Type)

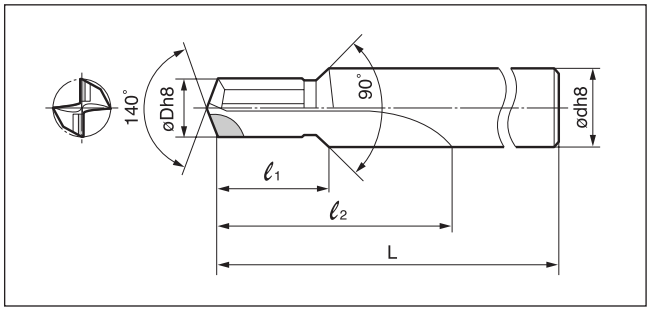
| Work Shape | Work | Conditions | Results |
|---|---|---|---|
|   | A390<br>High silicon Aluminum | Vc=100m/min<br>f=0,1mm/rev | • Holes by carbide drill was out of specifications after 2.000 holes/reg.<br>• SumiDia drill could drill up to 30.000 holes/reg.<br>• 15 times tool life that of carbide drills. |
|   | A390<br>High silicon Aluminum<br>(pre-cast hole of ø10) | Vc=120m/min<br>f=0,12mm/rev | • Average 40,000 holes/reg<br>• Surface roughness Ry = 1µm |
|   | ADC10<br>Aluminum Die Cast | Vc=90m/min<br>f=0,08mm/rev | • More than 50.000 holes and still running |

## Application Examples (DDL Type)

| Work Shape | Work | Conditions | Results |
|---|---|---|---|
|   | ADC12<br>Aluminum Die Cast<br>M8 Pre-tap holes | Vc=214m/min<br>f=0,14mm/rev | • Regrind after 100.000 holes |
|   | ADC12<br>Aluminum Die Cast | Vc=200m/min<br>f=0,17mm/rev | • Regrind after 74.000 holes (2.000m) (Preset tool change) |
|   | AC2A<br>Aluminum Casting | Vc=234m/min<br>f=0,28mm/rev | • Regrind after 80.000 holes (Preset tool change) |

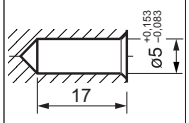
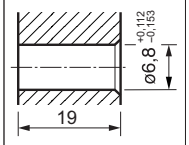
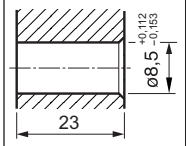


## ■ DML Type

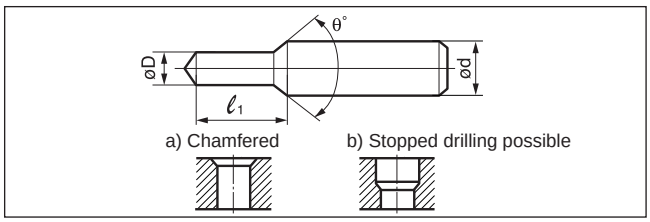



| Applicable Tap Size | Cat. No. | Stock DA2200 | øD | ød | L | ℓ1 | ℓ2 |
|---|---|---|---|---|---|---|---|
| M6 | **DML 050V** | | 5 | 8 | 90 | 18 | 36 |
| M8 | **DML 068V** | | 6,8 | 10 | 104 | 24 | 48 |
| M10 | **DML 085V** | | 8,5 | 12 | 122 | 30 | 60 |
| M12 | **DML 103V** | | 10,3 | 14 | 136 | 36 | 72 |

## ■ Application Examples (DML Type)

| Work Shape | Work | Conditions | Results |
|---|---|---|---|
|   | AC4C-T6<br>Aluminum Casting<br>M6 Pre-tap holes | Vc=100m/min<br>f=0,1mm/rev<br>m/c=6 spindles | • Regrind after 150.000 holes<br>• Tool life for carbide drill is 500 holes.<br>• 30 times tool life that of carbide drills |
|   | AC2C-T2<br>Aluminum Casting<br>M8 Pre-tap holes | Vc=210m/min<br>f=0,15mm/rev | • 100.000 holes/reg (2.000m) and still running.<br>• Dilling and chamfering in the same process |
|   | AC4C-T6<br>Aluminum Casting<br>M10 Pre-tap holes | Vc=250m/min<br>f=0,2mm/rev | • 80.000 holes/reg (1,840m) and still running.<br>• Drilling and chamfering in the same process |

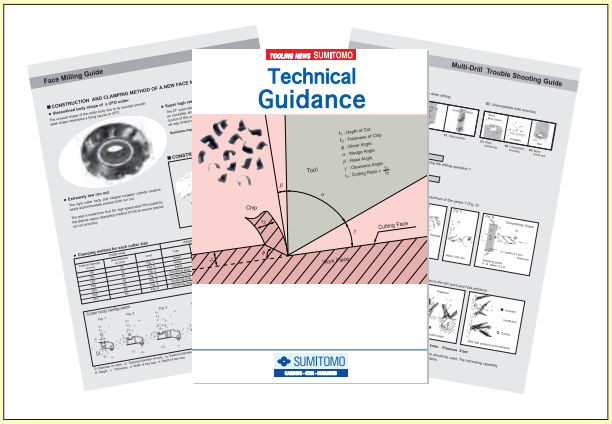
## ■ DML Type Possible Profiles




(1) Tolerance for dimension L is more than 0,2mm.
(2) θ° is less than 180°.

# Technical Guidance References

**N1 - N24**







**Basics of Turning** ..... N 2
Tool Failures and Remedies ..... N 3 - 4
Chip Control..... N 5

**Basics of Milling** ..... N 6 - 8
Tool Failures and Remedies..... N 9

**Basics of Endmilling** ..... N10-11
Tool Failures and Remedies..... N12

**Basics of Drilling** ..... N13-15
Tool Failures and Remedies..... N16

**SUMIBORON for**
Hardened Steel Machining ..... N17
Cast Iron Machining ..... N18
Hard-to cut Materials Machining ..... N19
Tool Failure and Remedies ..... N20

**References**
Steel and Non-Ferrous Metal Symbols Chart .... N21
Hardness Scale Comparison Chart..... N22
Finished Surface Roughness ..... N23

# Basics of Turning

## Calculating Power Requirement

$$P_c = \frac{d_{oc} \cdot f \cdot v_c \cdot K_c}{60 \times 10^3 \times \eta}$$

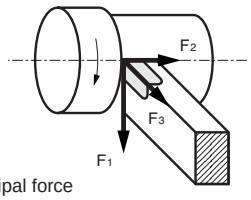
$$H = \frac{W}{0{,}75}$$

$P_c$ : Net power requirement (KW)
$v_c$ : Cutting speed (m/min)
$f$ : Feed rate (mm/rev)
$d_{oc}$ : Depth of cut (mm)
$\eta$ : Machine efficiency (0,70 ~ 0,85)
$K_c$ : Specific cutting force (N/mm²)
$H$ : Required horsepower (HP)

### Rough value of specific cutting force ($K_c$)

| | |
|---|---|
| General steel : | 2.500 ~ 3.000 N/mm² |
| Cast iron : | 1.500 N/mm² |
| Aluminum : | 800 N/mm² |

## Cutting Force



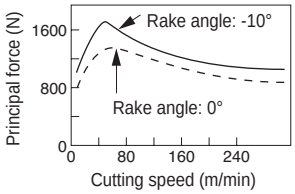

$F_1$ : Principal force
$F_2$ : Feed force
$F_3$ : Back force

### Calculating cutting force

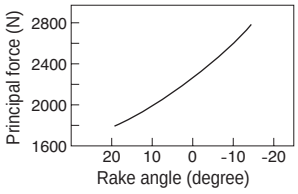
$F = K_c \cdot q$

P : Cutting force (N)
$K_c$ : Specific cutting force (N/mm²)
q : Chip area (mm²)

## Cutting Speed and Cutting Force




## Rake Angle and Cutting Force




## Calculating Cutting Speed

### ① Calculating rotational speed from cutting speed

$$n = \frac{1000 \cdot v_c}{\pi \cdot D}$$

n : Rotational speed (min⁻¹)
$v_c$ : Cutting speed (m/min)
D : Diameter of workpiece (mm)
$\pi \approx 3{,}14$

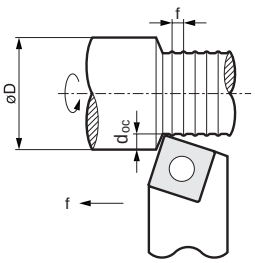
(Eg.) $v_c$ =150m/min, D=100mm

$$n = \frac{1000 \times 150}{3{,}14 \times 100} = 478 \text{ (min}^{-1}\text{)}$$

### ② Calculating cutting speed from rotational speed

$$v_c = \frac{\pi \cdot D \cdot n}{1.000}$$

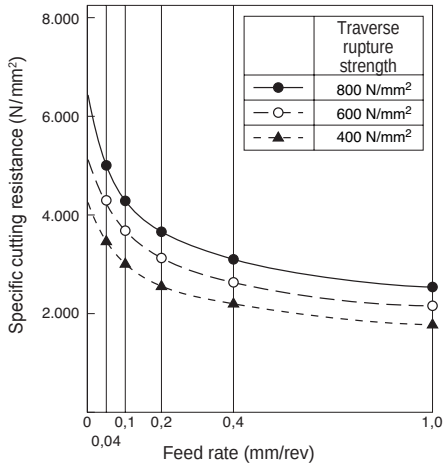
Refer to the above table




n : Rotational speed (min⁻¹)
$v_c$ : Cutting speed (m/min)
f : Feed rate (mm/rev)
$d_{oc}$ : Depth of cut (mm)
D : Diameter of workpiece (mm)

## Feed Rate and Specific Cutting Force

(For carbon steel)

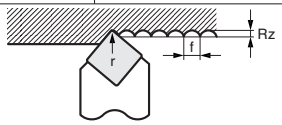



**When feed rate decreases, specific cutting force increases.**

## Theoretical Surface Finish

$$Rz = \frac{f^2}{8r}$$

Rz : Surface finish (mm)
f : Feed rate (mm/rev)
r : Nose radius (mm)



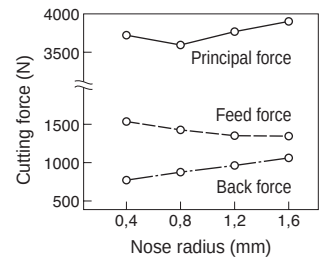

### Actual surface roughness

Steel :
Theoretical surface finish x 1,5 ~ 3
Cast iron :
Theoretical surface finish x 3 ~ 5

## Ways to Improve Surface Finish

① Use an insert with a larger nose radius.
② Optimize the cutting speed and feed rate so that built-up edge does not occur.
③ Select an appropriate insert grade.
④ Use wiper insert.

## Nose Radius and Cutting Force

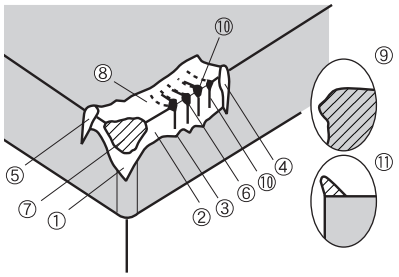



**Large nose radius increases back force.**

Work : 42CrMo4 (Hs38)
Inserts : TNGA2204○○
Holder : PTGNR2525-43
Condition : $v_c$ =100m/min
$d_{oc}$ =4mm
f =0,45mm/rev

# Tool Failures and Tool Life

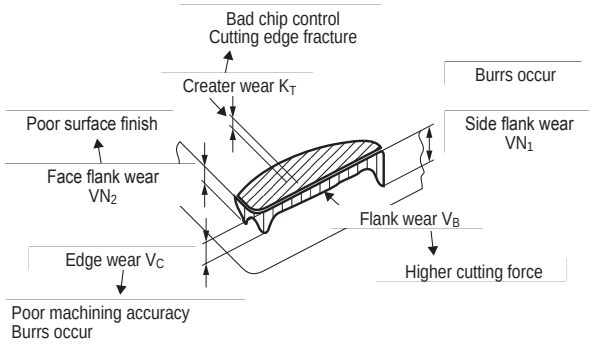
## ■ Forms of Tool Failures

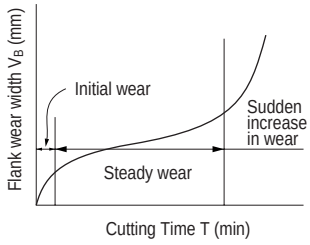
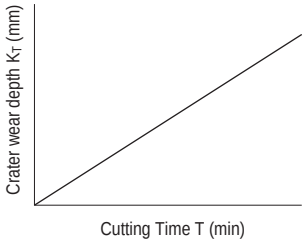



| Cat. | No. | Name of Failure | Cause of Failure |
|---|---|---|---|
| Resulting from Mechanical causes | 1~5 | Flank Wear | Due to the scratching effect of hard grains contained in the work material. |
| | 6 | Chipping | Fine breakages caused by high cutting loads or chattering. |
| | 7 | Fracture | Due to the impact of an excessive mechanical force acting on the cutting edge. |
| Resulting from Chemical reactions | 8 | Crater Wear | Swaft chips removing tool material as it flow over the top face at high temperatures. |
| | 9 | Plastic Deformation | Cutting edge is depressed due to softening at high temperatures. |
| | 10 | Thermal Crack | Fatigue from rapid, repeated heating and cooling cycles during machining. |
| | 11 | Built-up Edge | Work material is pressure welded on the top face of the cutting edge. |

## ■ Tool Wear

### Forms of Tool Wear

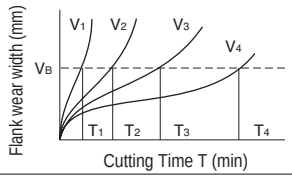
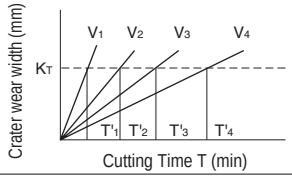
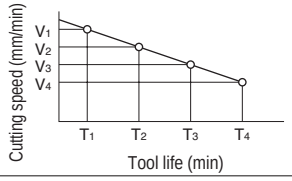
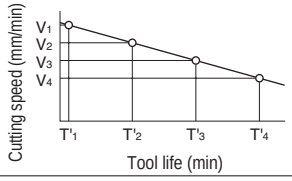



| Flank wear | Crater wear |
|---|---|
|  |  |
| Wear is rapid initially, then it proceeds more gradually in proportion with cutting time until a certain limit, beyond which it increases rapidly again. | Crater wear is more progressive with no sudden breakdown pattern. |



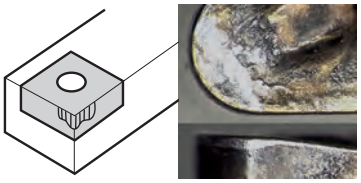
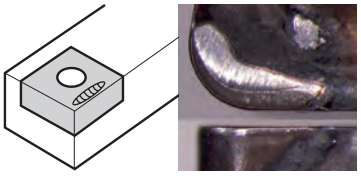
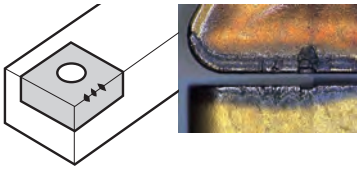
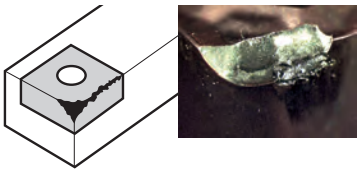
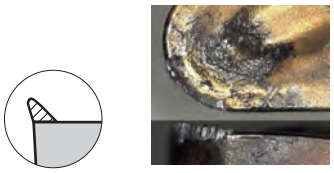
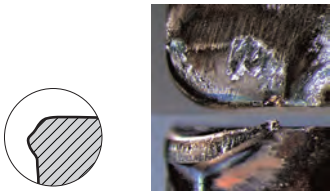
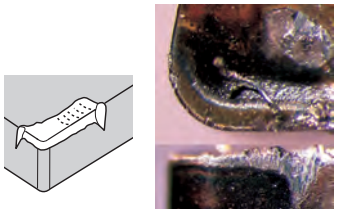
## ■ Tool Life (V-T)

Measure the relative tool lives of the specified wear, over a range of cutting speeds, then plot the tool life along the X-axis and the cutting speed along the Y-axis on a double logarithm graph.

| | Flank wear | Crater wear |
|---|---|---|
| Tool wear |  |  |
| Tool life |  |  |

# Tool Failure and Remedies

## ■ Trouble Shooting Guide for Turning

| | Damage | | Countermeasures |
|---|---|---|---|
| Tool Edge Failure | Excessive flank wear  | Tool grade | - Select a wear resistant grade.<br>P30 ⇨ P20 ⇨ P10<br>K20 ⇨ K10 ⇨ K05 |
| | | Tool geometry | - Use an insert with a larger rake angle. |
| | | Cutting condition | - Decrease the cutting speed. |
| | Excessive crater wear  | Tool grade | - Select a more crater-resistant grade. |
| | | Tool geometry | - Use an insert with a larger rake angle.<br>- Select an appropriate chipbreaker. |
| | | Cutting condition | - Decrease the cutting speed.<br>- Decrease the D.O.C. and Feed rate. |
| | Cutting edge chipping  | Tool grade | - Change to tougher grades.<br>P10 ⇨ P20 ⇨ P30<br>K01 ⇨ K10 ⇨ K20 |
| | | Tool geometry | - If caused by Built-up-edge, select a tool grade which is less susceptible to adhesion such as Cermet.<br>- Increase honing width to reinforce cutting edge.<br>- Reduce rake angle. |
| | | Cutting condition | - If caused by Built-up-edge, increase cutting speed. |
| | Cutting edge fracture  | Tool grade | - Change to tougher grades.<br>P10 ⇨ P20 ⇨ P30<br>K01 ⇨ K10 ⇨ K20 |
| | | Tool geometry | - Select a chipbreaker with a strong cutting edge.<br>- Select a holder with a larger approach angle.<br>- Select a holder with a larger shank size. |
| | | Cutting condition | - Decrease the D.O.C. and Feed rate. |
| | Build-up edge  | Tool grade | - Select a more adhesion-resistant grade. |
| | | Cutting condition | - Increase cutting speed and feedrate.<br>- Supply cutting fluid. |
| | Plastic deformation  | Tool grade | - Select a more heat resistant grade. |
| | | Cutting condition | - Decrease cutting speed and feed rate. |
| | Notch wear  | Tool grade | - Select a wear resistant grade.<br>P30 ⇨ P20 ⇨ P10<br>K20 ⇨ K10 ⇨ K05<br>- Select a grade with a smooth coating. |
| | | Tool geometry | - Select an appropriate chipbreaker. |
| | | Cutting condition | - Alter depth of cutto shift the notch location. |

# Chip Control

## Type of Chip Generation

| | a | b | c | d |
|---|---|---|---|---|
| Shape |  |  |  |  |
| Condition | Continuous chips with good surface finish. | Chip is sheared and separated by the shear angle. | Chips appear to be torn from the surface. | Chips crack before reaching the cutting point. |
| Application | Steel, Stainless steel | Steel, Stainless steel (Low speed) | Steel, Cast iron (Very low speed, very small feedrate) | Cast iron, Carbon |
| Influence factor | Easy ← Work deformation → Difficult | | | |
| | Large ← Rake angle → Small | | | |
| | Small ← D.O.C. → Large | | | |
| | Fast ← Cutting speed → Slow | | | |

## Type of Chip Control

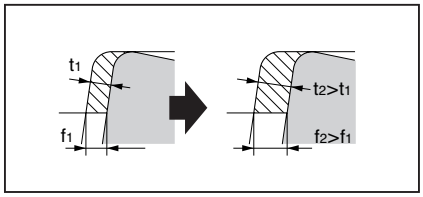
| Feed rate | A | B | C | D | E |
|---|---|---|---|---|---|
| Large feed rate |  |  |  |  |  |
| Small feed rate |  |  |  |  |  |
| NC lathe (For automation) | × | × | ○ | ○ | △ |
| General lathe (For safety) | × | ○ | ○ | ○ ~ △ | × |

Good : C type, D type

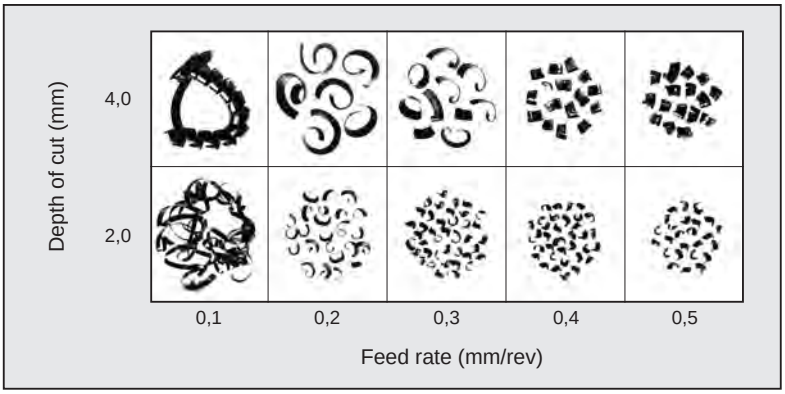
Poor
- A type : Twines around the tool or workpiece, damages the machined surface and affects safety.
- B type : Bulky, causes problems in the automatic chip conveyor and chipping occurs easily.
- E type : Causes spraying of chips, poor machined surface due to chattering, chipping, large cutting force and high temperatures.

## Factor of Improvement Chip Control

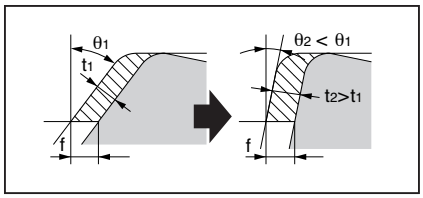
### ① Increase feed rate



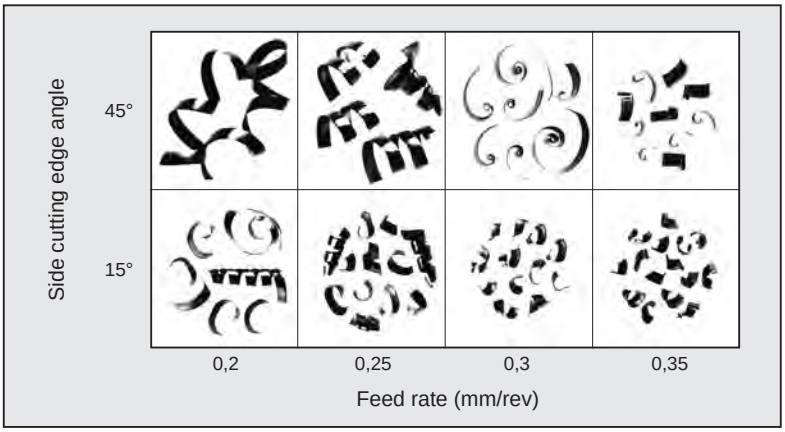

When feedrate increase, chips become thick and chip control improves.



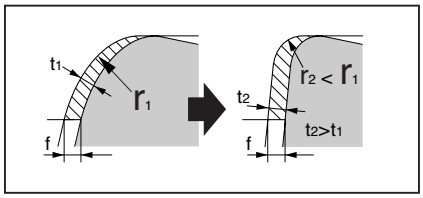

### ② Decrease side cutting edge




Even if feedrate is the same, smaller side cutting edge angle makes chips thick and chip control improves.

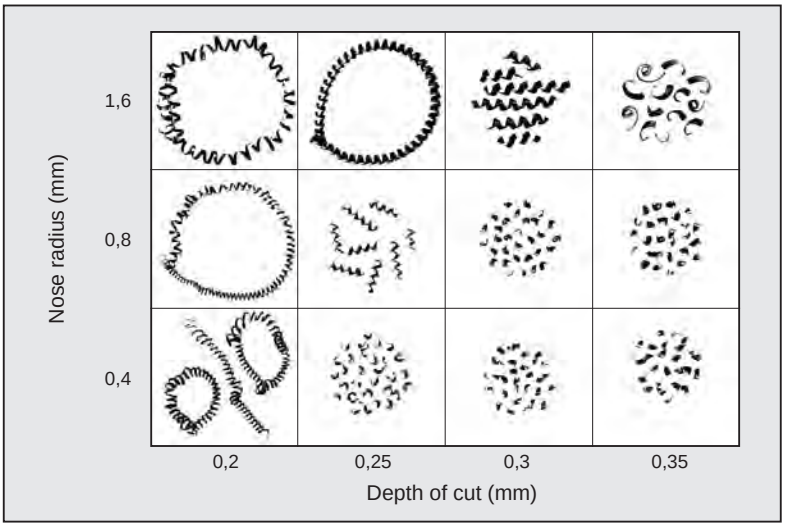



### ③ Decrease nose radius



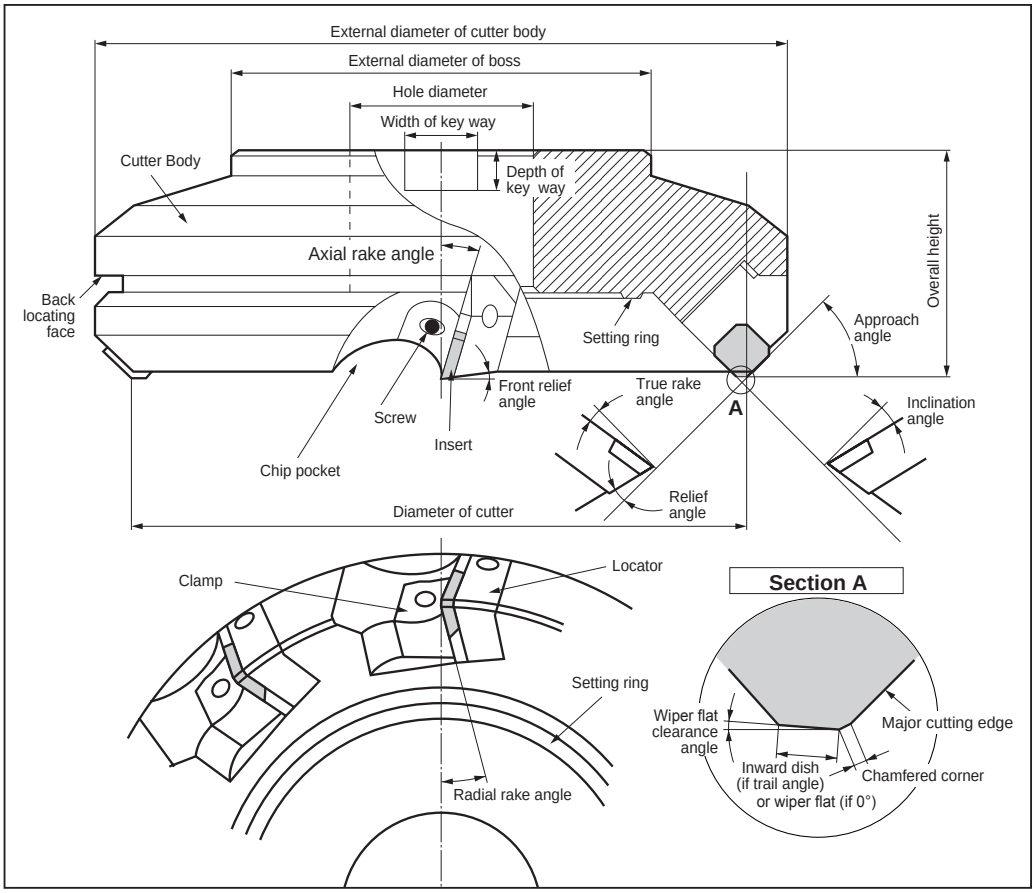

Even if depth of cut is the same, smaller nose radius makes chip thick and chip control improves.

* Cutting resistance increases in proportion with the width of the contact surface. Therefore, with a larger nose radius, cutting resistance and back force increases, chattering may also occur. However, with the same feedrate, a smaller nose radius would produce a poorer surface finish.



# Basics of Milling

## ■ Parts of a Milling Cutter




## ■ Power Requirement

### ● Calculating cutting force

$$P_c = \frac{d_{oc} \cdot w_{oc} \cdot v_f \cdot K_c}{60 \times 10^6 \times \eta} \text{ (kW)}$$

### ● Horsepower

$$H = \frac{Pc}{0{,}75}$$

### ● Chip removal amount

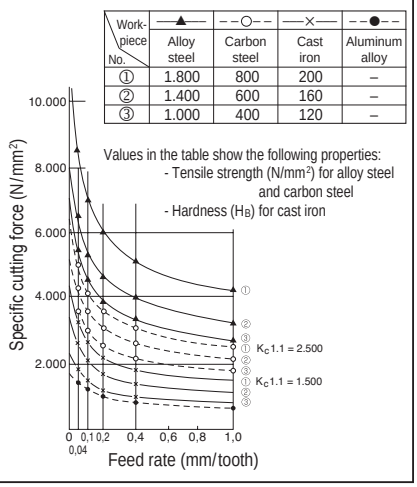
$$Q = \frac{d_{oc} \times w_{oc} \times v_f}{1.000} \text{ (cm}^3\text{/min)}$$

$P_c$ : Net power requirement (kW)
H : Horsepower requirement (HP)
Q : Chip removal amount ($cm^3$/min)
$w_{oc}$ : Cutting width (mm)
$v_f$ : Feed speed (mm/min)
$d_{oc}$ : Depth of cut (mm)
$\eta$ : Machine efficiency (0,70 ~ 0,85)
$K_c$ : Specific cutting forrce ($N/mm^2$)

Eg. (rough value
Steel : 2.500 ~ 3.000
Cast iron : 1.500)

### ● Relation between feed rate, work material, specific cutting force

| Work-piece No. | Alloy steel | Carbon steel | Cast iron | Aluminum alloy |
|---|---|---|---|---|
| ① | 1.800 | 800 | 200 | – |
| ② | 1.400 | 600 | 160 | – |
| ③ | 1.000 | 400 | 120 | – |




### ● Calculating cutting speed

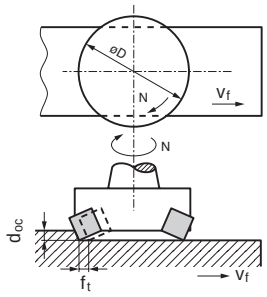
$$v_c = \frac{\pi \times D \times n}{1.000}$$

### ● Calculating feed rate

$$v_f = f_t \times z \times n$$

$$f_t = \frac{v_f}{z \times n}$$

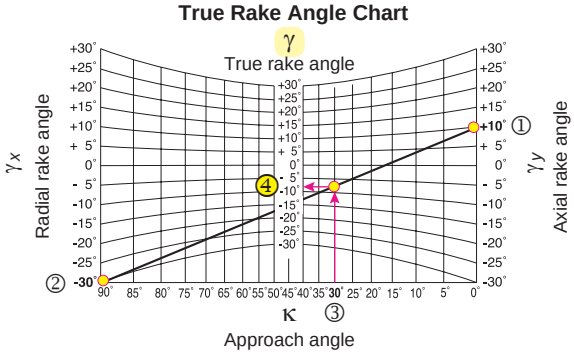
$v_c$ : Cutting speed (m/min)
$\pi \approx$ 3,14
D : Cutter diameter (mm)
n : Rotation speed (rpm)
$v_f$ : Feed speed (mm/min)
$f_t$ : Feed rate (mm/tooth)
z : Number of teeth



## Functions of the Various Cutting Angles

| | Description | Code | Functions | Influences |
|---|---|---|---|---|
| ①<br>② | Axial rake angle<br>Radial rake angle | $\gamma_y$<br>$\gamma_x$ | Controls chip removal direction, effects adhesion of the chips and thrust force etc. | Rake angles can vary from positive to negative (large to small) with typical combinations of positive and negative, positive and positive or negative and negative configurations. |
| ③ | Approach angle | $\kappa$ | Controls chip thickness and chip removal direction | The effect of the small approach angle is to reduce the chip thickness and cutting force. |
| ④ | True rake angle (Effective rake angle) | $\gamma$ | Controls cutting performance and ability to retain a cutting edge | - With a positive (large) angle, cutting ability and adhesion resistance are improved but the strength of the cutting edge is weakened.<br>- With negative (small) angle, the strength of the cutting edge is improved but chips will tend to adhere more easily. |
| ④ | Inclination angle | $\lambda$ | Controls chip removal direction | - With a positive (large) angle, the chip removal is satisfactory with less cutting resistance but the strengh of the corner is weaker. |
| ⑥ | Wiper flat clearance angle | $\alpha_f$ | Controls surface finish | A smaller clearance angle will produce a better surface finish. |
| ⑦ | Clearance angle | $\alpha$ | Controls edge strength, tool life and chattering, etc | |

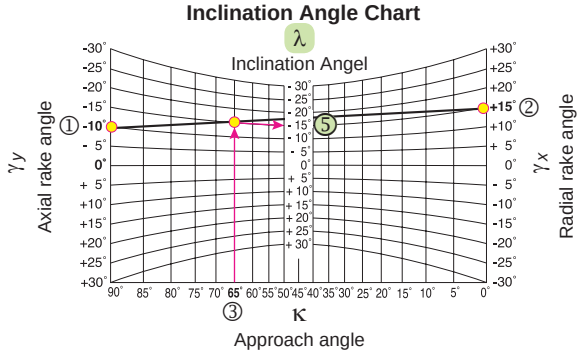
**True Rake Angle Chart**




| Example in using the above chart: | | Solution: |
|---|---|---|
| ① $\gamma_y$ : | Axial rake angle = +10° | True rake angle |
| ② $\gamma_x$ : | Radial rake angle = -30° | ④ $\gamma$ = - 8° |
| ③ $\kappa$ : | Approach angle = 30° | |

Formula : $\tan\gamma = \tan\gamma_x \cdot \sin\kappa + \tan\gamma_y \cdot \cos\kappa$

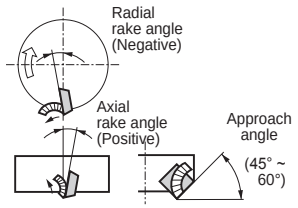
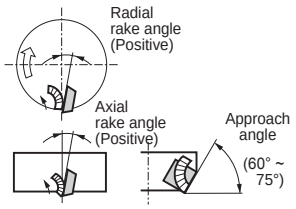
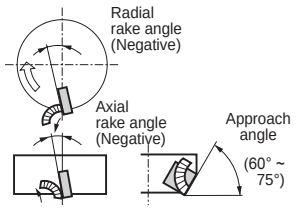
**Inclination Angle Chart**




| Example in using the above chart : | | Solution: |
|---|---|---|
| ① $\gamma_y$ : | Axial rake angle = -10° | Inclination angle |
| ② $\gamma_x$ : | Radial rake angle = +10° | ⑤ $\lambda$ = - 15° |
| ③ $\kappa$ : | Approach angle = 65° | |

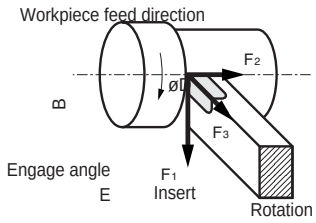
Formula : $\tan\lambda = \tan\gamma_y \cdot \sin\kappa - \tan\gamma_x \cdot \cos\kappa$

## Rake Angle Combination

| | Negative - Positive Type | Double Positive Type | Double Negative Type |
|---|---|---|---|
| The effects of the various angle configurations with relation to chip formation and chip removal.<br>Chip removal direction<br>Rotation |  |  |  |
| Advantage | Excellent chip removal and good cutting action | Good cutting action | Double-sided inserts can be use and higher cutting edge strength |
| Disadvantage | Only single-sided inserts can be use | Lower cutting edge strength and only single-sided inserts can be use | Dull cutting action |
| Application | For Steel, Cast iron, Stainless steel, Alloy steel | For general milling of steel<br>For low rigidly work piece | For light milling of cast iron and steel |
| Typical cutter | WGC, UFO | DPG | DNX, DGC, DNF |
| Chips (Eg.)<br>Workpiece: 37Cr4<br>$v_c$ = 130 m/min<br>$f_t$ = 0.23 mm/tooth<br>$d_{oc}$ = 3 mm |  |  |  |

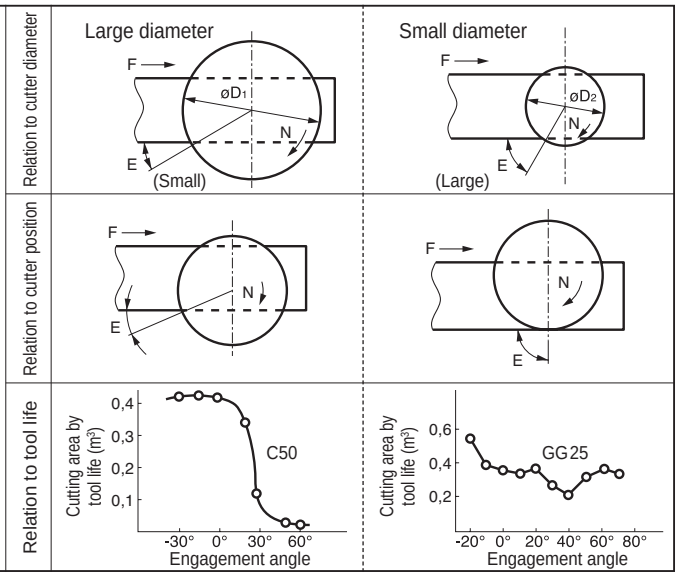
# Basics of Milling

## ■ Relation Between Engage Angle and Tool Life

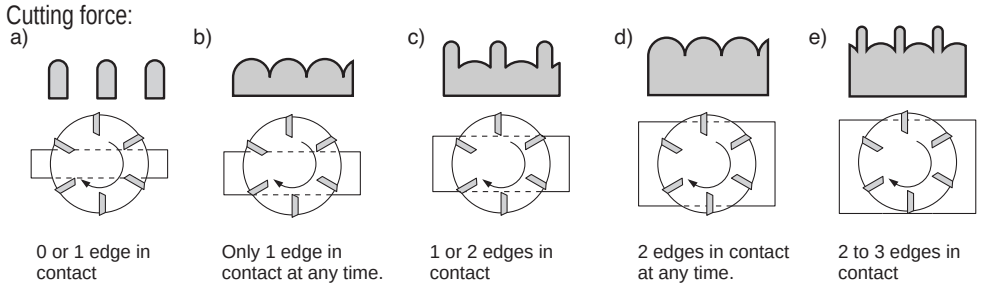



Engage angle denotes the angle by which the full length of the cutting edge comes in contact with the workpiece, with reference to the feed direction. The larger E is, the shorter the tool life.

To change the value of E:
1) Increase the cutter size
2) Shift the position of the cutter




● Relation between the number of simultaneously engaged cutting edges and cutting force:




0 or 1 edge in contact

Only 1 edge in contact at any time.

1 or 2 edges in contact

2 edges in contact at any time.

2 to 3 edges in contact

## ■ To Improve Surface Roughness

### ① Milling inserts with wiper flat

When all the cutting edges have wiper flats, a few teeth are intentionally elevated to play the role of a wiper insert.

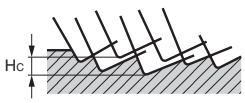
- Insert equipped with straight wiper flat (Face angle: Approx 15' - 1°)
- Insert equipped with curved wiper flat (Eg. curvature R500)

### ② Integral wiper insert system

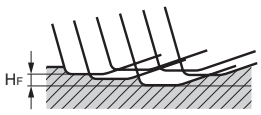
A system to protrude one or two inserts (wiper insert) with a smooth curved edge just a little beyond the other teeth to wipe the milled surface.

- (Applies to WGC, RF types etc.)

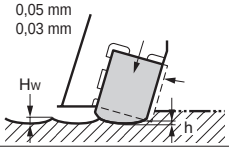
● Surface roughness without wiper flat



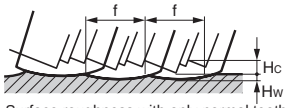

● Surface roughness with straight wiper flat




h : Projected value of wiper insert
Steels : 0,05 mm
Al : 0,03 mm

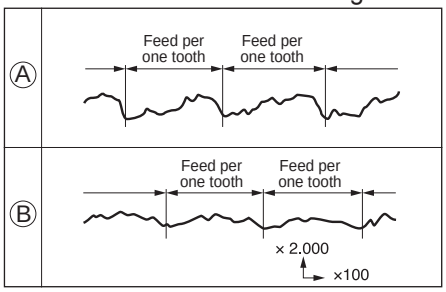



f : Feed rate per revolution



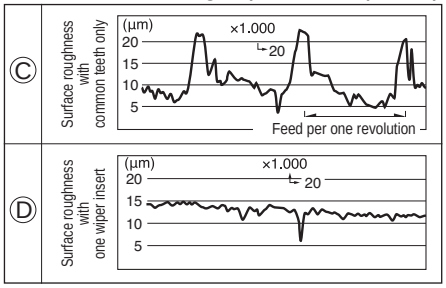

Hc : Surface roughness with only normal teeth
Hw : Surface roughness with wiper insert

● Influence of different face angles on surface finish




- Workpiece: 34CrMo4
- Cutter: DPG 5160 R (Single tooth)
- $v_c$ = 154 m/min
  $f_t$ = 0,234 mm/tooth
  $d_{oc}$ = 2 mm
- Face angle
  Ⓐ : 28'
  Ⓑ : 6'

● Effects of having wiper insert (example)



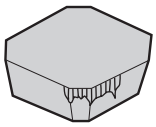

- Workpiece: GG25
- Cutter: DPG 4100 R
- Insert: SPKN 1203
- Axial run-out: 0,015 mm
- Radial run-out: 0,04 mm
- $v_c$ = 105 m/min
- $f_t$ = 0,29 mm/tooth (1,45 mm/rev)

Ⓒ : Only normal teeth
Ⓓ : with 1 wiper insert

## ■ Trouble Shooting Guide for Milling

### Cutting Edge Failure

#### Excessive Flank Wear



**Tool Material**

- Select a more wear resistant grade.
  Carbide
  P30 ⇨ P20 ⇨ K20 ⇨ K10 ⇨ { Coated / Cermet }

**Cutting Conditions**

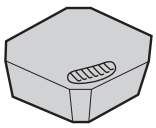
- Reduce cutting speeds.
- Increase feedrate.

**Remedy Examples**

- Recommended insert grades

| | Steel | Cast Iron | Non-Ferrous Alloy |
|---|---|---|---|
| Finishing | T250A (Cermet) | ACK200 (Coated Carbide) BN700 (SUMIBORON) | DA1000 (SUMIDIA) |
| Roughing | ACP100 (Coated Carbide) | ACK200 (Coated Carbide) | DL1000 (Coated Carbide) |

#### Excessive Crater Wear



**Tool Material**

- Select a crater resistant grade.

**Cutting Conditions**

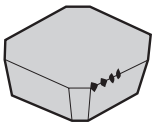
- Reduce cutting speeds.
- Reduce depth-of-cut and feed rate.

**Remedy Examples**

- Recommended insert grades

| | Steel | Cast Iron | Non-Ferrous Alloy |
|---|---|---|---|
| Finishing | T250A (Cermet) | ACK200 (Coated Carbide) | DA1000 (SUMIDIA) |
| Roughing | ACP100 (Coated Carbide) | ACK200 (Coated Carbide) | DL1000 (Coated Carbide) |

#### Cutting Edge Chipping



**Tool Material**

- Select tougher grade.
  P10 ⇨ P20 ⇨ P30
  K01 ⇨ K10 ⇨ K20

**Cutting Conditions**

- Reduce feed rates.

**Tool Design**

- Select a negative-positive cutter configuration with a large approach angle.
- Reinforce the cutting edge (Honing).
- Select a strong edge insert (G → H).

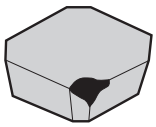
**Remedy Examples**

- Recommended insert grades

| | Steel | Cast Iron |
|---|---|---|
| Finishing | ACP200 (Coated Carbide) | ACK200 (Coated Carbide) EH20 (Uncoated Carbide) |
| Roughing | ACP300 (Coated Carbide) | ACK300 (Coated Carbide) |

- Recommended cutter: WaveMill WGC type
- Cutting conditions:
  Refer to recommended conditions listed in the general catalogue

#### Partial Fracture of Cutting Edges



**Tool Material**

- 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.

**Cutting Conditions**

- Select appropopriate conditions with regards to the particular application.

**Tool Design**

- Select a negative-positive (or negative) cutter configuration with a large approach angle.
- Reinforce the cutting edge (Honing).
- Select a strong edge insert (G → H).
- Increase insert size -
  (Thickness in particular).

**Remedy Examples**

- Recommended insert grades

| | Steel | Cast Iron |
|---|---|---|
| Roughing | ACP300 (Coated Carbide) | ACK300 (Coated Carbide) |

- 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

### Others

#### Unsatisfactory Machined Surface Finish

**Tool Material**

- Select an adhesion resistant grade.
  Carbide → Cermet

**Cutting Conditions**

- Increase cutting speeds.

**Tool Design**

- 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.

**Remedy Examples**

- Recommended insert grades

| | | Steel | Cast Iron | Non-Ferrous Alloy |
|---|---|---|---|---|
| Roughing | Cutter Insert | WGC type* ACP200 (Coated Carbide) | DNX type* ACK200 (Coated Carbide) | RF type* H1 (Carbide) DL1000 (Coated Carbide) |
| Finishing | Cutter Insert | WGC type T250A (Cermet) | FMU type BN700 (SUMIBORON) | FMU type DA1000 (SUMIDIA) |

* marked cutters can be fitted with wiper inserts.

#### Chattering

**Cutting Conditions**

- Reduce feed rates.

**Tool Design**

- Select a high rake cutter with sharp cutting edges
- Use an irregular pitched cutter.

**Others**

- Improve workpiece and cutter clamp rigidity.

**Remedy Examples**

- Recommended cutters:

For steel: WaveMill WGC type
For cast iron: DNX type
For Non-ferrous alloy: High speed cutter for aluminium RF type

#### Unsatisfactory Chip Control

**Tool Design**

- Select cutter with good chip removal features.
- Reduce number of teeth.
- Enlarge chip pocket.

**Remedy Examples**

- Recommended cutter: WaveMill WGC type

#### Edge Chipping on Workpiece

**Tool Design**

- Select a large approach angle.
- Select a sharp cutting edge insert (G → L).

**Cutting Conditions**

- Reduce feed rates.

**Remedy Examples**

- Recommended cutter: WaveMill WGC type

#### Burr on Workpiece

**Tool Design**

- Select a cutter with sharp cutting edges.

**Cutting Conditions**

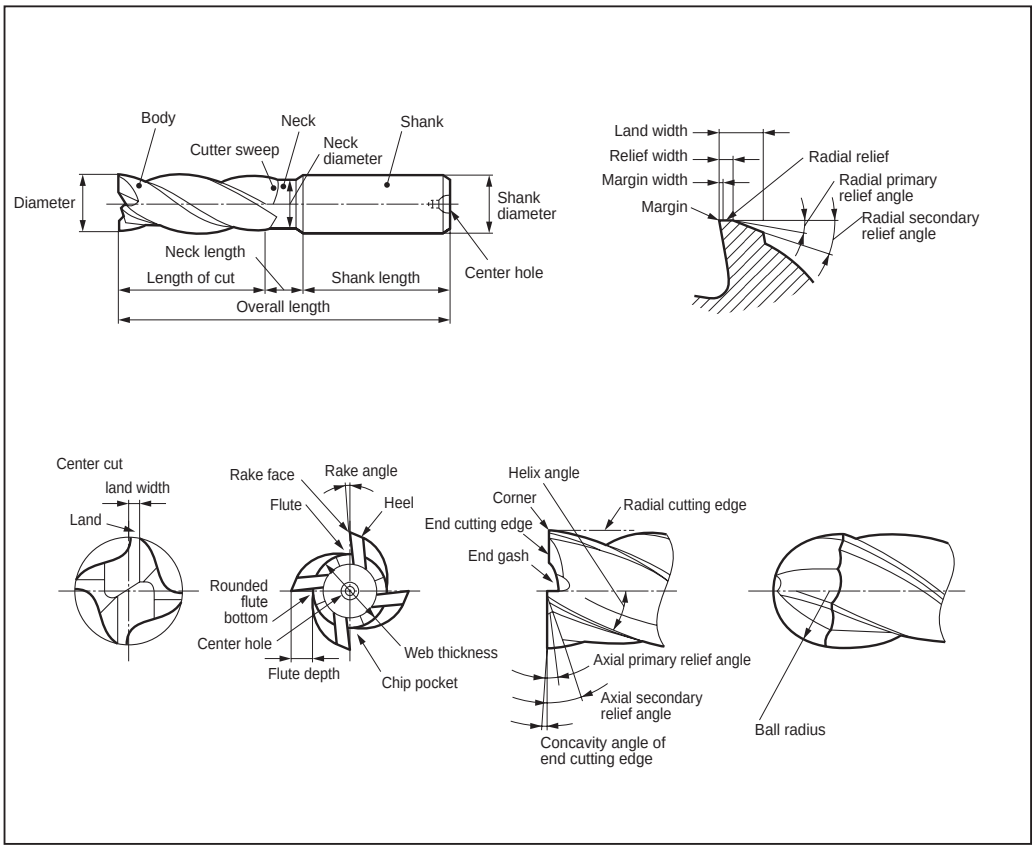
- Increase feed rates.

**Remedy Examples**

- Recommended cutter: WaveMill WGC type

# Basics of Endmilling

## Parts of an Endmill




## Calculating Cutting Conditions

### Cutting speed

$$v_c = \frac{\pi \cdot D \cdot n}{1.000} \qquad n = \frac{1.000 \cdot v_c}{\pi \cdot D}$$

### Feed rate

$$v_f = f_r \times n$$

$$v_f = f_t \times z \times n \qquad f_t = \frac{v_f}{z \times n}$$

### Depth of cut (D.O.C)

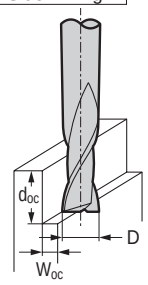
$d_{oc}$ : Axial D.O.C. (depth)
$w_{oc}$ : Radial D.O.C. (width)

### Notch width ($D_1$)

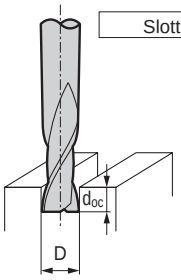
$$D1 = 2 \times \sqrt{2 \times R \times d_{oc} - d_{oc}^2}$$

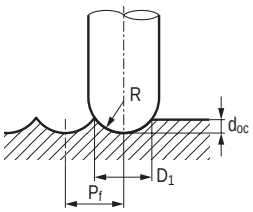
(Ball Endmill)

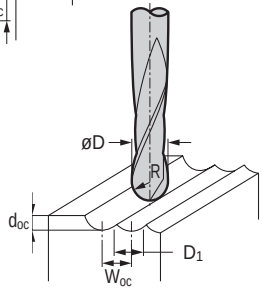
Side milling




Slotting



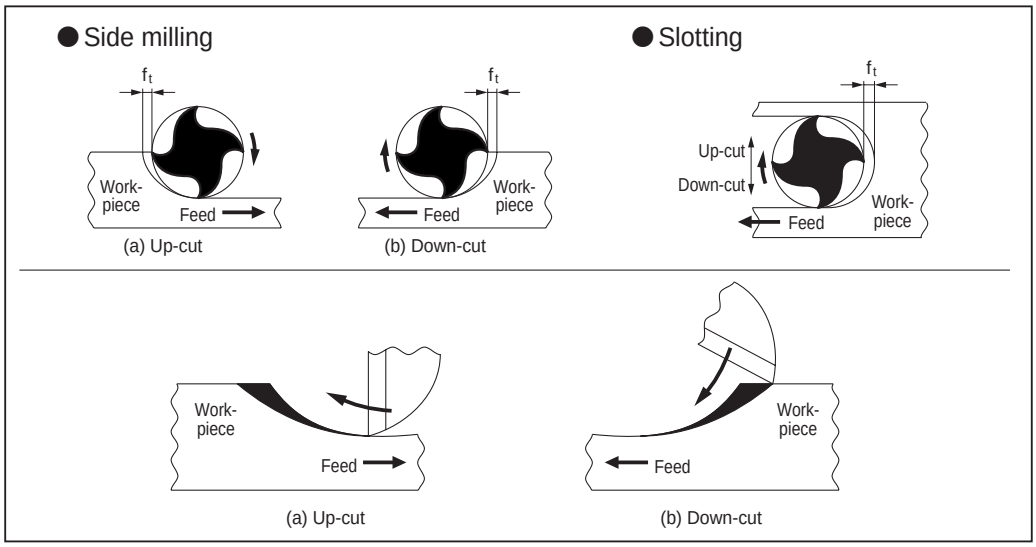



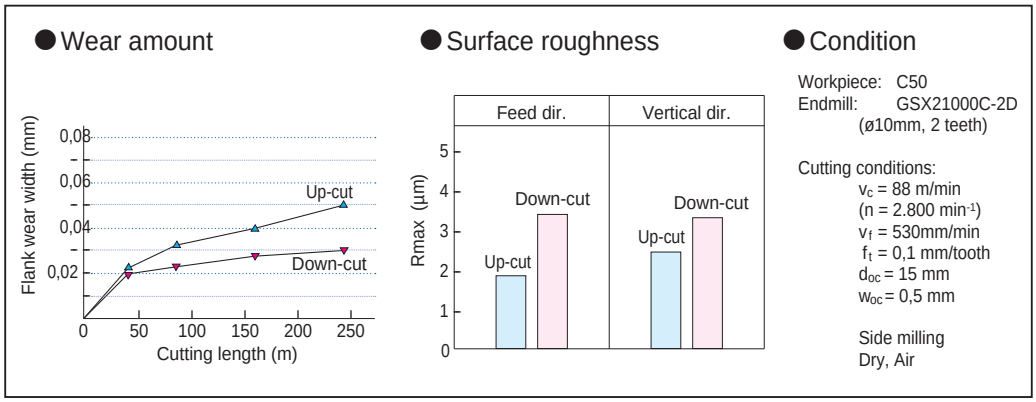




- $v_c$ : Cutting speed (m/min)
- $\pi \approx 3{,}14$
- D : Endmill diameter (mm)
- n : Rotational speed ($min^{-1}$)
- $v_f$ : Feed speed (mm/min)
- $f_r$ : Feed rate per revolution (mm/rev)
- $f_t$ : Feed rate per tooth (mm/tooth)
- z : Number of teeth

● Cutting speed and feedrate are calculated using the same formula as square endmill.

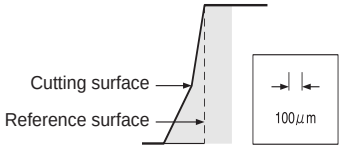
## ■ Up-cut and Dowm-cut




## ■ Relation Between Cutting Condition and Deflection

| Endmill | | | Side milling: Work material: Pre-hardened steel (40HRC) Cutting data: $v_c$ = 25m/min, $d_{oc}$ = 12 mm, $W_{oc}$ = 0,8 mm | | Slotting: Work material: Pre-hardened steel (40HRC) Cutting data: $v_c$ = 25m/min, $d_{oc}$ = 8 mm, $W_{oc}$ = 8 mm (Up-cut side / Down-cut side) | |
|---|---|---|---|---|---|---|
| Cat. No. | Number of teeth | Helix angle | Feed rate 0,16 mm/rev | Feed rate 0,11 mm/rev | Feed rate 0,05 mm/rev | Feed rate 0,03 mm/rev |
| | | | Style | Style | Style | Style |
| | | | Up-cut / Down-cut | Up-cut / Down-cut | Up-cut / Down-cut | Up-cut / Down-cut |
| SSM 2080 | 2 | 30° | | | | |
| SSM 4080 | 4 | 30° | | | | |

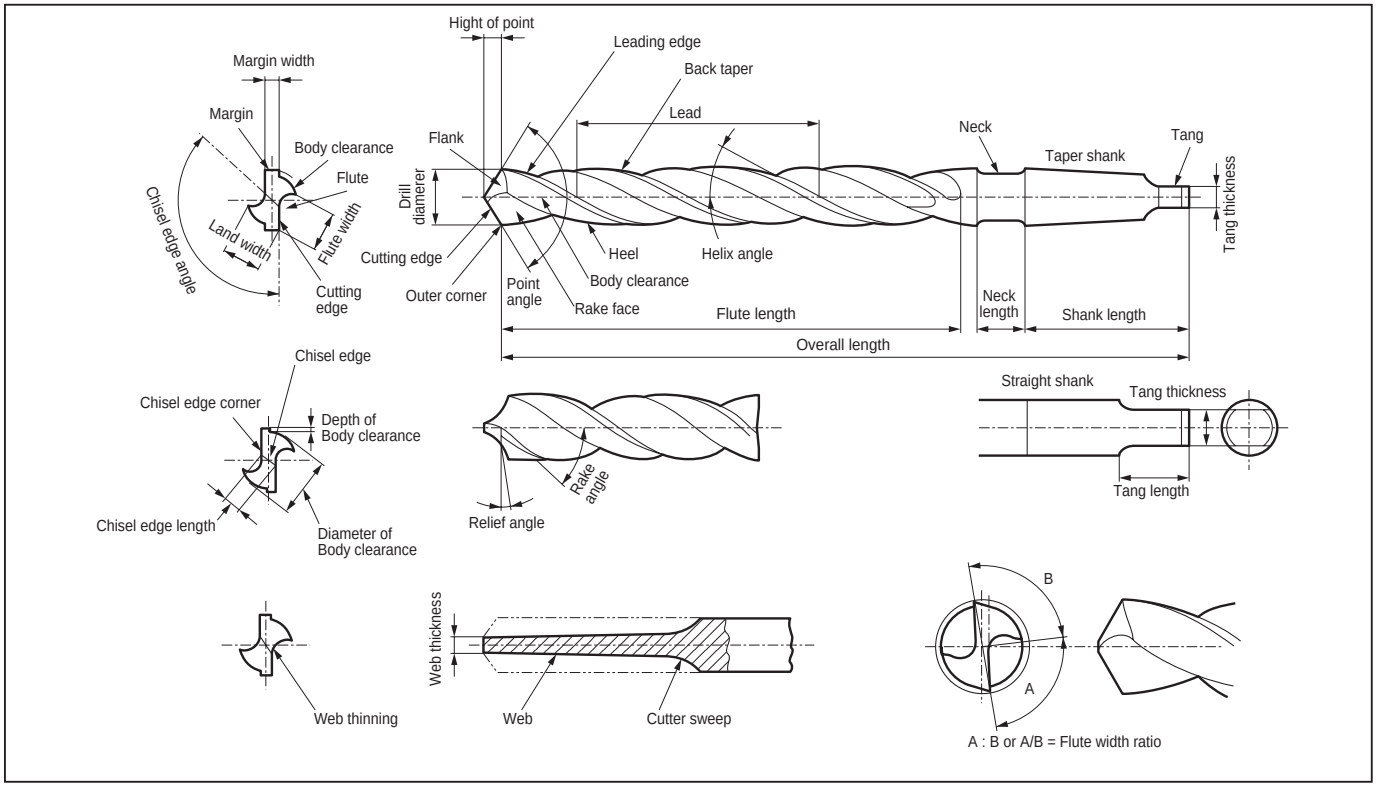


## ■ Trouble Shooting Guide for Endmilling

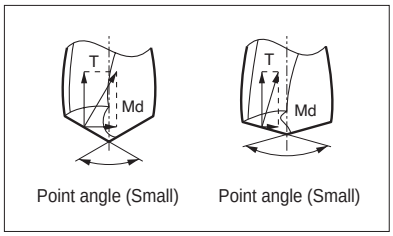
| Failure | | Basic Remedies | | Remedies Examples |
|---|---|---|---|---|
| Cutting Edge Failure | Excessive Wear on Periphery and Cutting Edge Corner | Tool Material | - Select a more wear resistant grade. | - Uncoated type ⇨ Coated type, eg. GSX MILL. |
| | | Cutting Conditions | - Reduce cutting speeds.<br>Increase feed rates.<br>- Check the cutting fluid use. | - Cutting fluid: Water soluble ⇨ Oil based |
| | Chipping on Cutting Edge | Cutting Conditions | - Reduce feed rates.<br>- Use Down-cut milling.<br>- Reduce depth-of-cut. | - Refer to recommended cutting conditions listed in the general catalogue. |
| | | Machine and Others | - Remove backlash on machine.<br>- Ensure strong workpiece clamping.<br>- Improve tool clamp rigidity.<br>- Reduce tool overhang. | - Check for damage on the collet and run-out precision |
| | Tool Breakage During Machining | Cutting Conditions | - Increase cutting speeds.<br>- Reduce feed rates.<br>- Reduce depth-of-cut.<br>- 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:<br>- Surface Roughness<br>- Surface Waviness<br>- Squareness | Tool Material | - Select a grade with high Young's Modulus.<br>- Select an adhesion resistant grade. | |
| | | Cutting Conditions | - Reduce feed rates.<br>- Reduce the depth-of-cut.<br>- Use Down-cut milling. | - Use high helix type endmills, eg. HSM type |
| | | Tool Design | - Select a large helix angle.<br>- Increase the number of flutes.<br>- Shorten the length of cut. | - 2 teeth ⇨ 4 teeth<br>eg. SSM2000/ZX type change to SSM4000/ZX type or GXS40000C-2D type<br>-For Aluminium endmilling, select ASM-DL type or |
| | | Others | - Prevent build-up on the cutting edge. | |
| | Chattering | Cutting Conditions | - Reduce cutting speeds.<br>- Use Down-cut milling.<br>- Use cutting fluid. | |
| | | Tool Design | - Improve workpiece and tool clamp rigidity. | - Check clearances between the spindle chuck and collet.<br>- Check clearances between the collet and endmill. |
| Others | Packing of Chip | Tool Material | - Reduce feed rates.<br>- Reduce depth-of-cut. | |
| | | Cutting Conditions | - Reduce the number of flutes.<br>- Improve chip evacuation capabilities. | - 4 teeth ⇨ 2 teeth<br>- Use good chip evacuation type endmills, eg. UP MILL or GSX MILL |
| | | Tool Design | - Increase the amount of cutting fluid. | |

# Basics of Drilling

## ■ Parts of a Drill

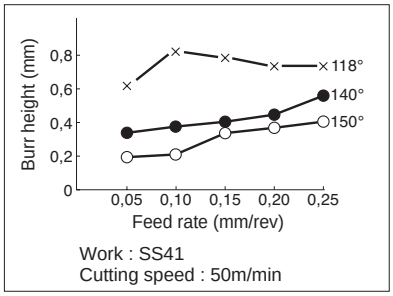



### ● Point Angle and Force



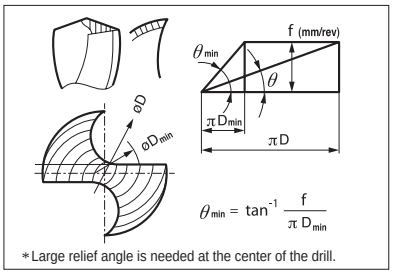

When point angle is large, thrust becomes large but torque becomes small.

### ● Point Angle and Burr



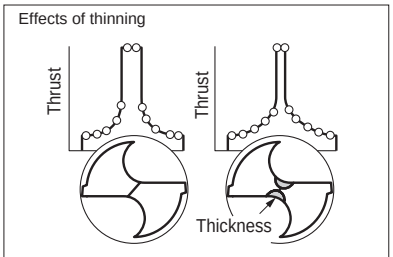

When point angle is large, burr height becomes low.

### ● Min. Requirement Relief Angle



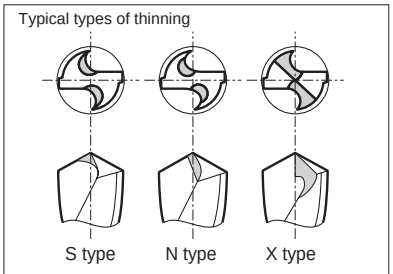

＊Large relief angle is needed at the center of the drill.

### ● Web Thickness and Thrust



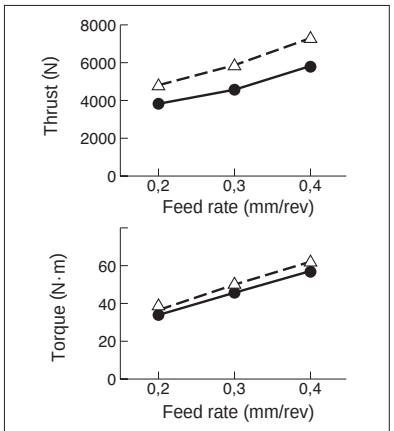

Web thinning decreases the thrust concentrated at chisel edge, makes the drill edge sharp and improves chip control. Tool life is also longer.

### ● Decrease Chisel Width by Thinning




S type : Standard type used generaly.
N type : Suitable for thin web drills.
X type : For hard-to-cut material or deep hole drilling.

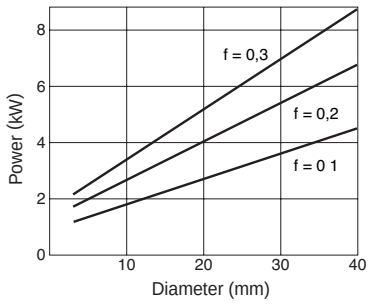
### ● Width of Edge Threatment and Cutting Force

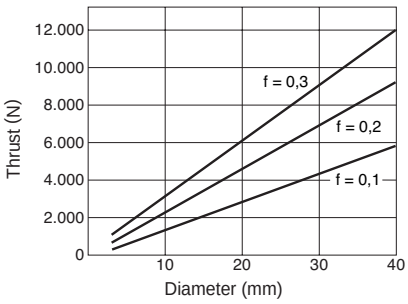



Drill: KDS 215 MAK
Work material: C50 (230HB)
Cutting conditions:
$v_c$ = 50 m/min, Water soluble

# Basics of Drilling

## ■ Reference of Power Requirement and Thrust




Work material:
C48 (220HB)

## ■ Cutting Condition Selection

● Control cutting force for low rigid machine

The following table shows the relation between edge treatment width and cutting force. If a problem caused by cutting force occurs, reduce either the feedrate or the edge treatment width.

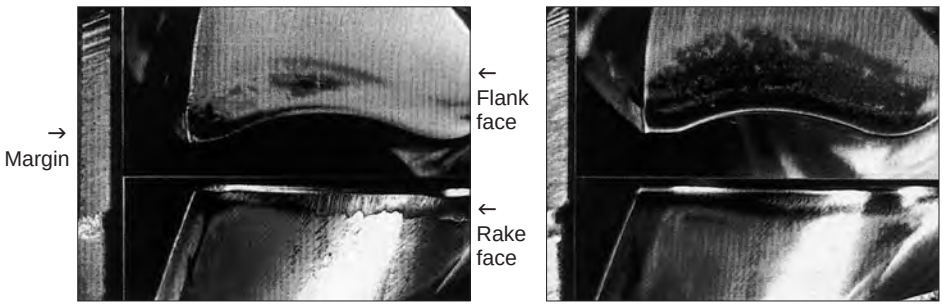
| Condition | | Edge treatment width | | | |
|---|---|---|---|---|---|
| | | | | | |
| $v_c$ (m/min) | f (mm/rev) | Torque (N• m) | Thrust (N) | Torque (N• m) | Thrust (N) |
| 40 | 0,38 | 12,8 | 2820 | 12,0 | 2520 |
| 50 | 0,30 | 10,8 | 2520 | 9,4 | 1920 |
| 60 | 0,25 | 9,2 | 2320 | 7,6 | 1640 |
| 60 | 0,15 | 6,4 | 1640 | 5,2 | 1100 |

Drill : ø10
Work material:
C50 (230HB)

● High speed machining recommendation

When there is surplus capacity with enough machine power and rigidity drilling at normal recommended cutting conditions, we recommend higher drilling speeds.

Wear example

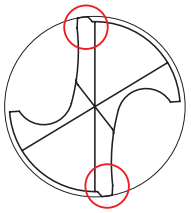



Vc=60m/min　　Vc=120m/min

Work material: C50 (230HB)
Cutting data: f = 0,3 mm/rev
$d_{oc}$ = 50mm
Tool life: 600 holes (Cutting length : 30m)

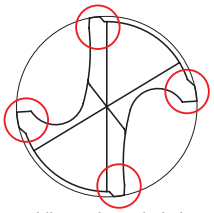
## ■ Explanation of Margins (Difference between single and double margins)

● Single Margin (2 guides: circled parts)



● Shape used on most drills

● D Double Margin (4 guides: circled parts)

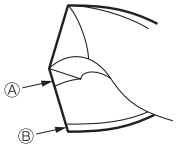


● 4-point guiding reduces hole bending and undulation for improved stability and accuracy during deep hole drilling.

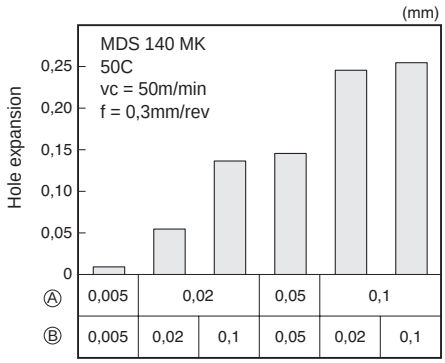
# Basics of Drilling

## ■ Run-out Accuracy

Run-out of the lip height B and thinning point A are important.

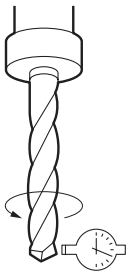



Ⓐ : The run-out accuracy of thinning point
Ⓑ : The difference of lip height

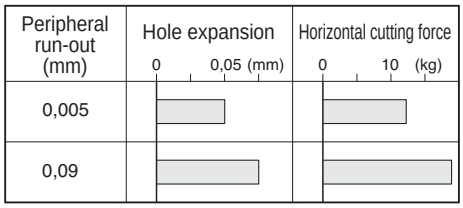



## ■ Peripheral Run-out Accuracy when Tool Rotates

Drill run-out when mounted on the machine spindle must be within 0,03mm. If the run-out is large, the drilled hole will also be large causing an increase in the horizontal cutting force, which may result in drill breakage if the machine or work clamping is not rigid.



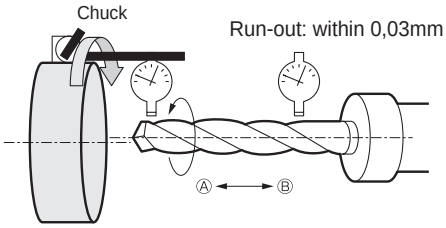
Run-out: within 0,03mm




Drill: MDS120MK
Work material: C50 (230HB)
Cutting data: $v_c$=50 m/min, f=0,3 mm/rev, $d_{oc}$ =38mm
Water soluble

## ■ Peripheral Run-out Accuracy when Workpiece Rotates

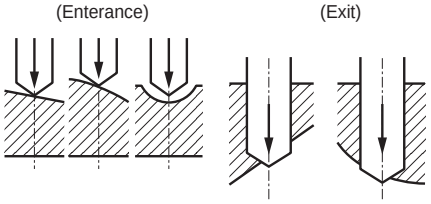
When use on a lathe, run-out at point A must be within 0,03mm, this value must be similar when taken at position B.




## ■ Influence of Workpiece Surface

### ● Workpiece with slanted or uneven surface

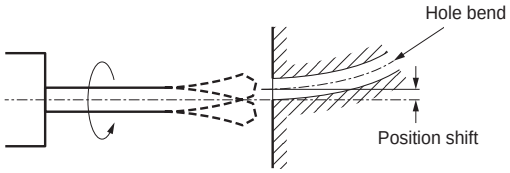
If the surface of the hole entrance or exit is slanted or uneven, decrease the feedrate to 0,1~0,15mm/rev at these points.




## ■ How to Use Long Drill

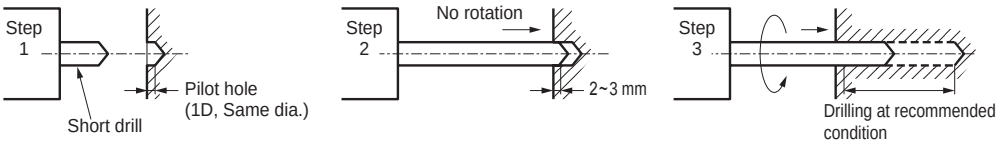
### ● Problem

When using FA type, DAK type or SMDH-D type drills at high rotational speeds, the run-out of the drill tip may cause a position shift at the entry point making the drill hole bent and resulting in drill breakage.




### ● Remedies

Method 1.




Method 2. Low rotational speed minimizes centrifugal forces and prevents drill bending.

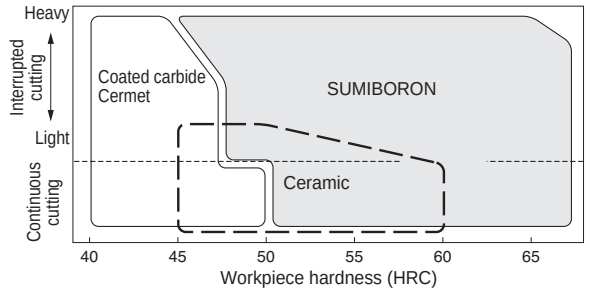


# Tool Failure and Remedies

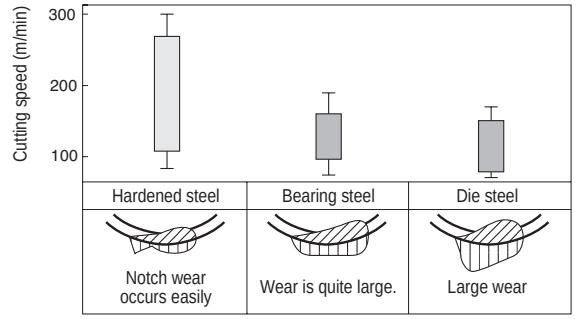
## ■ Trouble Shooting Guide for Drilling

| Failure | | Basic Remedies | | Remedies Examples |
|---|---|---|---|---|
| Drill Failure | Excessive Wear on Cutting Edge | Cutting Conditions | - Use higher cutting speeds.<br>- Increase feed rates. | - Vc=80~100m/min<br>- Refer to recommended cutting conditions listed in the general catalogue. |
| | | Cutting Fluid | - Reduce pressure if useing internal coolant.<br>- Use cutting fluid with more lubricity. | - Below 1,5MPa. |
| | Chisel Point Chipping | Tool Design | - Increase size of chisel width.<br>- Increase amount of honing on cutting edge. | |
| | | Cutting Conditions | - Reduce depth-of cut.<br>- Reduce feed rate at entry point. | - f = 0,05~0,1 mm/rev . |
| | | Others | - Improve workpiece clamping rigidity. | |
| | Chipping on Peripheral Cutting Edge | Tool Design | - Increase amount of honing on cutting edge.<br>- Reduce the amount of front flank angle. | |
| | | Cutting Conditions | - Reduce cutting speeds.<br>- Increase feed rates. | - Refer to recommended cutting conditions listed in the general catalogue. |
| | | Cutting Fluid Others | - Use cutting fluid with more lubricity.<br>- Improve workpiece clamp rigidity. | |
| | Margin Wear | Tool Design | - Increase amount of back taper.<br>- Reduce margin width. | |
| | | Cutting Conditions | - Reduce cutting speeds.<br>- Increase feed rates. | - Refer to recommended cutting conditions listed in the general catalogue. |
| | | Cutting Fluid Others | - Use cutting fluid with more lubricity.<br>- Schedule for earlier regrind. | |
| | Drill Breakage | Tool Design | - Increase amount of back taper.<br>- Reduce margin width. | |
| | | Cutting Conditions | - Reduce cutting speeds. | - Refer to recommended cutting conditions listed in the general catalogue. |
| | | Cutting Fluid Others | - Use cutting fluid with more lubricity.<br>- Improve workpiece clamp rigidity. | |
| Unsatisfactory Hole Accuracy | Oversized Holes | Tool Design | - Improve overall dril rigidity. (large web, small flute).<br>- Reduce drill point angle. | - 130°~120° |
| | | Cutting Conditions | - Reduce feed rate at entry phase.<br>- Reduce cutting speeds. | - f = 0,05~0,1 mm/rev<br>- Refer to recommended cutting conditions listed in the general catalogue. |
| | | Cutting Fluid Others | - Improve workpiece clamp rigidity.<br>- Improve drill clamp precision.<br>- Improve drill clamp rigidity. | - Drill run-out below 0,02mm |
| | Poor Surface Finish | Tool Design | - Increase amount of back taper. | |
| | | Cutting Conditions | - Increase cutting speeds. | - Refer to recommended cutting conditions listed in the general catalogue. |
| | | Cutting Fluid | - Use cutting fluid with more lubricity. | |
| | Holes are Not Straight | Tool Design | - Reduce amount of edge honing. | |
| | | Cutting Conditions | - Reduce feedrates. | - Refer to recommended cutting conditions listed in the general catalogue. |
| | | Others | - Improve workpiece clamp rigidity.<br>- Improve drill clamp precision.<br>- Improve drill clamp ridigity. | - Drill run-out below 0,02mm |
| Unsatisfactory Chip Control | Packing of Chips | Cutting Conditions | - Increase cutting speeds.<br>- Increase feed rates. | - Refer to recommended cutting conditions listed in the general catalogue. |
| | | Cutting Fluid | - Reduce pressure if using internal coolant. | - Below 1,5MPa. |
| | Long Stringy Chips | Tool Design | - Reduce amount of edge honing. | |
| | | Cutting Conditions | - Increase feed rates. | - Refer to recommended cutting conditions listed in the general catalogue. |
| | | Cutting Fluid | - Reduce pressure if using internal coolant. | - Below 1,5MPa. |

## Application Map of the Various Tool Materials

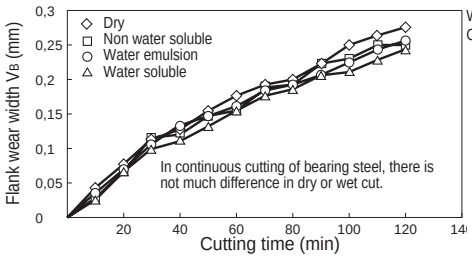



## Work Materials and Cutting Speed Recommendations



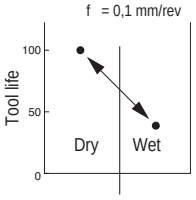

## Influence of Coolant on Tool Life

● Continuous cutting




● Interrupted cutting

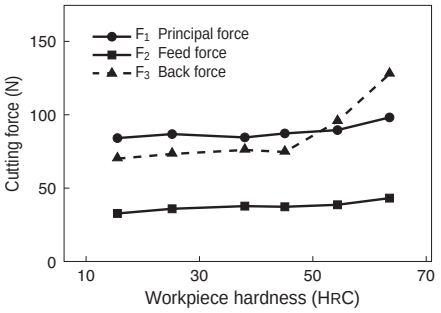
Work material: X155CrVMo12-1
Cutting data: $v_c$ = 100 m/min
$d_{oc}$ = 0,2 mm
f = 0,1 mm/rev

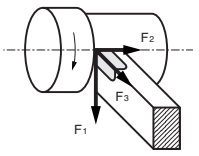



Work material: 100Cr6 (HRC58~62)
Insert: TPGN160304
Cutting data: $v_c$ = 100 m/min
$d_{oc}$ = 0,15 mm
f = 0,1 mm/rev

**For continuous cutting, the influence of coolant on tool life is minimal. However for interrupted cutting, coolant will shorten the tool life because of thermal cracking.**

## Relation Workpiece Hardness and Cutting Forces

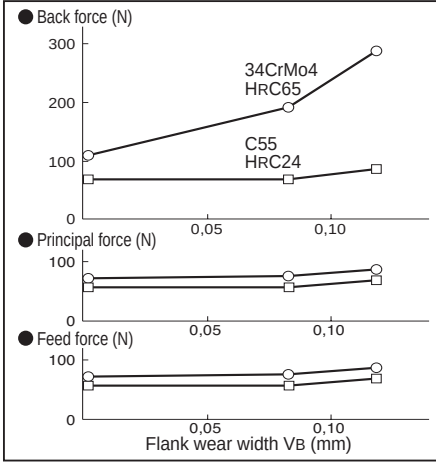



Work material: C105W1
Cutting data: $v_c$ = 120 m/min
$d_{oc}$ = 0,2 mm
f = 0,1 mm/rev

**Back force increases substantially for harder work materials.**

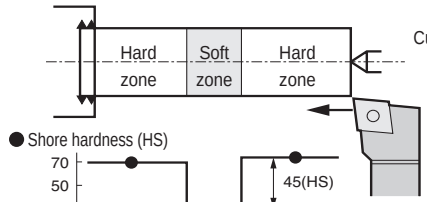
## Relation between Flank Wear and Cutting Force



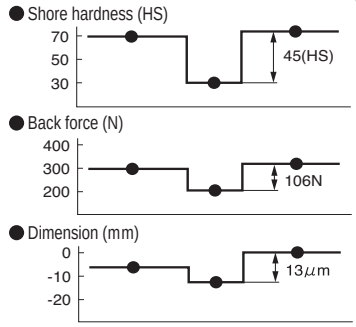

Cutting data: $v_c$ = 80 m/min
$d_{oc}$ = 0,15 mm
f = 0,1 mm/rev

**For hardened steel machining, back force increases substantially due to the expansion of flank wear.**

## Workpiece Hardness on Cutting Force and Accuracy

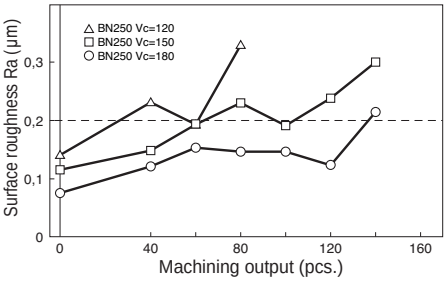



Cutting data: $v_c$ = 120 m/min
$d_{oc}$ = 0,5 mm
f = 0,3 mm/rev
dry




**External dimension at the soft zone is smaller due to lower cutting forces.**

## Relation Cutting Speed and Surface Roughness

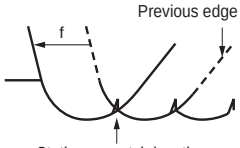
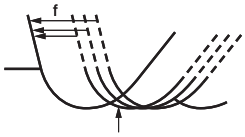



Work material:
25CrMo4
(HRC58~62)
Holder: MTXNR2525
Insert: TNMA160408NU

Cutting data:
$v_c$= 120, 150, 180 m/min
$d_{oc}$ = 0,15 mm
f = 0,045 mm/rev
Wet

**At high cutting speeds, surface roughness is more stable.**

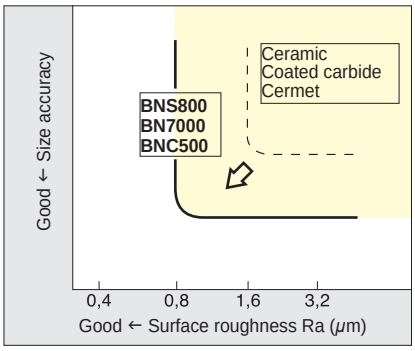
## Improvement of Surface Roughness by Altering the Feedrate

| Constant Feedrate | Variable Feedrate |
|---|---|
| Previous edge position<br>  <br>Stationary notch location |  <br>Shifting notch location |
|  |  |

**Varying the feedrate spreads the notch location over a larger area, surface finish improves and notch wear decreases.**

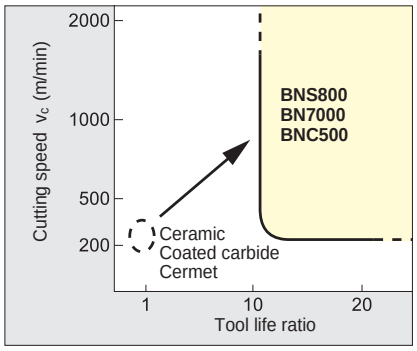
## ■ Advantages of Using SUMIBORON for Cast Iron Machining

● Higher accuracy

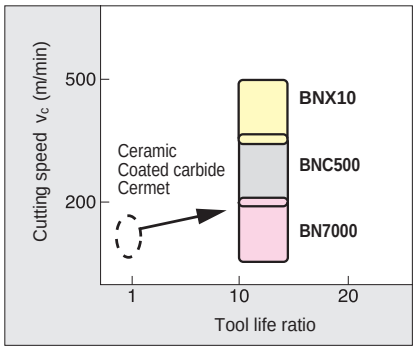



● Longer tool life at higher cutting speeds

GG: Grey cast iron

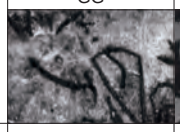
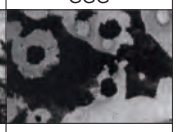
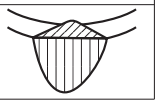



GGG: Ductile cast iron

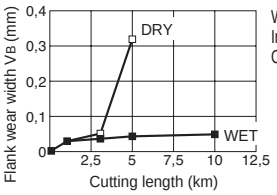



## ■ Turning

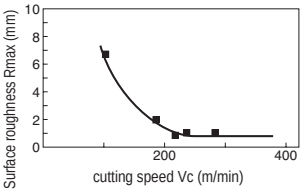
● Cast iron structure and wear shape examples

| | | GG | GGG |
|---|---|---|---|
| Structure | |  |  |
| | Matrix | Pearlite | Pearlite + Ferrite |
| Tool wear shape | Wet |  |  |
| | Dry |  Crater wear |  |

($v_c$ = 200~500 m/min)




Work material: GG25
Insert: SNGN120408(BN500)
Cutting data: $v_c$ = 450 m/min
$d_{oc}$ = 0,25 mm
f = 0,15 mm/rev
Continuous cutting







**For machining cast iron with SUMIBORON, cutting speeds (Vc) should be 200m/min and above. WET cutting is recommended.**

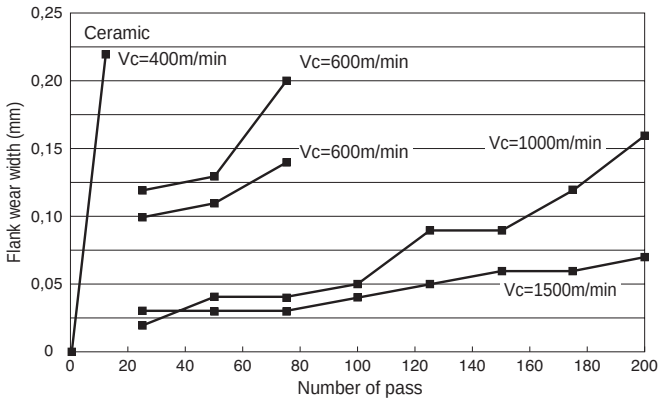
Machine: N/C lathe
Work material: GG25 (HB200)
Holder: MTJNP2525
Insert: TNMA160408(BN500)
Cutting data: $v_c$ = 110~280 m/min
$d_{oc}$ = 0,1 mm
f = 0,1 mm/rev
WET

## ■ Milling

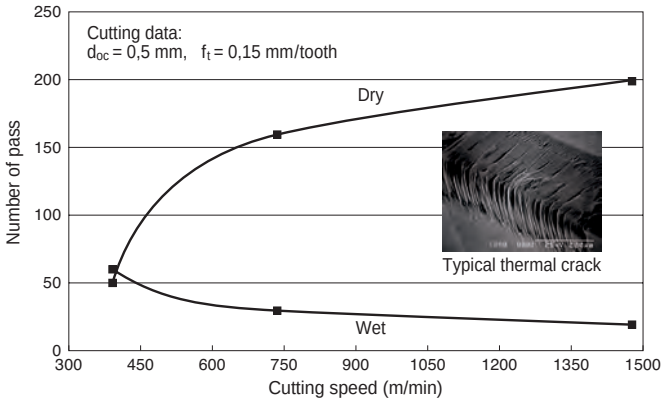
SUMIBORON BN Finish Mill EASY



- High speed machining Vc = 2000m/min
- Surface Roughness Rz=3,2 (1,0Ra)
- Running cost is reduced because of economical insert
- Easy insert setting with the aid of a setting gauge
- Safe, anti-centrifugal force construction for high speed conditions

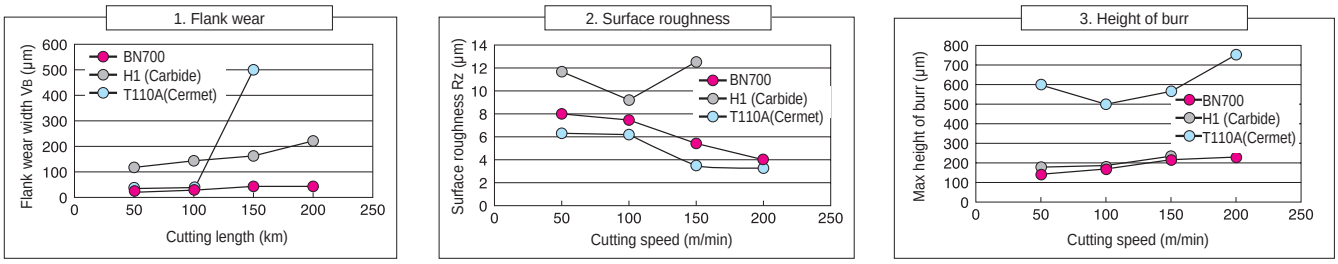



Work material: GG25
Tool material: BN700
Cutting data: $d_{oc}$ = 0,5 mm, $f_t$ = 0,1 mm/tooth, DRY




Dry cutting is recommended for high speed milling of cast iron with SUMIBORON.

## Powder Metal



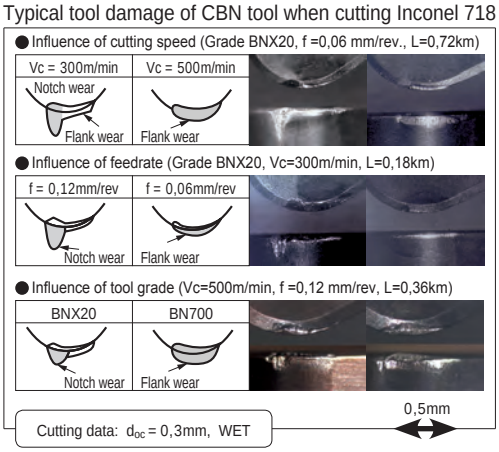

Work material: SMF4040 equivalent
Process details: ø100~300mm heavy interrupted facing with grooves and drilled holes. (after 40 passes)
Insert: TNGA160404 Cutting data: f=0.1mm/rev, d=0.1mm, Wet

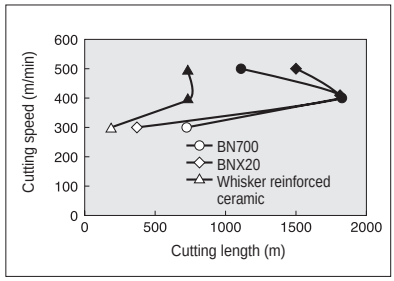
For general power metal components, carbide and cermet grades can perform up to Vc=100m/min. However, around Vc=120m/min, wear becomes rapid and surface roughness deteriorates with increased burrs.
SUMIBORON on the other hand, exhibits stability and superior wear resistance, burr prevention and surface roughness especially at high speeds.

## Heat Resistive Alloy

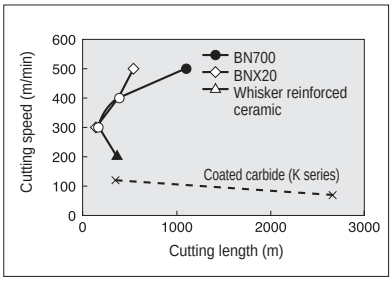
### Ni based alloy

Typical tool damage of CBN tool when cutting Inconel 718



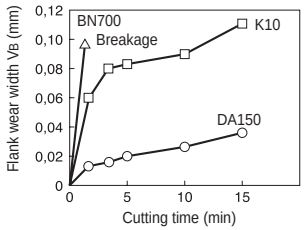




Tool life creteria
Notch wear = 0,25mm
Or flank wear = 0,25mm
BNX20 is recommended for high speed and low feedrate condition.
BN700 is recommended for cutting speeds below 240m/min

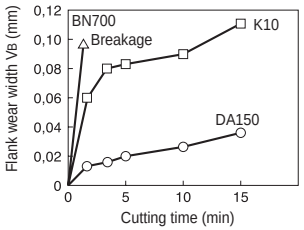



Tool life creteria
Notch wear = 0,25mm
Or flank wear = 0,25mm
BN700 is recommended for cutting at high feedrates.
(Over f=0,1mm/rev)

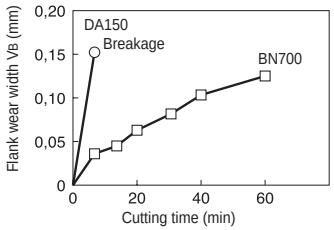
### Ti based alloy




Work Material: Ti-6Al-4V
Insert: DNM120404NF
Cutting data: vc = 100m/min, doc = 0,1mm, f = 0,05mm/rev, WET
SUMIDIA positive type inserts are extremely good for Ti alloy, due to high cutting edge strength and high wear resistance.




Work Material: Ti-6Al-4V
Insert: DNM120404NF
Cutting data: vc = 100m/min, doc = 0,1mm, f = 0,05mm/rev, WET
SUMIDIA positive type inserts are extremely good for Ti alloy, due to high cutting edge strength and high wear resistance.

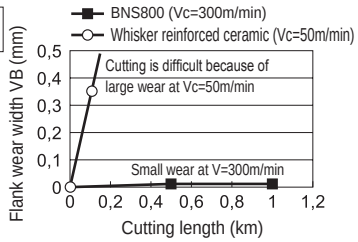



Work Material: Ti-6Al-4V
Insert: DNMA150412
Cutting data: Vc = 120m/min, doc = 0,3mm, f =0,25mm/rev, WET
Negative type insert BN700 is excellent for high efficiency cutting. (For large depth of cut and high feedrates)

### Hard facing alloys

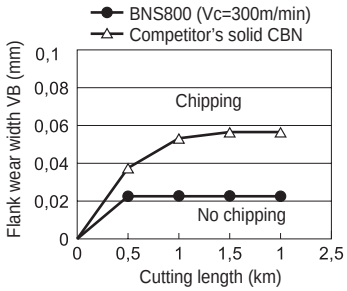
Work material: Colmonoy No.6 (Ni-based self fluxing alloy)

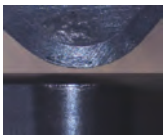
Insert: SNGN090308
Cutting data:
vc = 50, 300 m/min
f = 0,1 mm/rev
doc = 0,2 mm
Wet



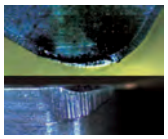

Work material: Stellite SF-20 (Co-based Self-fluxing alloy)

Insert: SNGN090308
Cutting data:
vc = 50 m/min
f = 0,1 mm/rev
doc = 0,2 mm
Dry

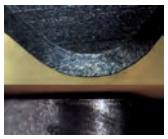


BNS800
(Vc=300m/min, After 2km Cutting)



Whisker reinforced ceramic
(Vc=50m/min, After 10m Cutting)

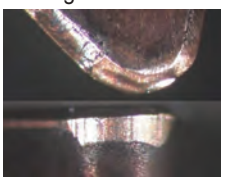
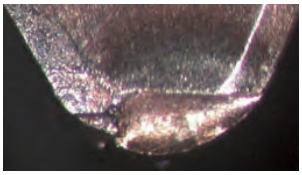
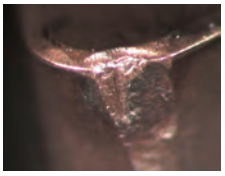
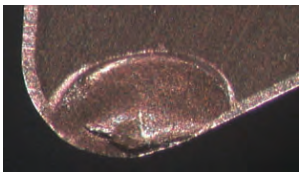
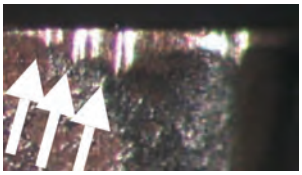
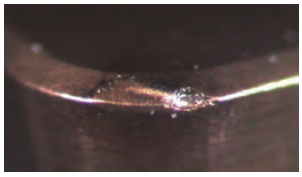


BNS800
(After 2km of cutting)




Competitor's solid CBN
(After 2km of cutting)

Cutting Edge Failure

| Damage | Remedies | |
|---|---|---|
| Large flank wear  | Tool material<br>Tool design<br><br>Cutting condition | ☞ Select a more wear resistant grade.<br>☞ Reduce the cutting force.<br>☞ Reduce the NL width and angle.<br>☞ Positive inserts preferred<br>☞ Check the cutting speed.<br>☞ Reduce the cutting speed to less than 200m/min.<br>☞ Higher feed rate reduces the overall tool-to-work contact time. |
| Large crater wear  | Tool material<br><br><br><br>Tool design<br><br><br><br>Cutting condition | ☞ Crater wear resistant grades are recommended.<br>Continuous ~ Light interrupted cutting = BNC100<br>Light ~ Medium interrupted cutting = BNX20<br>Medium ~ Heavy interrupted cutting = BNX25<br>☞ Determine the cutting edge geometry after inspecting the used inserts closely.<br>☞ Sharpen the cutting edge to prevent crater wear.<br>☞ Strengthen the cutting edge to prevent crater breakage.<br>☞ Check the cutting speed.<br>☞ Reduce the cutting speed to less than 200m/min.<br>☞ Higher feed rates are recommended. |
| Breakage at bottom of crater  | | |
| Flaking  | Tool material<br><br>Tool design<br><br>Cutting condition | ☞ Flaking is caused by high back forces and back force is related to flank wear.<br>☞ Select a more wear resistant grade.<br>☞ A sharper cutting edge helps prevent flaking.<br>☞ Reduce the NL angle and width<br>☞ Positive inserts preferred<br>☞ Reduce flank wear with lower speed and higher feed rates.<br>☞ Reducing tool-to-work contact time effectively reduces flank wear. |
| Chipping at notch position  | Cutting condition | ☞ If surface finish is affected, consider using the “Variable Feed rate” method to improve finishing.<br>☞ For other cases, use remedies similar to that for normal wear. |
| Chipping at notch position  | Tool material<br><br>Tool design<br><br>Cutting condition | ☞ Caused by impact shocks to the cutting edge.<br>Chattering may also be a contributing factor.<br>☞ Select a tougher grade.<br>☞ Strengthen the cutting edge.<br>☞ Large NL angle, Honing.<br>☞ Higher feed rates are recommended to lessen the number of impacts. |
| Chipping at nose position  | Tool material<br><br><br>Tool design<br><br>Cutting condition | ☞ Caused by impact shocks to the cutting edge.<br>Chattering may also be a contributing factor.<br>☞ Select a tougher grade.<br>☞ Strengthen the cutting edge.<br>☞ Large NL angle, Honing.<br>☞ Higher feedrates are recommended to lessen the number of impacts. |
| Thermal crack  | Cutting condition<br><br><br><br><br>Tool design<br>Tool material | ☞ Thermal shocks generate vertical crack lines across the cutting edge.<br>Completely dry condition is recommended.<br>☞ If dry condition machining is already observed, then reduction of cutting temperatures and cutting force is necessary.<br>☞ Decrease cutting speed, feedrate, depth of cut.<br>☞ Sharpen cutting edge.<br>☞ Select more thermal conductivity grade. |

## ■ 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

| | | |
|---|---|---|
| SNCM220 | 8620 | 21NiCrMo2 |
| SNCM240 | 8640 | — |
| SNCM415 | — | — |
| SNCM420 | 4320 | — |
| SNCM439 | 4340 | 40NiCrMo6 |
| SNCM447 | — | 34NiCrMo6 |

### ● Cr Steels

| | | |
|---|---|---|
| SCr415 | — | 15CrMo5 |
| SCr420 | 5120 | 20Cr4 |
| SCr430 | 5130 | 34Cr4 |
| SCr435 | 5132 | 37Cr4 |
| SCr440 | 5140 | 41Cr4 |
| SCr445 | 5147 | — |

### ● Cr-Mo Steels

| | | |
|---|---|---|
| SCM415 | — | 15CrMo5 |
| SCM420 | — | 20CrMo5 |
| SCM430 | 4131 | 25CrMo4 |
| SCM435 | 4137 | 34CrMo4 |
| SCM440 | 4140 | 42CrMo4 |
| SCM445 | 4145 | — |

### ● Mn Steels and Mn-Cr Steels for Structural Use

| | | |
|---|---|---|
| SMn420 | 1522 | — |
| SMn433 | 1534 | — |
| SMn438 | 1541 | — |
| SMn443 | 1541 | — |
| SMnC420 | — | — |
| SMnC443 | — | — |

### ● Cr-Mo Steels

| | | |
|---|---|---|
| SK1 | — | — |
| SK2 | W1-11 1/2 | — |
| SK3 | W1-10 | C105W1 |
| SK4 | W1-9 | — |
| SK5 | W1-8 | C80W1 |
| SK6 | — | C80W1 |
| SK7 | — | C70W2 |

### ● High Speed Steels

| JIS | AISI | DIN |
|---|---|---|
| SKH2 | T1 | — |
| SKH3 | T4 | S18-1-2-5 |
| SKH10 | T15 | S12-1-4-5 |
| SKH51 | M2 | S6-5-2 |
| SKH52 | M3–1 | — |
| SKH53 | M3–2 | S6-5-3 |
| SKH54 | M4 | — |
| SKH56 | M36 | — |

### ● Alloy Tool Steels

| | | |
|---|---|---|
| SKS11 | F2 | — |
| SKS51 | L6 | — |
| SKS43 | W2-9 1/2 | — |
| SKD1 | D3 | X210Cr12 |
| SKD11 | D2 | X155CrVMo12-1 |
| SKD61 | — | X40CrVMo5-1 |

### ● Grey Cast Iron

| | | |
|---|---|---|
| FC100 | No 20B | GG-10 |
| FC150 | No 25B | GG-15 |
| FC200 | No 30B | GG-20 |
| FC250 | No 35B | GG-25 |
| FC300 | No 45B | GG-30 |
| FC350 | No 50B | GG-35 |

### ● Nodular Cast Iron

| | | |
|---|---|---|
| FCD400 | 60-40-18 | GGG-40 |
| FCD450 | — | GGG-40.3 |
| FCD500 | 80-55-06 | GGG-50 |
| FCD600 | — | GGG-60 |
| FCD700 | 100-70-03 | GGG-70 |

### ● Ferritic Stainless Steels

| | | |
|---|---|---|
| SUS405 | 405 | X10CrAl13 |
| SUS429 | 429 | — |
| SUS430 | 430 | X6Cr17 |
| SUS430F | 430F | X7CrMo18 |
| SUS434 | 434 | X6CrMo17 1 |

### ● Martensitic Stainless Steels

| | | |
|---|---|---|
| SUS403 | 403 | — |
| SUS410 | 410 | X10Cr13 |
| SUS416 | 416 | — |
| SUS420JI | 420 | X20Cr13 |
| SUS420F | 420F | — |
| SUS431 | 431 | X20CrNi17 2 |
| SUS440A | 440A | — |
| SUS440B | 440B | — |
| SUS440C | 440C | — |

### ● Austenitic Stainless Steels

| JIS | AISI | DIN |
|---|---|---|
| SUS201 | 201 | — |
| SUS202 | 202 | — |
| SUS301 | 301 | X12CrNi17 7 |
| SUS302 | 302 | — |
| SUS302B | 302B | — |
| SUS303 | 303 | X10CrNiS18 9 |
| SUS303Se | 303Se | — |
| SUS304 | 304 | X5CrNiS18 10 |
| SUS304L | 304L | X2CrNi19 11 |
| SUS304NI | 304N | — |
| SUS305 | 305 | X5CrNi18 12 |
| SUS308 | 308 | — |
| SUS309S | 309S | — |
| SUS310S | 310S | — |
| SUS316 | 316 | X5CrMo17 12 2 |
| SUS316L | 316L | X2CrNiMo17 13 2 |
| SUS316N | 316N | — |
| SUS317 | 317 | — |
| SUS317L | 317L | X2CrNiMo18 16 4 |
| SUS321 | 321 | X6CrNiTi18 10 |
| SUS347 | 347 | X6CrNiNb18 10 |
| SUS384 | 384 | — |

### ● Heat Resisting Steels

| | | |
|---|---|---|
| SUH31 | — | — |
| SUH35 | — | — |
| SUH36 | — | X53CrMnNi21 9 |
| SUH37 | — | — |
| SUH38 | — | — |
| SUH309 | 309 | — |
| SUH310 | 310 | CrNi2520 |
| SUH330 | N08330 | — |

### ● Ferritic Heat Resisting Steels

| | | |
|---|---|---|
| SUH21 | — | CrAl1205 |
| SUH409 | 409 | X6CrTi12 |
| SUH446 | 446 | — |

### ● Martensitic Heat Resisting Steels

| | | |
|---|---|---|
| SUH1 | — | X45CrSi9 3 |
| SUH3 | — | — |
| SUH4 | — | — |
| SUH11 | — | — |
| SUH600 | — | — |

# References

## Hardness Scale Comparision Chart

● Approx. metric value and Brinell hardness of steel

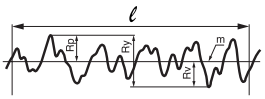
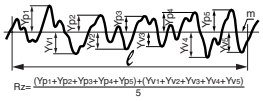
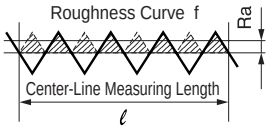
| Brinell Hardness 10mm Ball 3.000kgf (HB) | Rockwell Hardness | | | | Vickers Hardness 50kgf | Shore Hardness | Traverse Rupture Strength ($N/mm^2$) |
|---|---|---|---|---|---|---|---|
| | „A“ Scale Diamond, brale 60kgf (HRA) | „B“ Scale 100kgf 1/10“ Ball (HRB) | „C“ Scale Diamond, brale 150kgf (HRC) | „D“ Scale Diamond, brale 100kgf (HRD) | (HV) | (HS) | |
| — | 85,6 | — | 68,0 | 76,9 | 940 | 97 | — |
| — | 85,3 | — | 67,5 | 76,5 | 920 | 96 | — |
| — | 85,0 | — | 67,0 | 76,1 | 900 | 95 | — |
| 767 | 84,7 | — | 66,4 | 75,7 | 880 | 93 | — |
| 757 | 84,4 | — | 65,9 | 75,3 | 860 | 92 | — |
| 745 | 84,1 | — | 65,3 | 74,8 | 840 | 91 | — |
| 733 | 83,8 | — | 64,7 | 74,3 | 820 | 90 | — |
| 722 | 83,4 | — | 64,0 | 73,8 | 800 | 88 | — |
| 712 | — | — | — | — | — | — | — |
| 710 | 83,0 | — | 63,3 | 73,3 | 780 | 87 | — |
| 698 | 82,6 | — | 62,5 | 72,6 | 760 | 86 | — |
| 684 | 82,2 | — | 61,8 | 72,1 | 740 | — | — |
| 682 | 82,2 | — | 61,7 | 72,0 | 737 | 84 | — |
| 670 | 81,8 | — | 61,0 | 71,5 | 720 | 83 | — |
| 656 | 81,3 | — | 60,1 | 70,8 | 700 | — | — |
| 653 | 81,2 | — | 60,0 | 70,7 | 697 | 81 | — |
| 647 | 81,1 | — | 59,7 | 70,5 | 690 | — | — |
| 638 | 80,8 | — | 59,2 | 70,1 | 680 | 80 | — |
| 630 | 80,6 | — | 58,8 | 69,8 | 670 | — | — |
| 627 | 80,5 | — | 58,7 | 69,8 | 667 | 79 | — |
| 601 | 79,8 | — | 57,3 | 68,7 | 640 | 77 | — |
| 578 | 79,1 | — | 56,0 | 67,7 | 615 | 75 | — |
| 555 | 78,4 | — | 54,7 | 66,7 | 591 | 73 | 2055 |
| 534 | 77,8 | — | 53,5 | 65,8 | 569 | 71 | 1985 |
| 514 | 76,9 | — | 52,1 | 64,7 | 547 | 70 | 1890 |
| 495 | 76,3 | — | 51,0 | 63,8 | 528 | 68 | 1820 |
| 477 | 75,6 | — | 49,6 | 62,7 | 508 | 66 | 1730 |
| 461 | 74,9 | — | 48,5 | 61,7 | 491 | 65 | 1670 |
| 444 | 74,2 | — | 47,1 | 60,8 | 472 | 63 | 1585 |
| 429 | 73,4 | — | 45,7 | 59,7 | 455 | 61 | 1510 |
| 415 | 72,8 | — | 44,5 | 58,8 | 440 | 59 | 1460 |
| 401 | 72,0 | — | 43,1 | 57,8 | 425 | 58 | 1390 |
| 388 | 71,4 | — | 41,8 | 56,8 | 410 | 56 | 1330 |
| 375 | 70,6 | — | 40,4 | 55,7 | 396 | 54 | 1270 |
| 363 | 70,0 | — | 39,1 | 54,6 | 383 | 52 | 1220 |
| 352 | 69,3 | (110,0) | 37,9 | 53,8 | 372 | 51 | 1180 |
| 341 | 68,7 | (109,0) | 36,6 | 52,8 | 360 | 50 | 1130 |
| 331 | 68,1 | (108,5) | 35,5 | 51,9 | 350 | 48 | 1095 |

| Brinell Hardness 10mm Ball 3.000kgf (HB) | Rockwell Hardness | | | | Vickers Hardness 50kgf | Shore Hardness | Traverse Rupture Strength ($N/mm^2$) |
|---|---|---|---|---|---|---|---|
| | „A“ Scale Diamond, brale 60kgf (HRA) | „B“ Scale 100kgf 1/10“ Ball (HRB) | „C“ Scale Diamond, brale 150kgf (HRC) | „D“ Scale Diamond, brale 100kgf (HRD) | (HV) | (HS) | |
| 321 | 67,5 | (108,0) | 34,3 | 50,1 | 339 | 47 | 1060 |
| 311 | 66,9 | (107,5) | 33,1 | 50,0 | 328 | 46 | 1025 |
| 302 | 66,3 | (107,0) | 32,1 | 49,3 | 319 | 45 | 1005 |
| 293 | 65,7 | (106,0) | 30,9 | 48,3 | 309 | 43 | 970 |
| 285 | 65,3 | (105,5) | 29,9 | 47,6 | 301 | — | 950 |
| 277 | 64,6 | (104,5) | 28,8 | 46,7 | 292 | 41 | 925 |
| 269 | 64,1 | (104,0) | 27,6 | 45,9 | 284 | 40 | 895 |
| 262 | 63,6 | (103,0) | 26,6 | 45,0 | 276 | 39 | 875 |
| 255 | 63,0 | (102,0) | 25,4 | 44,2 | 269 | 38 | 850 |
| 248 | 62,6 | (101,0) | 24,2 | 43,2 | 261 | 37 | 825 |
| 241 | 61,8 | 100,0 | 22,8 | 42,0 | 253 | 36 | 800 |
| 235 | 61,4 | 99,0 | 21,7 | 41,4 | 247 | 35 | 785 |
| 229 | 60,8 | 98,2 | 20,5 | 40,5 | 241 | 34 | 765 |
| 223 | — | 97,3 | (18,8) | — | 234 | — | — |
| 217 | — | 96,4 | (17,5) | — | 228 | 33 | 725 |
| 212 | — | 95,5 | (16,0) | — | 222 | — | 705 |
| 207 | — | 94,6 | (15,2) | — | 218 | 32 | 690 |
| 201 | — | 93,8 | (13,8) | — | 212 | 31 | 675 |
| 197 | — | 92,8 | (12,7) | — | 207 | 30 | 655 |
| 192 | — | 91,9 | (11,5) | — | 202 | 29 | 640 |
| 187 | — | 90,7 | (10,0) | — | 196 | — | 620 |
| 183 | — | 90,0 | (9,0) | — | 192 | 28 | 615 |
| 179 | — | 89,0 | (8,0) | — | 188 | 27 | 600 |
| 174 | — | 87,8 | (6,4) | — | 182 | — | 585 |
| 170 | — | 86,8 | (5,4) | — | 178 | 26 | 570 |
| 167 | — | 86,0 | (4,4) | — | 175 | — | 560 |
| 163 | — | 85,0 | (3,3) | — | 171 | 25 | 545 |
| 156 | — | 82,9 | (0,9) | — | 163 | — | 525 |
| 149 | — | 80,8 | — | — | 156 | 23 | 505 |
| 143 | — | 78,7 | — | — | 150 | 22 | 490 |
| 137 | — | 76,4 | — | — | 143 | 21 | 460 |
| 131 | — | 74,0 | — | — | 137 | — | 450 |
| 126 | — | 72,0 | — | — | 132 | 20 | 435 |
| 121 | — | 69,8 | — | — | 127 | 19 | 415 |
| 116 | — | 67,6 | — | — | 122 | 18 | 400 |
| 111 | — | 65,7 | — | — | 117 | 15 | 385 |

1) Figures within the ( ) are not commonly used
2) Rockwell A, C and D scales utilises a diamond brale
3) 1 $N/mm^2$ = 1 MPa

## ■ Finished Surface Roughness

### ● Types of Surface Roughness Measurements

| Types | Symbol | Method of Determination | Descriptive Figure |
|---|---|---|---|
| Maximum Height | ※1) Ry | This is the value (expressed in µm) measured from the deepest valley to the highest peak of the reference line, ℓ, extracted from the profile.<br><br>(Disregard unusually high peaks and deep valleys as they are considered as flaws.) |  |
| Ten-point Mean Roughness | ※2) Rz | From the profile, extract a portion to be the reference line, ℓ.<br><br>Select the 5 highest peak and 5 deepest valleys. Measure the distance between the two lines and express it in µm.<br>(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) Ry : According to new **JIS B 0601**:2001 (Old symbol: Rz)
※2) Rz : According to new **JIS B 0601**:2001 (Old symbol: $Rz_{JIS}$)

| Designated values for ※1) Ry | Designated values for ※2) Rz | Designated values for Ra | Standard reference length values, ℓ (mm) | Triangular Symbols |
|---|---|---|---|---|
| (0,05S)<br>0,1S<br>0,2S<br>0,4S | (0,05Z)<br>0,1Z<br>0,2Z<br>0,4Z | (0,013a)<br>0,025a<br>0,05a<br>0,10a | — | ▽▽▽▽ |
| 0,8S | 0,8Z | 0,20a | 0,25 | |
| 1,6S<br>3,2S<br>6,3S | 1,6Z<br>3,2Z<br>6,3Z | 0,4a<br>0,8a<br>1,6a | 0,8 | ▽▽▽ |
| 12,5S<br>(18S)<br>25S | 12,5Z<br>(18Z)<br>25Z | 3,2a<br>6,3a | 2,5 | ▽▽ |
| (35S)<br>50S<br>(70S)<br>100S | (35Z)<br>50Z<br>(70Z)<br>100Z | 12,5a<br>25a | — | ▽ |
| (140S)<br>200S<br>(280S)<br>400S<br>(560S) | (140Z)<br>200Z<br>(280Z)<br>400Z<br>(560Z) | (50a)<br>(100a) | — | — |

Remarks: The designated values in the brackets do not apply unless otherwise stated.

# Spare Parts

P

P1 ~ P8

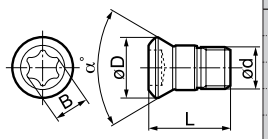



**Screw** ..... P2
**Lever Pin, Shim** ..... P4
**Shim Pin, Nut, Eccentric Pin** ..... P6
**Wrench** ..... P7

# Screw

## ■ Screw

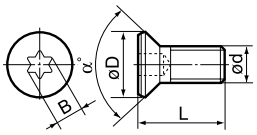
### High Precision Screw




| 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 |

### Torx Flat Head Screw

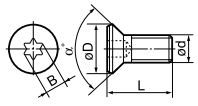
| Cat. No. | Stock | Dimensions (mm) | | | | | |
|---|---|---|---|---|---|---|---|
| | | d | Pitch | L | D | B | α° |
| **BFTX02508** | ● | M2,5 | 0,45 | 7,5 | 3,45 | T8 | 60 |
| **BFTX0309** | | M3 | 0,5 | 8,8 | 4,2 | T10 | 60 |
| **BFTX03508** | ● | M3,5 | 0,6 | 8 | 5,1 | T10 | 52 |
| **BFTX03584** | ● | 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 |




| 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 |

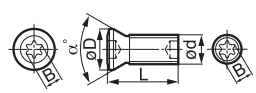
| Cat. No. | Stock | Dimensions (mm) | | | | | |
|---|---|---|---|---|---|---|---|
| | | d | Pitch | L | D | B | α° |
| **BFTX0203N** | ● | M2 | 0,4 | 3 | 2,7 | T6 | 60 |
| **BFTX0204N** | ● | M2 | 0,4 | 4,3 | 2,7 | T6 | 60 |
| **BFTX02205N** | ● | M2,2 | 0,45 | 4,5 | 3 | T6 | 60 |
| **BFTX02505N** | ● | 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 | 60 |

### Torx Flat Head Screw




| Cat. No. | Stock | Dimensions (mm) | | | | | |
|---|---|---|---|---|---|---|---|
| | | d | Pitch | L | D | B | α° |
| **BFTX0307 IP** | ● | M3 | 0,5 | 7 | 4,3 | 10IP | 55 |
| **BFTX03512 IP** | ● | M3,5 | 0,6 | 11,5 | 5,3 | 15IP | 60 |

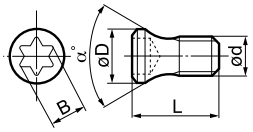
### Torx Flat Head Screw




| 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

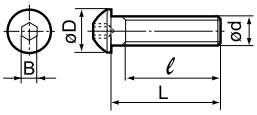
### Torx Flat Head Screw




| 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

Hexagonal Hole Type



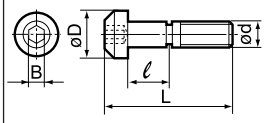

T Type with Torx Hole




(BH410T)

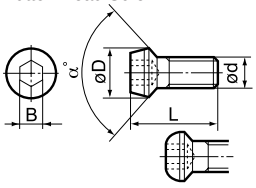
| Cat. No. | Stock | Dimensions (mm) | | | | | |
|---|---|---|---|---|---|---|---|
| | | d | Pitch | L | ℓ | D | B |
| **BH0304** | | M3 | 0,5 | 4 | Full | 5,5 | 2 |
| **BH0306** | ● | M3 | 0,5 | 6 | Full | 5,5 | 2 |
| **FBUP3-A0-9 (=BH0308)** | ● | M3 | 0,5 | 8 | Full | 5,5 | 2 |
| **BH0310** | ● | 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



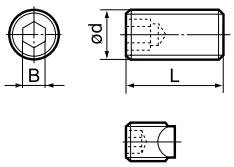

| Cat. No. | Stock | Dimensions (mm) | | | | | |
|---|---|---|---|---|---|---|---|
| | | d | Pitch | L | ℓ | D | B |
| **BHA0525** | ● | M5 | 0,8 | 25,5 | 9,5 | 8,5 | 3 |
| **BHA0625** | ● | M6 | 1,0 | 30 | 11,3 | 10,5 | 4 |
| **BHE0407** | ● | M4 | 0,7 | 9,5 | 2 | 5,7 | 2,5 |
| **BHE0510** | | M5 | 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 |

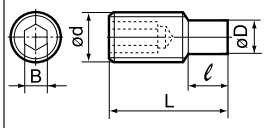
### Set Screw




| 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 | – |

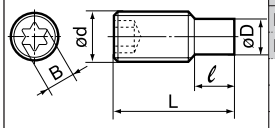
## ■ Screw

### Set Screw



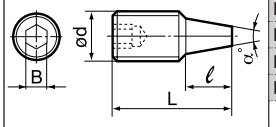

| Cat. No. | Stock | Dimensions (mm) | | | | | |
|---|---|---|---|---|---|---|---|
| | | d | Pitch | L | ℓ | D | B |
| **BTD0408** | | M4 | 0,7 | 8 | 2 | 2,8 | 2 |
| **BTD0410** | | M4 | 0,7 | 10 | 2 | 2,8 | 2 |
| **BTD0412** | | M4 | 0,7 | 12 | 2 | 2,8 | 2 |
| **BTD0508** | | M5 | 0,8 | 8 | 3 | 3,5 | 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



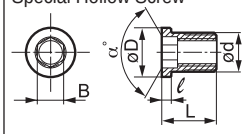

| Cat. No. | Stock | Dimensions (mm) | | | | | |
|---|---|---|---|---|---|---|---|
| | | d | Pitch | L | ℓ | D | B |
| **BTD0615T** | | M6 | 1,0 | 15 | 5 | 4 | T20 |
| **BTD0620T** | | M6 | 1,0 | 20 | 5 | 4,3 | T20 |

### Set Screw



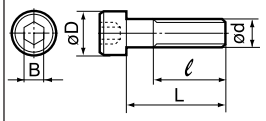

| Cat. No. | Stock | Dimensions (mm) | | | | | |
|---|---|---|---|---|---|---|---|
| | | d | Pitch | L | ℓ | B | α° |
| **BTT0407** | ● | M4 | 0,5 | 7 | 2,6 | 2 | 60 |
| **BTT0411** | ● | M4 | 0,5 | 11 | 2,6 | 2 | 60 |
| **BTT0511** | | M5 | 0,8 | 11 | 5 | 2 | 60 |
| **BTT0615** | | M6 | 1,0 | 15 | 6 | 2,6 | 60 |

### Special Hollow Screw



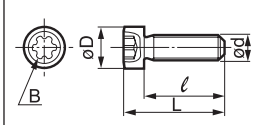

| Cat. No. | Stock | Dimensions (mm) | | | | | |
|---|---|---|---|---|---|---|---|
| | | d | Pitch | L | ℓ | D | B |
| **BW0507F** | ● | M5 | 0,5 | 7 | 1,2 | 6,3 | 3,5 |
| **BW0609F** | ● | M6 | 0,8 | 9 | 1,5 | 7,7 | 4 |

### Cap Screw




| Cat. No. | Stock | Dimensions (mm) | | | | | |
|---|---|---|---|---|---|---|---|
| | | d | Pitch | L | ℓ | D | B |
| **BX0308** | | M3 | 0,5 | 8 | Full | 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 |

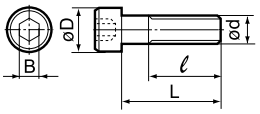
### Torx Screw




| Cat. No. | Stock | Dimensions (mm) | | | | | |
|---|---|---|---|---|---|---|---|
| | | d | Pitch | L | ℓ | D | B |
| **BXD 02208 IP** | ● | M2,2 | 0,45 | 7,5 | 5,7 | 3,5 | 8 IP |
| **BXD 02509 IP** | ● | M2,5 | 0,45 | 9 | 7 | 4,1 | 10IP |
| **BXD 03011 IP** | ● | M3 | 0,5 | 10,5 | 8 | 4,9 | 15IP |
| **BXD 03512 IP** | ● | M3,5 | 0,6 | 11,5 | 8,8 | 5,5 | 15IP |
| **BXD 04014 IP** | ● | M4 | 0,7 | 12,5 | 9,5 | 6 | 20IP |
| **BXD 04519 IP** | | M4,5 | 0,75 | 14,3 | 10,8 | 6,8 | 25IP |

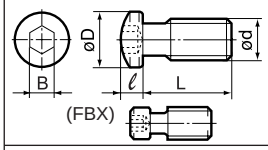
## ■ Screw

### Cap Screw



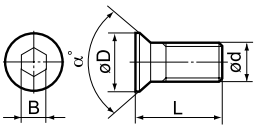

| Cat. No. | Stock | Dimensions (mm) | | | | | |
|---|---|---|---|---|---|---|---|
| | | d | Pitch | L | ℓ | D | B |
| **EHBX0512** | ● | M5 | 0,8 | 12 | 10,5 | 8 | 4 |

### Fastener Bolt



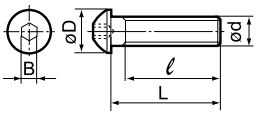

| Cat. No. | Stock | Dimensions (mm) | | | | | |
|---|---|---|---|---|---|---|---|
| | | d | Pitch | L | ℓ | D | B |
| **FBH0512** | ● | M5 | 0,8 | 12 | 3,1 | 7,3 | 3 |
| **FBX0811** | ● | M8 | 1,25 | 11 | 4,9 | 8,5 | 4 |
| **FBX0817** | ● | M8 | 1,25 | 17 | 5 | 8,5 | 4 |

### Flat Head Screw



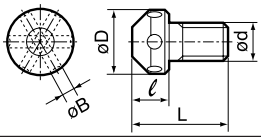

| Cat. No. | Stock | Dimensions (mm) | | | | | |
|---|---|---|---|---|---|---|---|
| | | d | Pitch | L | ℓ | B | α° |
| **FBUP1-A0-8** | | M3 | 0,5 | 6 | 4,4 | 2 | 82 |
| **FBUP1-V0-8** | | M3 | 0,5 | 6 | 5,6 | 2 | 82 |
| **FBUP2-A0-8** | | M3 | 0,5 | 10 | 5,5 | 2 | 82 |
| **FBUP3-A0-8** | | M3,5 | 0,6 | 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



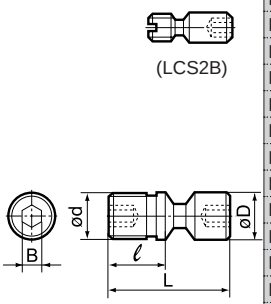

| Cat. No. | Stock | Dimensions (mm) | | | | | |
|---|---|---|---|---|---|---|---|
| | | d | Pitch | L | ℓ | D | B |
| **FBUP3-A0-9** | ● | M3 | 0,5 | 8 | Full | 5,5 | 2 |

### 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

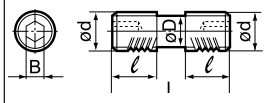



| Cat. No. | Stock | Dimensions (mm) | | | | | |
|---|---|---|---|---|---|---|---|
| | | d | Pitch | L | ℓ | D | B |
| **LCS2B** | | M3 | 0,5 | 10 | 3 | 3,6 | 2 |
| **LCS3** | ● | M6 | 1,0 | 17 | 10 | 6 | 2,5 |
| **LCS3B-SD** | ● | M5 | 0,8 | 9,5 | 4,2 | 5 | 2 |
| **LCS3DB-SD** | ● | M5 | 0,8 | 12 | 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 |

# Screw, Lever Pin, Shim

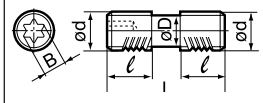
## ■ Screw

Double Screw



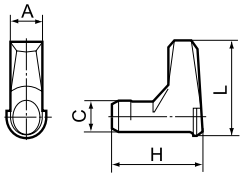

| Cat. No. | Stock | Dimensions (mm) | | | | | |
|---|---|---|---|---|---|---|---|
| | | d | Pitch | L | ℓ | D | B |
| **WB4-8** | | M4 | 0,7 | 7,5 | 3 | 3,0 | 2 |
| **WB5-10** | ● | M5 | 0,8 | 10 | 4 | 3,8 | 2,5 |
| **WB5-12** | ● | M5 | 0,8 | 12 | 5 | 3,8 | 2,5 |
| **WB5-18** | | M5 | 0,8 | 18 | 6 | 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

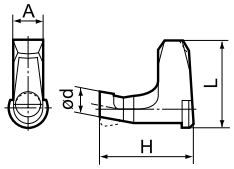



| Cat. No. | Stock | Dimensions (mm) | | | | | |
|---|---|---|---|---|---|---|---|
| | | d | Pitch | L | ℓ | D | B |
| **WB6-16T** | | M6 | 1,0 | 14 | 6 | 4,5 | T20 |
| **WB6-24T** | | M6 | 1,0 | 24 | 8,5 | 4,5 | T20 |
| **WB7-15T** | ● | M7 | 1,0 | 15 | 5,5 | 5 | T25 |
| **WB7F-15T** | ● | M7 | 0,75 | 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

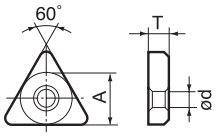



| Cat. No. | Stock | Dimensions (mm) | | | | | |
|---|---|---|---|---|---|---|---|
| | | A | H | L | C | – | – |
| **LCL3** | | 3,7 | 12 | 10 | 3,6 | – | – |
| **LCL3-SD** | ● | 3,7 | 12 | 10 | 3,55 | – | – |
| **LCL3C-SD** | ● | 3,1 | 7,8 | 9,9 | 3,1 | – | – |
| **LCL3D-SD** | ● | 3,7 | 11,5 | 12 | 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 | – | – |

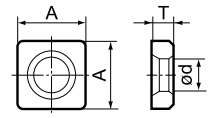



| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **LCL06** | ● | 2,5 | 6,2 | 7,0 | 2,1 | – | – |
| **LCL09** | ● | 3,5 | 9,3 | 10,8 | 3,2 | – | – |
| **LCL10** | ● | 3,4 | 11,8 | 10,8 | 3 | – | – |
| **LCL12** | ● | 3,7 | 13,4 | 12,9 | 3,5 | – | – |
| **LCL16** | ● | 4,6 | 17,6 | 18,4 | 4,4 | – | – |
| **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 | – | – |

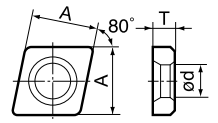
## ■ Shim



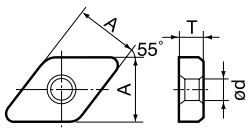

| Cat. No. | Stock | Dimensions (mm) | | | | | |
|---|---|---|---|---|---|---|---|
| | | A | T | d | – | – | – |
| **LST317SD** | ● | 9,5 | 2,7 | 5,2 | – | – | – |
| **LST42SD** | ● | 12,65 | 3,18 | 6,9 | – | – | – |
| **LST53SD** | | 15,85 | 4,76 | 7,9 | – | – | – |



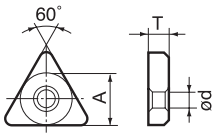

| Cat. No. | Stock | Dimensions (mm) | | | | | |
|---|---|---|---|---|---|---|---|
| | | d | Pitch | L | D | B | α° |
| **LSS32SD** | ● | 9,48 | 3,18 | 5 | – | – | – |
| **LSS42SD** | ● | 12,65 | 3,18 | 6,9 | – | – | – |
| **LSS53SD** | | 15,85 | 4,76 | 7,9 | – | – | – |
| **LSS63SD** | ● | 19 | 4,76 | 10 | – | – | – |
| **LSS84** | | 25,35 | 6,35 | 13,2 | – | – | – |



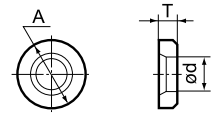

| Cat. No. | Stock | Dimensions (mm) | | | | | |
|---|---|---|---|---|---|---|---|
| | | A | T | d | – | – | – |
| **LSC32SD** | ● | 9,48 | 3,18 | 5 | – | – | – |
| **LSC42SD** | ● | 12,65 | 3,18 | 6,9 | – | – | – |
| **LSC53SD** | ● | 15,85 | 4,76 | 7,9 | – | – | – |
| **LSC63SD** | | 19 | 4,76 | 10 | – | – | – |
| **LSC317** | | 9,5 | 2,7 | 5,2 | – | – | – |



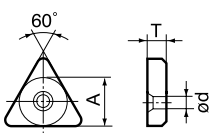

| Cat. No. | Stock | Dimensions (mm) | | | | | |
|---|---|---|---|---|---|---|---|
| | | A | T | d | – | – | – |
| **LSD32SD** | ● | 8,5 | 3,18 | 5 | – | – | – |
| **LSD42SD** | ● | 12,65 | 3,18 | 6,9 | – | – | – |



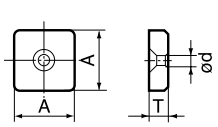

| Cat. No. | Stock | Dimensions (mm) | | | | | |
|---|---|---|---|---|---|---|---|
| | | A | T | d | – | – | – |
| **LST317CA** | | 9,33 | 2,7 | 5 | – | – | – |
| **LST42CA** | | 12,5 | 3,2 | 6,7 | – | – | – |




| Cat. No. | Stock | Dimensions (mm) | | | | | |
|---|---|---|---|---|---|---|---|
| | | A | T | d | – | – | – |
| **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 | – | – | – |



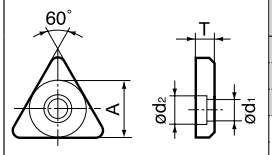

| Cat. No. | Stock | Dimensions (mm) | | | | | |
|---|---|---|---|---|---|---|---|
| | | A | T | d | – | – | – |
| **STND323** | | 9,3 | 3,18 | 3,4 | – | – | – |
| **STND433** | | 12,5 | 4,76 | 3,4 | – | – | – |



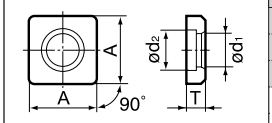

| Cat. No. | Stock | Dimensions (mm) | | | | | |
|---|---|---|---|---|---|---|---|
| | | A | T | d | – | – | – |
| **SSND423** | ● | 12,5 | 3,18 | 3,4 | – | – | – |
| **SSND533** | | 15,65 | 4,76 | 3,4 | – | – | – |

# Shim

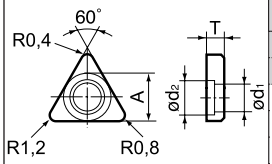
## ■ Shim



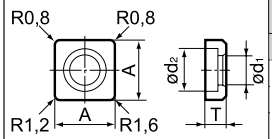

| Cat. No. | Stock | Dimensions (mm) | | | | | |
|---|---|---|---|---|---|---|---|
| | | A | T | $d_1$ | $d_2$ | – | – |
| **STW323** | ● | 9,5 | 3,18 | 4,7 | 6,5 | – | – |
| **STW333** | ● | 9,5 | 4,76 | 4,7 | 6,5 | – | – |
| **STW434** | ● | 12,65 | 4,76 | 6,2 | 8 | – | – |



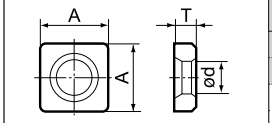

| Cat. No. | Stock | Dimensions (mm) | | | | | |
|---|---|---|---|---|---|---|---|
| | | A | T | $d_1$ | $d_2$ | – | – |
| **SSW423** | ● | 12,65 | 3,18 | 6,2 | 8 | – | – |
| **SSW433** | ● | 12,65 | 4,76 | 6,2 | 8 | – | – |
| **SSW635** | ● | 19 | 4,76 | 9 | 11,5 | – | – |



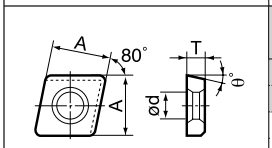

| Cat. No. | Stock | Dimensions (mm) | | | | | |
|---|---|---|---|---|---|---|---|
| | | A | T | $d_1$ | $d_2$ | – | – |
| **EST32** | | 9,53 | 3,18 | 5,5 | 5,9 | – | – |
| **EST43** | | 12,7 | 4,76 | 7,5 | 7,9 | – | – |



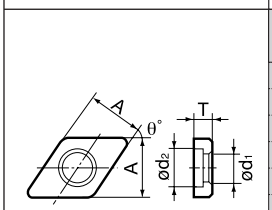

| Cat. No. | Stock | Dimensions (mm) | | | | | |
|---|---|---|---|---|---|---|---|
| | | A | T | $d_1$ | $d_2$ | – | – |
| **ESS42** | | 12,7 | 3,18 | 7,5 | 7,9 | – | – |



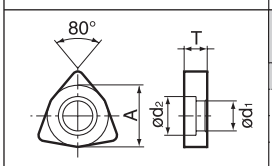

| Cat. No. | Stock | Dimensions (mm) | | | | | |
|---|---|---|---|---|---|---|---|
| | | A | T | d | – | – | θ° |
| **LSS42CA** | | 12,5 | 3,2 | 6,7 | – | – | 8 |
| **LSS53CA** | | 15,68 | 4,8 | 7,7 | – | – | 10 |




| 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 |

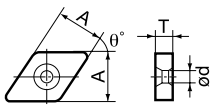



| Cat. No. | Stock | Dimensions (mm) | | | | | |
|---|---|---|---|---|---|---|---|
| | | A | T | d | – | – | θ° |
| **SVW322** | | 9,5 | 3,18 | 4,7 | 6,5 | – | 35 |
| **SFW423** | | 12,65 | 3,18 | 6,2 | 8,0 | – | 50 |
| **SFW433** | | 12,65 | 4,76 | 6,2 | 8,0 | – | 50 |
| **SDW323** | | 9,5 | 3,18 | 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 |

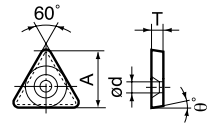



| Cat. No. | Stock | Dimensions (mm) | | | | | |
|---|---|---|---|---|---|---|---|
| | | A | T | $d_1$ | $d_2$ | – | – |
| **SWW433** | ● | 12,65 | 4,76 | 6,2 | 8 | – | |

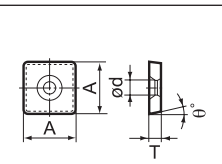
## ■ Shim



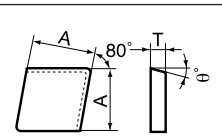

| Cat. No. | Stock | Dimensions (mm) | | | | | |
|---|---|---|---|---|---|---|---|
| | | A | T | d | – | – | θ° |
| **SDND433** | | 12,65 | 4,76 | 3,4 | – | – | 55 |
| **SEND423** | | 12,5 | 3,18 | 3,4 | – | – | 75 |
| **SCND433** | ● | 12,65 | 4,76 | 3,4 | – | – | 80 |



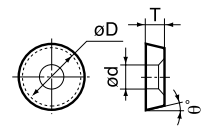

| Cat. No. | Stock | Dimensions (mm) | | | | | |
|---|---|---|---|---|---|---|---|
| | | A | T | d | – | – | θ° |
| **STPD322** | ● | 8,4 | 3,18 | 3,4 | – | – | 6 |
| **STPD422** | ● | 11,0 | 11,0 | 3,4 | – | – | 6 |
| **STPL42** | | 11,0 | 3,18 | 3,4 | – | – | 6 |



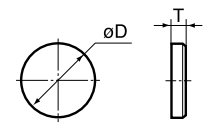

| Cat. No. | Stock | Dimensions (mm) | | | | | |
|---|---|---|---|---|---|---|---|
| | | A | T | d | – | – | θ° |
| **SSPD422** | | 11,6 | 3,18 | 3,4 | — | — | 6 |
| **SSPD522** | | 14,1 | 3,18 | 3,4 | — | — | 6 |



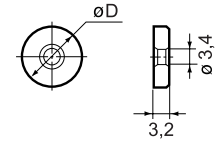

| Cat. No. | Stock | Dimensions (mm) | | | | | |
|---|---|---|---|---|---|---|---|
| | | A | T | d | – | – | θ° |
| **SCN204** | | 8,7 | 2,04 | – | – | – | 7 |



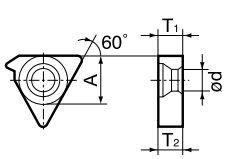

| Cat. No. | Stock | Dimensions (mm) | | | | | |
|---|---|---|---|---|---|---|---|
| | | D | T | d | – | – | θ° |
| **SRPH163** | | 14 | 3,2 | 5,3 | – | – | 11 |
| **SRPH203** | | 18 | 3,2 | 6,3 | – | – | 11 |



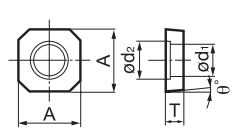

| Cat. No. | Stock | Dimensions (mm) | | | | | |
|---|---|---|---|---|---|---|---|
| | | D | T | – | – | – | – |
| **BNRS120** | | 11,2 | 4 | – | – | – | – |
| **BNRS160** | | 15,2 | 4 | – | – | – | – |
| **BNRS200** | | 19,2 | 4 | – | – | – | – |
| **BNRS290** | | 28,2 | 4 | – | – | – | – |




| Cat. No. | Stock | Dimensions (mm) | | | | | |
|---|---|---|---|---|---|---|---|
| | | D | – | – | – | – | – |
| **SRND32** | ● | 9,5 | – | – | – | – | – |
| **SRND42** | ● | 12,7 | – | – | – | – | – |



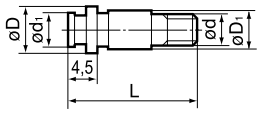

| Cat. No. | Stock | Dimensions (mm) | | | | | |
|---|---|---|---|---|---|---|---|
| | | A | $T_1$ | $T_2$ | d | – | – |
| **LSTE31-0** | ● | 9,5 | 2,7 | 2,7 | 5,2 | – | – |
| **LSTE31-1** | ● | 9,5 | 2,67 | 2,91 | 5,2 | – | – |
| **LSTE31-2** | ● | 9,5 | 2,64 | 3,11 | 5,2 | – | – |
| **LSTE42-0** | | 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 | – | – |



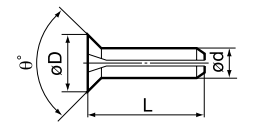

| Cat. No. | Stock | Dimensions (mm) | | | | | |
|---|---|---|---|---|---|---|---|
| | | A | T | $d_1$ | $d_2$ | – | θ° |
| **WGCS13R** | | 10,7 | 3,0 | 5,5 | 7,5 | – | 5 |

# Shim Pin, Nut, Eccentric Pin

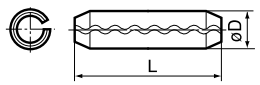
## ■ Shim Pin



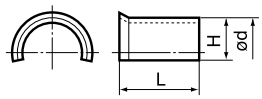

| Cat. No. | Stock | Dimensions (mm) | | | | | |
|---|---|---|---|---|---|---|---|
| | | d | Pitch | L | D | $D_1$ | $d_1$ |
| **MP317** | ● | M4 | 0,7 | 15,5 | 6 | 4 | 3,7 |
| **MP320** | ● | M4 | 0,7 | 19,5 | 6 | 4 | 3,7 |
| **MP416** | ● | M5 | 0,8 | 14 | 7,5 | 6 | 5 |
| **MP420** | ● | M5 | 0,8 | 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 | – |

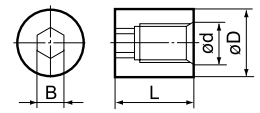



| Cat. No. | Stock | Dimensions (mm) | | | | | |
|---|---|---|---|---|---|---|---|
| | | – | – | L | D | – | – |
| **SPP3** | ● | – | – | 16 | 3 | – | – |

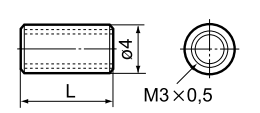



| Cat. No. | Stock | Dimensions (mm) | | | | | |
|---|---|---|---|---|---|---|---|
| | | d | H | L | – | – | – |
| **LSP3SD** | ● | 5 | 3,5 | 5,5 | – | – | – |
| **LSP4SD** | ● | 6,7 | 4 | 7 | – | – | – |
| **LSP5SD** | ● | 7,7 | 4,5 | 8,5 | – | – | – |
| **LSP6SD** | ● | 9,85 | 5,9 | 11,1 | – | – | – |
| **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

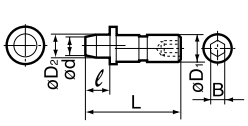



| Cat. No. | Stock | Dimensions (mm) | | | | | |
|---|---|---|---|---|---|---|---|
| | | d | L | D | B | – | – |
| **CPM32N** | ● | M4 | 7,5 | 7 | 3 | – | – |
| **CPM43N** | ● | M5 | 8,5 | 7 | 3 | – | – |
| **CPM43S** | ● | M5 | 6 | 7 | 3 | – | – |

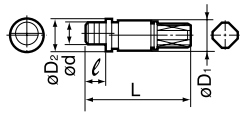



| Cat. No. | Stock | Dimensions (mm) | | | | | |
|---|---|---|---|---|---|---|---|
| | | L | – | – | – | – | – |
| **BNBW-2** | ● | 3 | – | – | – | – | – |
| **BNBW-4** | ● | 5 | – | – | – | – | – |
| **BNBW-7** | ● | 8 | – | – | – | – | – |

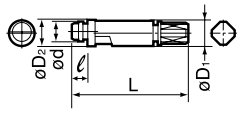
## ■ Eccentric Pin



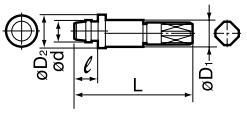

| Cat. No. | Stock | Dimensions (mm) | | | | | |
|---|---|---|---|---|---|---|---|
| | | d | $D_1$ | $D_2$ | L | ℓ | B |
| **CPB32C** | | 3,3 | 4,1 | 5,5 | 14 | 3,4 | 2,5 |
| **CPB34** | ● | 3,4 | 4,1 | 5,5 | 14 | 5 | 2,5 |
| **CPB35** | | 3,4 | 4,1 | 5,5 | 17 | 5 | 2,5 |
| **CPB42** | ● | 4,5 | 5,5 | 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 |



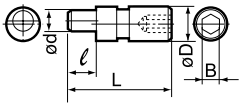

| Cat. No. | Stock | Dimensions (mm) | | | | | |
|---|---|---|---|---|---|---|---|
| | | d | $D_1$ | $D_2$ | L | ℓ | - |
| **P221US** | | 2,11 | 3,5 | 4 | 18 | 3,3 | – |
| **P322US** | | 3,635 | 5 | 5,5 | 21 | 3,3 | – |
| **P323US** | | 3,635 | 5 | 5,5 | 24 | 3,3 | – |
| **P332US** | | 3,635 | 5 | 5,5 | 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 | – |

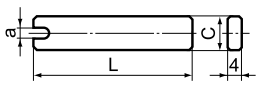



| Cat. No. | Stock | Dimensions (mm) | | | | | |
|---|---|---|---|---|---|---|---|
| | | d | $D_1$ | $D_2$ | L | ℓ | B |
| **CPU304C** | ● | 3,3 | 5,5 | – | 10 | 3,5 | 3 |

# Wrench

## ■Wrench

Key Wrench



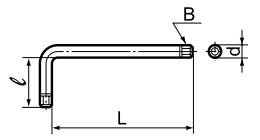

| Cat. No. | Stock | Dimensions (mm) | | | | | |
|---|---|---|---|---|---|---|---|
| | | L | a | – | C | – | – |
| KY25 | | 45 | 2,5 | – | 10 | – | – |
| KY40 | | 60 | 4 | – | 13 | – | – |

Hex Wrench (Hexagonal)



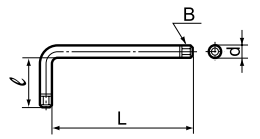

| Cat. No. | Stock | Dimensions (mm) | | | | | |
|---|---|---|---|---|---|---|---|
| | | B | L | ℓ | – | – | – |
| LH015 | | 1,5 | 52 | 8 | – | – | – |
| LH020 | ● | 2 | 58 | 12 | – | – | – |
| LH025 | ● | 2,5 | 60 | 15 | – | – | – |
| LH030 | ● | 3 | 65 | 20 | – | – | – |
| LH035 | ● | 3,5 | 70 | 25 | – | – | – |
| LH040 | ● | 4 | 72 | 25 | – | – | – |
| LH050 | | 5 | 80 | 28 | – | – | – |
| LH060 | | 6 | 90 | 32 | – | – | – |

Torx Wrench



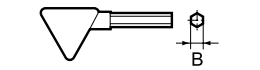

| Cat. No. | Stock | Dimensions (mm) | | | | | |
|---|---|---|---|---|---|---|---|
| | | B | d | L | ℓ | – | – |
| LT08-06 | | T8 | 2,3 | 45,0 | 6,0 | – | – |
| LT20 | ● | T20 | 3,9 | 57,2 | 19,1 | – | – |
| LT25 | ● | T25 | 4,4 | 60,3 | 20,2 | – | – |
| LT27 | | T27 | 5,0 | 63,5 | 21,5 | – | – |

"Torx Plus" Wrench



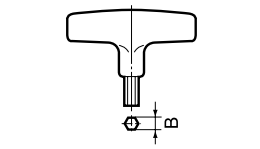

| Cat. No. | Stock | Dimensions (mm) | | | | | |
|---|---|---|---|---|---|---|---|
| | | B | d | L | ℓ | – | – |
| LT 20 IP | ● | T20 | 4,0 | 57 | 18,5 | – | – |
| LT 25 IP | ● | T25 | 4,5 | 60 | 19,5 | – | – |

Hex Wrench (Hexagonal)



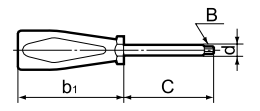

| Cat. No. | Stock | Dimensions (mm) | | | | | |
|---|---|---|---|---|---|---|---|
| | | B | – | – | – | – | – |
| TH015 | ● | 1,5 | – | – | – | – | – |
| TH020 | ● | 2 | – | – | – | – | – |
| TH025 | ● | 2,5 | – | – | – | – | – |

Hex Wrench (Hexagonal)



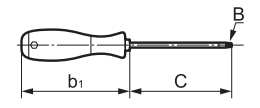

| Cat. No. | Stock | Dimensions (mm) | | | | | |
|---|---|---|---|---|---|---|---|
| | | B | – | – | – | – | – |
| TH030 | ● | 3 | – | – | – | – | – |
| TH040 | ● | 4 | – | – | – | – | – |
| TH050 | ● | 5 | – | – | – | – | – |

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 | – | – |

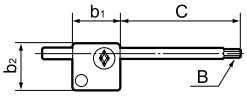
Torx Wrench




| Cat. No. | Stock | Dimensions (mm) | | | | | |
|---|---|---|---|---|---|---|---|
| | | B | C | $b_1$ | – | – | – |
| 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 | – | – | – |

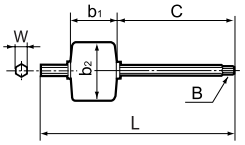
## ■Wrench

Torx Wrench



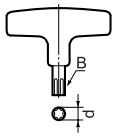

| Cat. No. | Stock | Dimensions (mm) | | | | | |
|---|---|---|---|---|---|---|---|
| | | B | C | $b_1$ | $b_2$ | – | – |
| TRX06 | ● | T6 | 34,5 | 15 | 15 | – | – |
| TRX08 | ● | T8 | 34,5 | 19 | 19 | – | – |
| TRX10 | ● | T10 | 42,5 | 22 | 22 | – | – |
| TRX15 | ● | T15 | 45 | 22 | 27 | – | – |
| TRX20 | ● | T20 | 49,0 | 22 | 30 | – | – |

Torx Plus & Hex Wrench



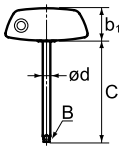

| Cat. No. | Stock | Dimensions (mm) | | | | | |
|---|---|---|---|---|---|---|---|
| | | B | W | L | C | $b_1$ | $b_2$ |
| TRX15 IP | ● | T15 | 3,5 | 85,5 | 47 | 23 | 29 |

Torx Wrench



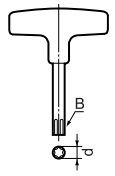

| Cat. No. | Stock | Dimensions (mm) | | | | | |
|---|---|---|---|---|---|---|---|
| | | B | d | – | – | – | – |
| TT25 | ● | T25 | 4,4 | – | – | – | – |
| TT27 | ● | T27 | 5,0 | – | – | – | – |

Torx Plus Wrench




| Cat. No. | Stock | Dimensions (mm) | | | | | |
|---|---|---|---|---|---|---|---|
| | | B | d | C | $b_1$ | – | – |
| TTR15 IP | ● | 15IP | 4,0 | 80 | 25,5 | – | – |

Torx Wrench




| Cat. No. | Stock | Dimensions (mm) | | | | | |
|---|---|---|---|---|---|---|---|
| | | B | d | – | – | – | – |
| TTX15W | ● | T15 | 4,0 | – | – | – | – |
| TTX20 | ● | T20 | 3,9 | – | – | – | – |

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CCGT******NAG ... C37 ... Indexable insert
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CCGW******NU-WG2 ..... M3 ..... SUMIBORON insert
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CCMT******L-DM NU ..... M4 ..... SUMIDIA insert
CCMT******NF ..... M4 ..... SUMIDIA insert
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CCMT******NLU ..... C38 ..... Indexable insert
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# Tool Engineering Services

In order to provide a higher level of support and satisfaction for our customers,
Sumitomo Electric Industries has created the Tool Engineering Service system.
We have created several Tool Engineering Centers around the world as bases for this support.
The Tool Engineering Centers provide a wide range of support to assist user manufacturing activities,
with services including training (at the Center), test cuts, technical consulting,
line diagnostics (at the user's site) and tooling proposals.




## Tool Engineering Center Locations

**Japan**

- ▶Itami Tool Engineering Center (**I-TEC**)
- ▶Yokohama Tool Engineering Center (**Y-TEC**)
- ▶Hokkaido Igetalloy Tool Engineering Center (**Hi-TEC**)
- ▶Tokai Tool Engineering Center (**T-TEC**)
- ▶Kyushu Tool Engineering Center (**K-TEC**)

**Overseas**

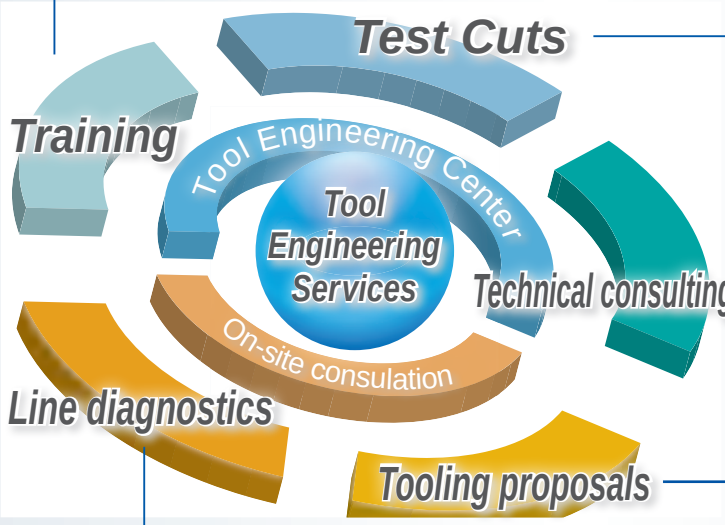
- ▶**Germany / European Design & Engineering Center** (**E-DEC**)
- ▶Thailand / Thailand Tool Engineering Center (**Ti-TEC**)
- ▶Shanghai / Shanghai Tool Engineering Center (**S-TEC**)

## 1 Trauning

To make it easy for anyone to take part, the Centers offer six training courses designed for a variety of different training objectives and participants.
*Contact your nearest SEI sales office for detailed training curricula.

## 2 Performance evaluation technology

To attain improvements in machining on sites, manufacturers must rely on more than just the subjective guidance provided by experience and instinct. Today's advanced measuring instruments can make machining phenomena observable, and clarify problems.




## 3 Test cuts and technical consulting

The Tool Engineering Centers can make test cuts on user workpieces, and work with users to create more detailed technical proposals. The Centers can also provide solutions to various machining problems, general line diagnostics for machining lines, and tooling support for new lines.
*Contact your nearest SEI sales office for more information.

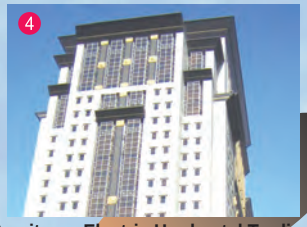
# Network

## Sales 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.



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



**Sumitomo Electric Hardmetal Trading (Shanghai) Co., Ltd.**
(Established in 2005 / Shanghai, China)
Subsidiary sales company for chinese market.



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

Approved to ISO9001 Reg. No. YKA0955989



**Sumitomo Electric Hardmetal Corp.**
(Head Office)




TEC

## Tool Engineering Center



**Domestic Network**

- **Itami Tooling Engineering Center (I-TEC)**, opened in 2006
- **Yokohama Tooling Engineering Center (Y-TEC)**, opened in 2008
- **Hokkaido Tooling Engineering Center (H-TEC)**, opened in 2009
- **Tokai Tooling Engineering Center (T-TEC)**, opened in 2011
- **Kzushu Tooling Engineering Center (K-TEC)**, opened in 2006

**Overseas Network**

- **Thai Tooling Engineering Center (Ti-TEC)**, opened in 2006
- **Shanhai Tooling Engineering Center (S-TEC)**, opened in 2011
- **Europe Design & Engineering Center (E-DEC)**, opened in 2012

## Production Network

Approved to ISO9001 Reg. No. YKA0955804



**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. GB11/82531



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

Approved to ISO9001 Reg. No. YKA200689



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

Approved to ISO9001 Reg. No. YKA200075



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

Approved to ISO9001 Reg. No. IRQSI0810488



**Motherson Techno Tools. Ltd.**
(Participation in 2005 / Noida, India)
Production of CBN / PCD tools and sales of carbide tools.



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



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

Approved to ISO9001 Reg. No. 63960-2009-AQ-GER-TGA



**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 Hardmetal de Mexico S.A. de C.V**
(Established in 2007 / Aguascalientes, Mexico)
Subsidiary sales company
for Mexico market.



**Sumitomo Electric Hardmetal do Brazil Ltda.**
(Established in 2012 / Campinas, Brazil)
Subsidiary sales company
for Brazil market.



**PT. Sumiden Powder Metal Indonesia**
(Established in 2012 / Jakarta, Indonesia)
Subsidiary sales company
for Indonesia market.



**Sumi Sertmetal Ticaret ve Sanayi Ltd. Şirketi**
(Established in 2012 / Istanbul, Turkey)
Subsidiary sales company
for Turkey market.



**Sumitcarbide Canada, Inc.**
(Established in 2012 / Toronto, Canada)
Subsidiary sales company
for Canada market.






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



**Sumitomo Electric Carbide Manufacturing (Changzhou) Co., Ltd.**
(Established in 2011 / Changzhou, China)
Production of carbide drills and PCD inserts.

Approved to ISO9001 Reg. No. JQA-QMA12384



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

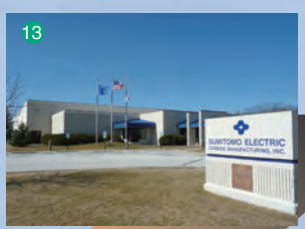
Approved to ISO9001 Reg. No. QC-QM-Z-04/019-001



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



**Sumitomo Electric Hartmetallfabrik GmbH, organizaci slozka.**
(Established in 2008 /
Jihlava, Czech Republic)
Production of MultiDrill and CBN tools.



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



**Sumitomo Electric Carbide Manufacturing, Inc. Master Tool Division**
(Established in 2007 / Cleveland, U.S.A.)
Production of specialtools for automotive
part specific and general tooling

SUMITOMO

CARBIDE - CBN - DIAMOND

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