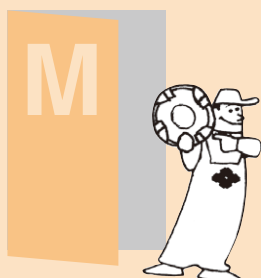


SUMIDIA/SUMIDIA Binderless SUMICRYSTAL M1 to M46

M



Grades	SUMIDIA Series	M2
	SUMIDIA DA1000	M3
Insert	 SUMIDIA BreakMaster LD Type / GD Type	M4
	SUMIDIA BreakMaster DM Type	M5
	SUMIDIA NF Type Inserts	M6
	SUMIDIA Insert Identification	M7
	SUMIDIA Indexable Inserts Stock List	M8
Tools	SUMIDIA Mini Boring Tools CKB Type	M24
	SUMIDIA Small Hole Boring Bar DABB Type	M25
Cutters, Endmills	High-Efficiency Aluminum Cutter HF Type	M26
	Aluminium Body Cutter RF Type	M30
	SUMIDIA Cutter For Aluminium SRF Type	M32
	SUMIDIA Cutter FAM Type / SAM Type	M34
	SUMIDIA Endmill SAM-E Type	M35
	SUMIDIA Mini-Cutter DFE Type	M36
	SUMIDIA Endmill DFE Type	M37
Drills	SUMIDIA Endmill DAE Type	M37
	SUMIDIA Drill DAL Type	M38
	SUMIDIA Drill DDL Type	M38

M SUMIDIA Binderless

Nano-Polycrystalline Diamond Tool SUMIDIA Binderless M40
MOLD FINISH MASTER SUMIDIA Binderless Ball-nose Endmills NPDB Type M41

M SUMICRYSTAL

SUMICRYSTAL M43
SUMICRYSTAL UP M45
SUMICRYSTAL PD / PDX M46

Stock Indications and Symbols

- mark: Standard stocked item
- mark: To be replaced by a new item featured on the same page
- ▲ mark: To be replaced by new item
(Please confirm stock availability)

- * mark: Semi-standard stock (Please confirm stock availability)
- mark: Stock or planned stock (Please confirm stock availability)
- No mark: Made-to-order item
- mark: We cannot produce

M1

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General Features

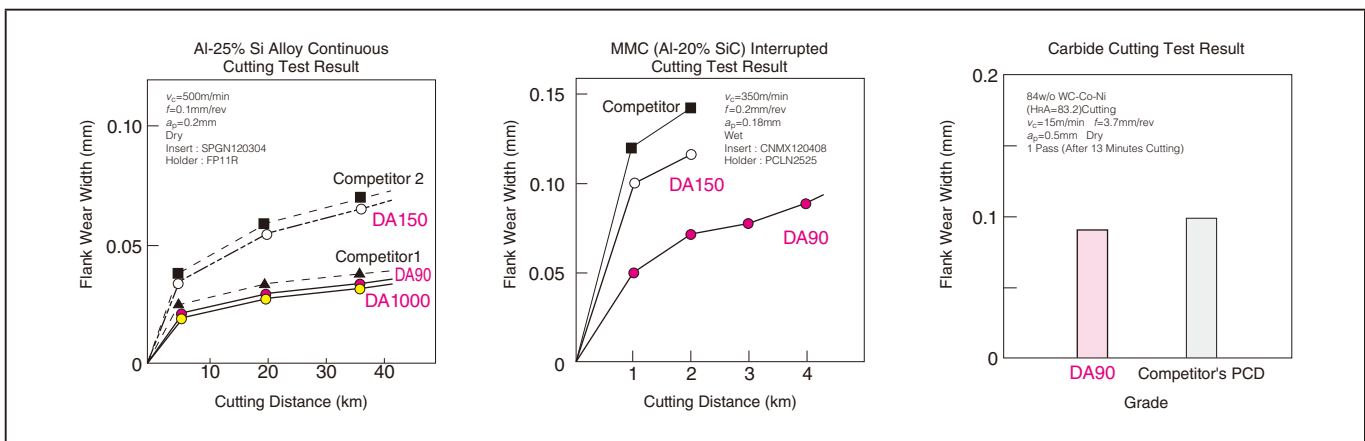
SUMIDIA is a unique series of sintered polycrystalline diamond grades, namely, DA90, DA150, DA2200 and DA1000.

The lineup covers a wide range of applications. DA90, DA150 and DA2200 use optimal combinations of diamond grain size and binder to produce their own individual characteristics, while DA1000 provides excellent strength, wear resistance and sharpness.

Series / Characteristics / Application

Grades	Characteristics	Application	Average Size of Diamond Grains (μm)	Hardness HV (GPa)	TRS (GPa)
DA1000	High density sintered material made of ultrafine diamond particles that demonstrates optimum wear and fracture resistance, and excellent edge sharpness.	- High-Silicon Aluminium Alloy Cutting - Rough, Interrupted and Finishing of Al-alloy - Wood or Wooden Board Cutting - Non-Ferrous Metal finishing (Aluminium, Copper Alloy)	Up to 0.5	110 to 120	≈ 2.6
DA2200	Sintered material made of ultra-fine diamond particles that demonstrates optimum wear and fracture resistance, and excellent edge sharpness.	- Rough, Interrupted and Finishing of Al-alloy - Wood or Wooden Board Cutting	0.5	90 to 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) - Carbide or Semi-Sintered Carbide & Ceramic Roughing - FRP, Hard Rubber & Carbon Cutting - Wooden or Inorganic Material Board Cutting	5	100 to 120	≈ 1.95
DA90	Contains coarser diamond grains than other grades. Therefore, it has good wear resistance suitable for the machining of carbides and high silicon aluminium.	- High-Silicon Aluminium Alloy Cutting - Sintered Carbide Cutting - Carbide Cutting - Green or Semi-Sintered Carbide & Ceramic Roughing - Sintered Ceramic Cutting - Stone or Rock Cutting	Up to 50	100 to 120	≈ 1.10

Performance



Recommended Cutting Conditions

Work Material	Cutting Speed v_c (m/min)	Feed Rate f (mm/rev)	Depth of Cut a_p (mm)
Aluminium Alloy	Up to 3,000	Up to 0.2	Up to 3
Copper Alloy	Up to 1,000	Up to 0.2	Up to 3
Reinforced Plastics	Up to 1,000	Up to 0.4	Up to 2
Wood or Organic Materials	Up to 4,000	Up to 0.4	—
Carbide	10 to 30	Up to 0.2	Up to 0.5
Carbon	100 to 600	1	Up to 2

SUMIDIA Grinding Method

Functions	Remarks
Grinding Machine	— A rigid, special-purpose grinding machine that is capable of wet grinding operations.
Grinding Wheel	Abrasive Grain Diamond
	Grain Size Rough Grinding: 400 mesh Finish Grinding: 800 to 1,500 mesh
	Bond Special Purpose Metal Bond for Diamond Sintered Tool or Vetrified
	Concentration 100 to 125
Grinding Conditions	Dressing Use a WA stick of about 400mesh
	Peripheral Speed 800 to 1,000 m/min
	Table Rocking 30 to 60 cycle/min
	Grinding Liquid Coolant Water Soluble Grinding Coolant (Solution Type)
Others	(1) The rake surface is generally lapped.
	(2) Inspect for edge chipping using a microscope with a magnification of 30 to 50 times.
	(3) Machining of non-ferrous metals require a sharp cutting edge.
	(4) Surfaces that were cut by EDM should have more than 0.05mm ground off.

SUMIDIA DA1000



■ Characteristics

High-density sintered ultra-fine diamond particles

- Significantly improved surface roughness on machined surfaces
- World's best wear resistance and strength
- High performance, high precision, high efficiency machining of all aluminum and non-ferrous alloys

■ Application Range

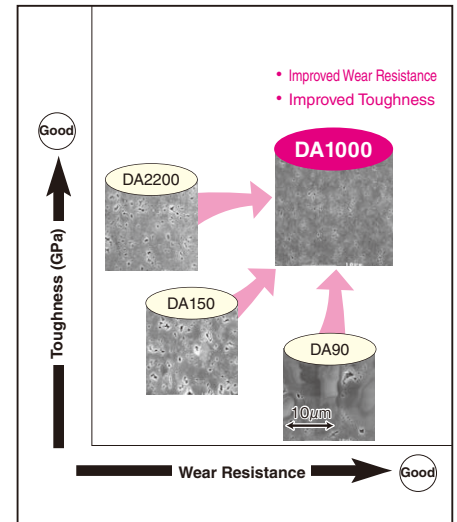
● Aluminum Alloy

Machinability	Work Material	Turning		Milling	Example Parts
		Roughing	Finishing		
(Good) ↑ ↕ ↓ (Diff)	Sintered Aluminum	DA1000 DA2200 DA150			Piston Liner
	Die Cast Aluminum (ADC12)				Transmission Case, Oil Pan, Cylinder Block, Aluminum Wheel, HDD
	Low Silicon (AC2B-T6, AC4C-T6)				Cylinder Head
	High Silicon (T6)				Cylinder Block

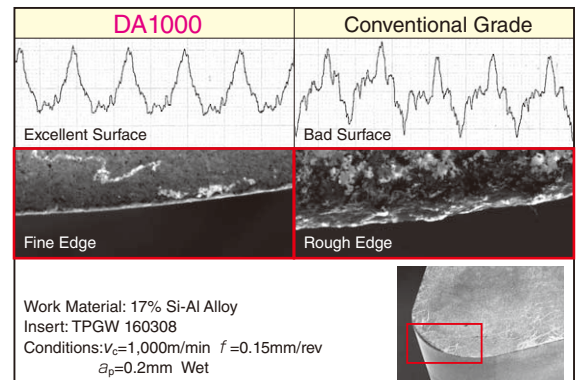
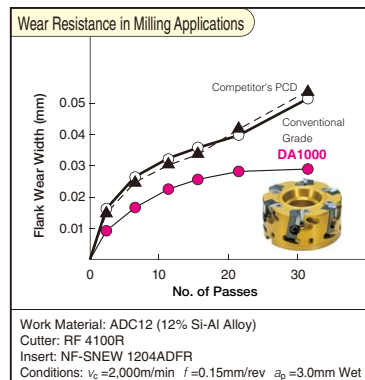
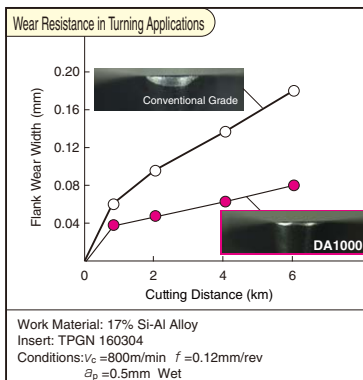
● Non-aluminium Alloy

Machinability	Work Material	Turning		Milling	Example Parts
		Roughing	Finishing		
(Good) ↑ ↕ ↓ (Diff)	Non-ferrous Sintered Alloy	DA1000 DA2200			Bush
	Gunmetal Carbon				Connecting Rod
	Carbide	DA90 DA150			Roll
	Fe Combined				Cylinder Block, Bearing Cap

■ Position of DA1000



■ Cutting Performance



Process	Cutting Conditions	Results
Bush Boring Cutting Distance 73m/Workpiece	Work Material: Copper Alloy $V_c=300\text{m/min}$, $f=0.07\text{mm/rev}$ $a_p=0.08\text{mm}$, Wet NF-TPGN160308 Surface Roughness: 3.2S	No. of workpieces DA1000 Conventional
Oil Pump Cover Milling Cutting Distance 62m/Workpiece	Work Material: ADC12 $V_c=1,400\text{m/min}$, $f=0.3\text{mm/rev}$ $a_p=0.2\text{mm}$, Wet NF-CNGX120408 Tool Life Criteria: Burring	No. of workpieces DA1000 Conventional
Cylinder Block Milling	Work Material: ADC12 $V_c=2,800\text{m/min}$, $f=0.14\text{mm/rev}$ $a_p=2\text{mm}$, Wet NF-SNEW1204ADFR Tool Life Criteria: Burring	No. of workpieces DA1000 Conventional

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BREAK MASTER LD/GD Type

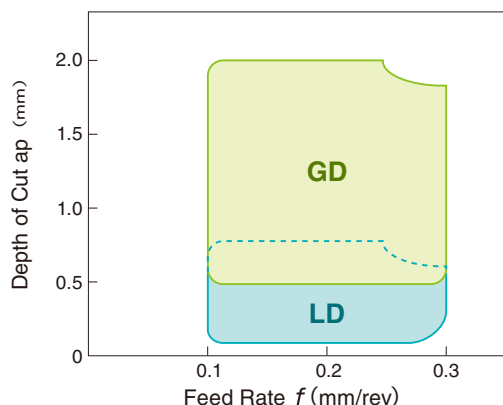


Characteristic

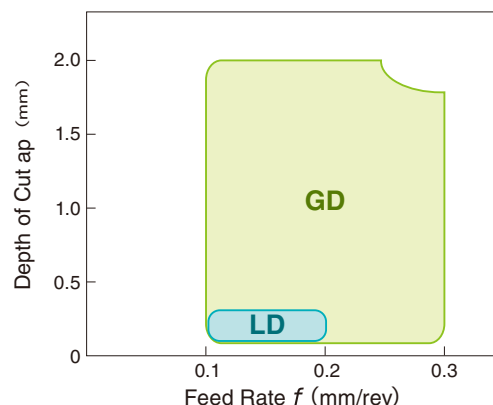
- Provides excellent chip control in medium finishing and finishing of aluminum alloy.
- Solves chip control problems and dramatically improves work efficiency.
- Achieves stable long tool life by employing high toughness grade DA1000.

Application Range

- Aluminum Alloys (A6061)

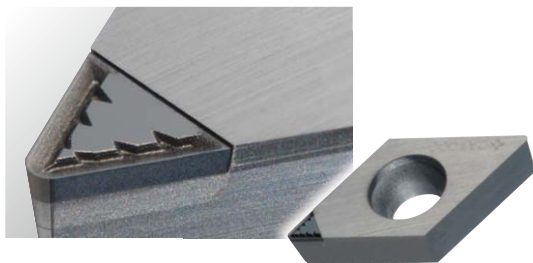


- Aluminum Alloy Castings (ADC12)



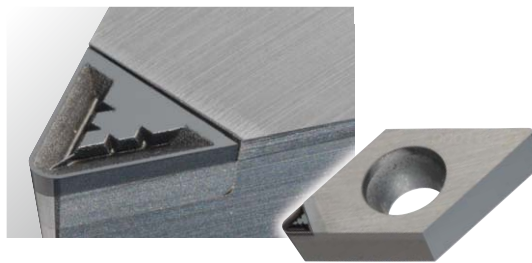
LD Type Chipbreaker for Finishing

Provides excellent chip control in finishing



GD Type Chipbreaker for Medium Finishing

Provides excellent chip control in medium finishing

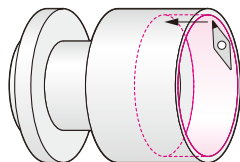


Comparison Test

Rolled Aluminum Alloy Machining

- Process : Boring of Machine Component

Provides good chip control in small-depth cutting of rolled material



Break Master LD Type



Without Chipbreaker Inserts

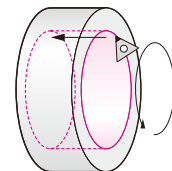
Work Material : A6061 Insert : NF-VCMT110302N-LD (DA1000)
Cutting Conditions : $v_c=200\text{m/min}$ $f=0.20\text{mm/rev}$ $a_p=0.10\text{mm}$ Wet

Comparison Test

Aluminum Alloy Casting Machining

- Process : Boring of Transmission Component

Finely broken chips in machining of casting material



Break Master GD Type

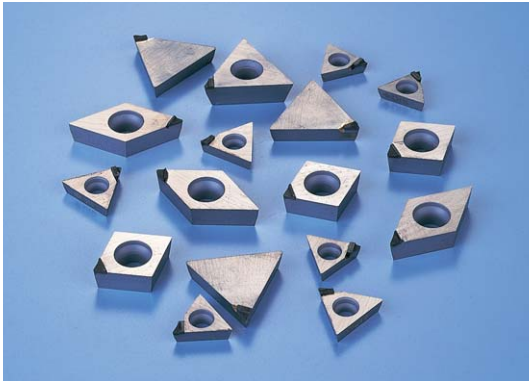


Without Chipbreaker Inserts

Work Material : ADC12 Insert : NF-TPMT110304N-GD (DA1000)
Cutting Conditions : $v_c=400\text{m/min}$ $f=0.23\text{mm/rev}$ $a_p=1.20\text{mm}$ Wet

Note: Regrinding this product will inversely affect chip control performance.

Break Master DM Type



■ Characteristics

● Economy One-Use Insert

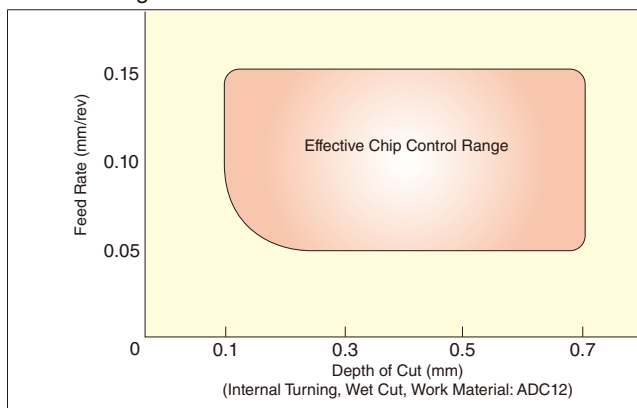
- Similar to SUMIBORON One-Use type inserts

● With Built-in Chipbreaker for Effective Chip Removal

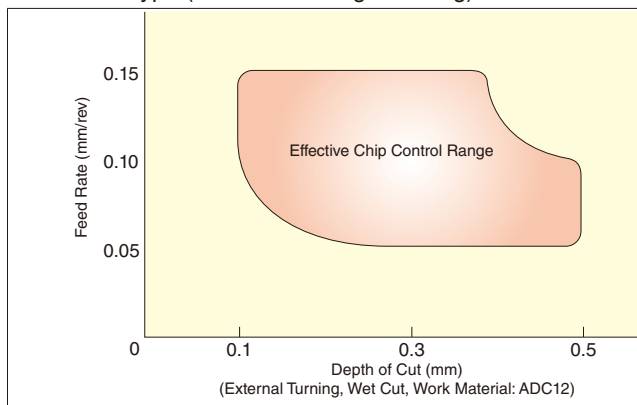
- Solving chip control problems and improving efficiency with DM-type chipbreaker.

■ Application Range

● For Boring



● DC&CC Type (External Turning & Facing)



■ Chip Control

● Break Master



● No Chipbreaker



■ Application Examples

Process	Cutting Conditions	Conditions
Operation: Internal Boring	Work Material: AC2A-T6 $v_c \approx 300$ m/min $f \approx 0.06$ mm/rev $a_p \approx 0.35$ mm Wet	Surface finish of the bore hole was less than $Ra=1\mu\text{m}$. Chips formed were of a uniform curl of about 2mm in length. There were almost no chips left inside the bore hole.

■ Recommended Cutting Conditions

● Boring (Triangular Insert)

Feed Rate f	Depth of Cut a_p	Coolant
Up to 0.15 mm/rev	Up to 0.7 mm	Wet

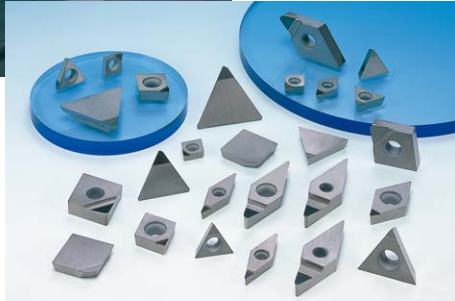
● External Copying (55°/80° Diamond Shaped Inserts)

Feed Rate f	Depth of Cut a_p	Coolant
Up to 0.15 mm/rev	Up to 0.5 mm	Wet

● For facing process, D.O.C. should be less than 0.4mm.

■ Series

Process	Boring	External Turning & Facing
Cartridge Unit	NU-TPMR1103 Type	—
	NU-TPMR1603 Type	—
Tool Holder	NU-TPMT0802 Type	NU-CCMT0602 Type
	NU-TPMT0902 Type	NU-CCMT09T3 Type
	NU-TPMT1102 Type	NU-DCMT0702 Type
	NU-TPMT1103 Type	NU-DCMT11T3 Type
	NU-TPMT1604 Type	—



■ Characteristics

● Total Cost Effectiveness with High Performance and Lower Price

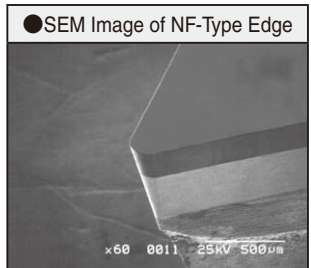
- Long, stable tool life and good fracture resistance with high toughness grade DA1000.
- Optimum design utilizing improved mass production techniques provides a relatively lower cost.
- Regrindable type results in huge total cost reduction.

● 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 and pin-lock type holders.

■ Performance

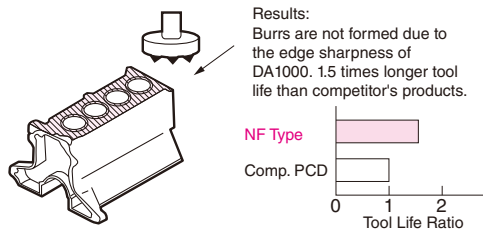
SUMIDIA NF type inserts use improved mass production techniques which maintain good performance yet offer higher cost efficiency. Coupled with SUMIDIA DA1000 grade, the strong cutting edges of NF type inserts give excellent surfaces finishes.



(NF-type is precision ground just like conventional inserts.)

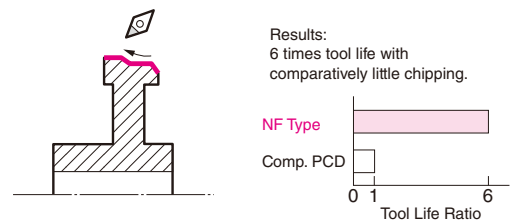
■ Application Examples

● Milling of Aluminum Cylinder Block



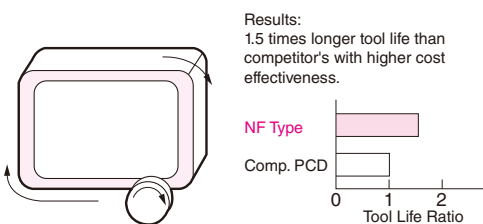
Work Material: ADC12 Insert: 15° Positive Milling Insert
Cutting Conditions: $v_c=1,000\text{m/min}$, $f_z=0.025\text{mm/t}$, $a_p=1.2\text{mm}$, Wet

● OD Turning of Aluminum Alloy Electronics Part



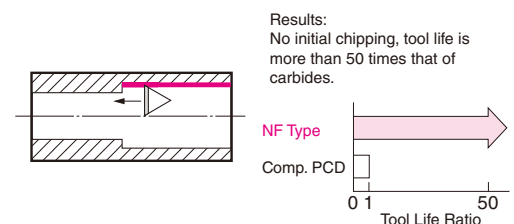
Work Material: ADC12 Insert: NF-VCMT110301
Cutting Conditions: $v_c=800\text{m/min}$, $f=0.1\text{mm/rev}$, $a_p=0.02\text{mm}$, Wet

● Milling of Aluminum Oil Pump Cover



Work Material: ADC12 Insert: NF-TEEN32R
Cutting Conditions: $v_c=3,000\text{m/min}$, $f_z=0.06\text{mm/t}$, $a_p=0.2\text{mm}$, Wet

● Boring of Aluminum Valve Bore



Work Material: ADC12 Insert: NF-TPGN110304P
Cutting Conditions: $v_c=530\text{m/min}$, $f=0.05\text{mm/rev}$, $a_p=0.2\text{mm}$, Wet

Regrindable Type

CNMA 120408 B

(1)

(2)

(1) Insert ISO Code
(ISO Standard Classification)
B2/B3

(2) Supplementary Symbols
Chart 1

Chart 1 (2) Supplementary Symbols

Symbol	Description
R	Right Hand
L	Left Hand
B	All-PCD Rake Surface Type
-WF	Edge With Special Land For Aluminum Wheel Glossy Finishing

One-corner Type

NF - CNMA 120408 P

(1)

(2)

(3)

(1) Type Code
Chart 2

(2) Insert ISO Code
(ISO Standard Classification)
B2/B3

(3) Supplementary Symbols
Chart 3

Chart 2 (1) Type Code

Symbol	Description
NF	NF Type M6
NU	One-use Insert

Chart 3 (4) Supplementary Symbols

Symbol	Description
L	Left Hand
P	Full-length Cutting Edge Type
N-LD	Chipbreaker Type M4
N-GD	
R-DM	Chipbreaker Type (Right Hand) M5
L-DM	Chipbreaker Type (Left Hand) M5

Insert Shape Photos

All-PCD Rake Surface Type	Edge With Special Land For Aluminum Wheel Glossy Finishing	NF Type	One-use Insert	Full-length Cutting Edge Type	Chipbreaker Type
		