

SUMICRYSTAL

M61 to M67

M

SUMICRYSTAL

M

SUMIDIA
BINDERLESS

SUMICRYSTAL

C

D

S

T

V

W

SUMICRYSTAL

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General Features

SUMICRYSTAL is the world's first commercially available large single-crystal synthetic diamond, developed by Sumitomo.

Thorough quality control has achieved stable quality, making SUMICRYSTAL ideal as an industrial material.

Production Method

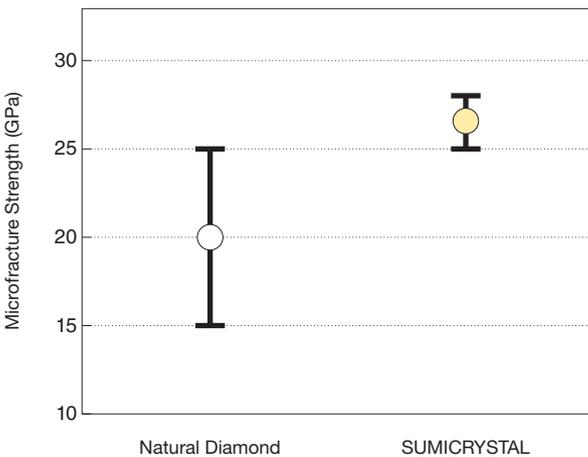
The synthetic single-crystal diamond SUMICRYSTAL is synthesised in a super high pressure chamber from 5 to 6GPa and high temperatures from 1,300 to 1,600°C. The temperature difference between the raw carbon and the seed crystal is used to grow the diamond on the seed crystal. Through this stringent control of pressures and temperatures, a more stable structure with minimal impurities can be obtained.

Properties

SUMICRYSTAL has 4 main advantages over natural diamond.

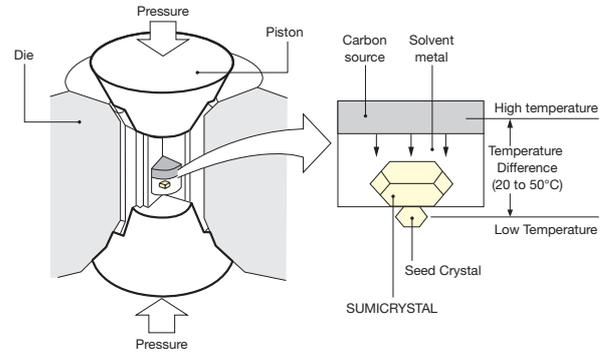
- 1) Structural advantage: Natural diamond is rounded and the crystal orientation is difficult to determine with the naked eye. SUMICRYSTAL, however, has a distinct crystal face which makes the identification much easier.
- 2) Uniformity: Due to the strictly controlled conditions in which the crystals are grown, uniform quality is obtained consistently.
- 3) Availability: Unlike the limited supply of natural diamonds, SUMICRYSTAL can be mass produced.
- 4) SUMICRYSTAL diamond type Ib, which is used for tools, has mechanical and thermal properties equal to or even greater than natural diamond, while containing small amounts of nitrogen impurities.

Microfracture Strength of Synthetic Diamond

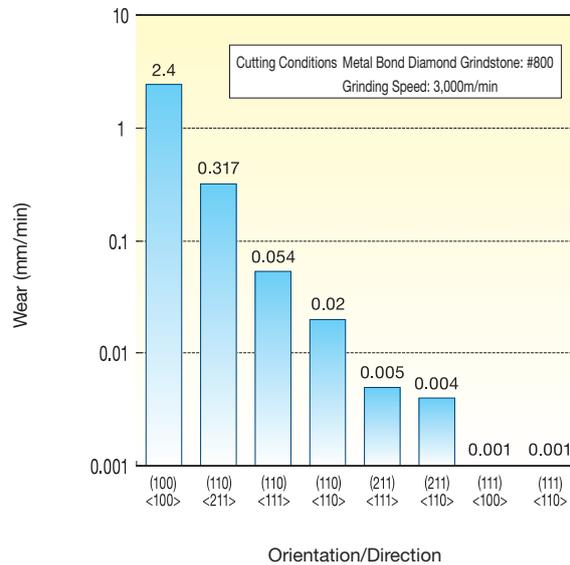


Inside a super high pressure chamber

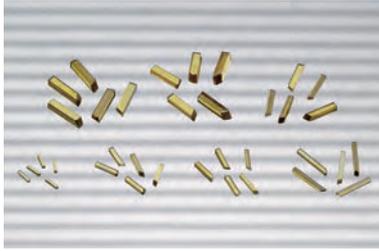
Synthetic Conditions
 Pressure: 5 to 6GPa
 Temperature: 1,300 to 1,600°C



Orientation and Wear Resistance



PD/PDX



General Features

SUMICRYSTAL PD and PDX are single-crystal synthetic diamonds processed into thin prism shapes for use as dresser blanks. Their stable performance and long tool life improve dressing precision.

SUMICRYSTAL PD

Features

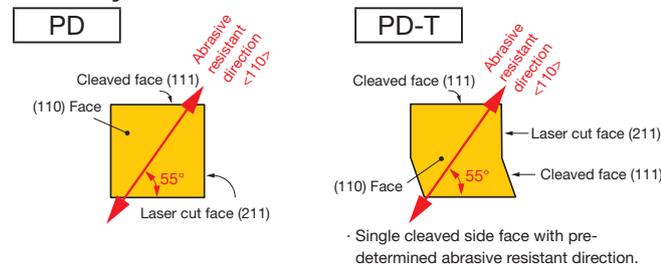
- Revolutionary Elongated Shape
 - (1) Improves holding power and prevents falling out.
 - (2) Consistent cross-section prevents deterioration.
 - (3) Uniform crystal orientation promotes stable tool life.

Standard Cat. No. (PD)

Shape	Cat. No.	Stock	Dimensions (mm)		
			T	W	L
<p>· Dimension L is the distance between the centre points of both ends. · Both upper and lower (111) faces are cleaved.</p>	PD 0220	●	0.2±0.05	0.2±0.05	2.0 to 2.5
	PD 0420	●	0.4±0.05	0.4±0.05	2.0 to 2.5
	PD 0630K	●			3.0 to 4.0
	PD 0640K	●	0.6±0.1	0.6±0.1	4.0 to 5.0
	PD 0650K	●			5.0 up
	PD 0830K	●			3.0 to 4.0
	PD 0840K	●	0.8±0.1	0.8±0.1	4.0 to 5.0
	PD 0850K	●			5.0 up
	PD 1130K	●	1.1±0.1	1.1±0.1	3.0 to 4.0
	PD 1140K	●			4.0 to 5.0
<p>Single cleaved side face with pre-determined abrasive resistant direction.</p>	PD 0630TK	●	0.6±0.1	0.6±0.1	3.0 to 4.0
	PD 0640TK	●			4.0 to 5.0
	PD 0830TK	●			3.0 to 4.0
	PD 0840TK	●	0.8±0.1	0.8±0.1	4.0 to 5.0
	PD 1130TK	●			3.0 to 4.0
	PD 1140TK	●	1.1±0.1	1.1±0.1	4.0 to 5.0

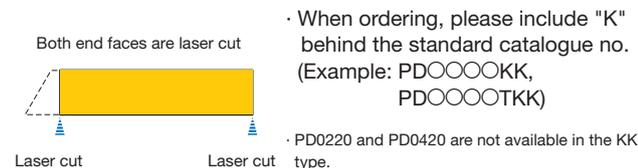
*1 Sizes other than those indicated above can be ordered.
*2 These products may have fine impurities within Sumitomo's prescribed range.
*3 The laser cut faces among other product areas may have chipping within Sumitomo's prescribed range.

PD Crystal Orientation



KK Type

Apart from the standard items listed above, PD is also available in the KK type with both end faces laser-cut.



SUMICRYSTAL PDX

Features

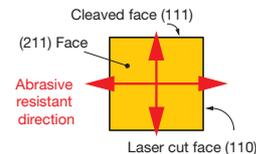
- Compared to SUMICRYSTAL PD, the product has different face crystal orientation.
 - (1) Crystal orientation (211) provides better tool life than PD blanks.
 - (2) Parallel abrasive resistant faces (111) facilitate blank setting during manufacturing of dressers.

Standard Cat. No. (PDX)

Shape	Cat. No.	Stock	Dimensions (mm)		
			T	W	L
<p>· Dimension L is the distance between the centre points of both ends. · Both upper and lower (111) faces are cleaved.</p>	PDX 0220	●	0.2±0.05	0.2±0.05	2.0±0.1
	PDX 0320	●	0.3±0.05	0.3±0.05	2.0±0.1
	PDX 0420	●	0.4±0.05	0.4±0.05	2.0±0.1
	PDX 0630	●			3.0±0.5
	PDX 0640	●	0.6±0.1	0.6±0.1	4.0±0.5
	PDX 0830	●			3.0±0.5
	PDX 0840	●	0.8±0.1	0.8±0.1	4.0±0.5
	PDX 1130	●			3.0±0.5
	PDX 1140	●	1.1±0.1	1.1±0.1	4.0±0.5

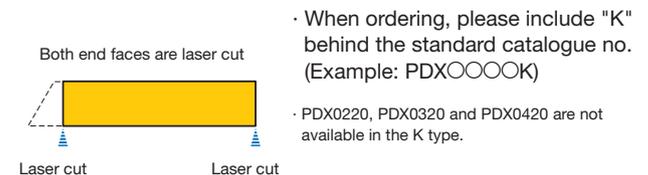
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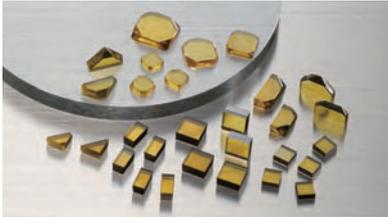
PDX Crystal Orientation



K Type

Apart from the standard items listed above, PDX is also available in the K type with both end faces laser-cut.





General Features

Of today's sophisticated cutting-edge technologies, ultra-precision machining processes such as those used for optical element molds are seeing particularly rapid development.

SUMICRYSTAL UP blanks have high performance and reliability, making them optimally suited to these applications.

Features

- (1) High quality with very low variance.
Stable wear resistance with excellent resistance to cutting edge chipping.
- (2) Minimal stock removal during cutting edge formation.
Uniform shape facilitates cutting edge formation.

Standard Type

Rectangular parallel type with 6 (100) faces.

Standard Cat. No. (Standard Type)

Shape	Cat. No.	Stock	Dimensions (mm)			
			L	W	C ₁ , C ₂	T
<p>The red arrows indicate the direction for easy grinding. Crystal face orientations are all (100) except the corners.</p>	UP 282512		2.8 to 3.5	2.5 to 3.5	up to 0.8	1.2±0.1
	UP 282515		2.8 to 3.5	2.5 to 3.5	up to 0.8	1.5±0.1
	UP 303015		3.0 to 3.5	3.0 to 3.5	up to 0.3	1.5±0.1
	UP 301415		3.0 to 3.5	1.4 to 1.7	up to 0.3	1.5±0.1
	UP 333014		3.3 to 4.0	3.0 to 4.0	up to 0.9	1.4±0.1
	UP 333017		3.3 to 4.0	3.0 to 4.0	up to 0.9	1.7±0.1
	UP 353514		3.5 to 4.0	3.5 to 4.0	up to 0.4	1.4±0.1
	UP 353517		3.5 to 4.0	3.5 to 4.0	up to 0.4	1.7±0.1
	UP 351717		3.5 to 4.0	1.7 to 2.0	up to 0.4	1.7±0.1

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Economy Type

Peripheral growth faces and top (100) are not cut. Benefits include large volume and low cost.

Standard Cat. No. (Economy Type)

Shape	Cat. No.	Stock	Dimensions (mm)	
			øD Minimum guaranteed dimensions	T
<p>The red arrows indicate the direction for easy grinding.</p>	UP 2010		2.0	1.0 ^{+0.2} _{-0.0}
	UP 2012			1.2 ^{+0.3} _{-0.0}
	UP 2510		2.5	1.0 ^{+0.2} _{-0.0}
	UP 2512			1.2 ^{+0.3} _{-0.0}
	UP 2515			1.5 ^{+0.3} _{-0.0}
	UP 3010		3.0	1.0 ^{+0.2} _{-0.0}
	UP 3012			1.2 ^{+0.3} _{-0.0}
	UP 3015			1.5 ^{+0.3} _{-0.0}
	UP 3510		3.5	1.0 ^{+0.2} _{-0.0}
	UP 3512			1.2 ^{+0.3} _{-0.0}
	UP 3515			1.5 ^{+0.3} _{-0.0}
	UP 4010		4.0	1.0 ^{+0.2} _{-0.0}
	UP 4012			1.2 ^{+0.3} _{-0.0}
	UP 4015			1.5 ^{+0.3} _{-0.0}
	UP 4020		4.5	2.0 ^{+0.3} _{-0.0}
	UP 4510			1.0 ^{+0.2} _{-0.0}
	UP 4512			1.2 ^{+0.3} _{-0.0}
	UP 4515			1.5 ^{+0.3} _{-0.0}
	UP 4520		5.0	2.0 ^{+0.3} _{-0.0}
	UP 5010			1.0 ^{+0.2} _{-0.0}
UP 5012		1.2 ^{+0.3} _{-0.0}		
UP 5015		1.5 ^{+0.3} _{-0.0}		
UP 5020			2.0 ^{+0.3} _{-0.0}	

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*3 Impurities, chipping, etc. outside the inspection range may be present outside the minimum guaranteed dimensions of these products.
*4 Some products have ground top surfaces.

Cutting Tools Using SUMICRYSTAL UP

Wiper Insert for High-efficiency Cutter for Aluminum Alloy RF Type



* This product was jointly developed with A.L.M.T. Corp.

SUMICRYSTAL SC10 (Wiper Insert)

H201 M47

- Utilises Sumitomo Electric Hardmetal's SUMICRYSTAL as a cutting edge. SUMICRYSTAL is a single-crystal diamond produced using a unique super-high-pressure technology.
- SUMICRYSTAL can maintain its edge sharpness better than sintered diamonds, greatly reducing burr formation.



SUMICRYSTAL (Single-crystal Diamond) SC10 Wiper Blade Machined Surface



SUMIDIA (Sintered Diamond) Wiper Blade Machined Surface

UP (Half-Cut Product)

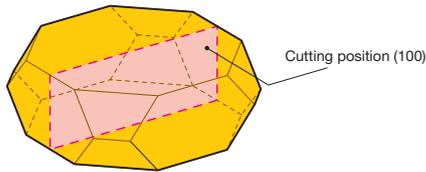
General Features

SUMICRYSTAL UP Half Cut products are materials for holders consisting of the UP Economy type material cut in half along the (100) or (110) faces.

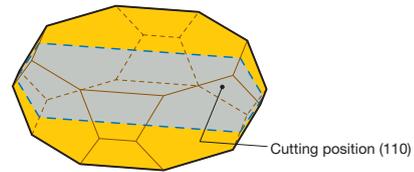
Features

- (1) Machining loss is reduced because volume removed by grinding during tool production is reduced.
- (2) Similar shape to the completed tool, reducing material costs.
- (3) The cut surface is a smooth laser surface.

Type cut along (100) face



Type cut along (110) face



Standard Cat. No. (Cutting Position 100 Type)

Dimensions (mm)

Shape	Cat. No.	Stock	øD Minimum guaranteed dimensions	T
<p>Laser cut face (100)</p>	UP 2010 (100) 1/2		2.0	1.0 ^{+0.2} _{-0.0}
	UP 2012 (100) 1/2			1.2 ^{+0.3} _{-0.0}
	UP 2510 (100) 1/2		2.5	1.0 ^{+0.2} _{-0.0}
	UP 2512 (100) 1/2			1.2 ^{+0.3} _{-0.0}
	UP 2515 (100) 1/2			1.5 ^{+0.3} _{-0.0}
	UP 3010 (100) 1/2		3.0	1.0 ^{+0.2} _{-0.0}
	UP 3012 (100) 1/2			1.2 ^{+0.3} _{-0.0}
	UP 3015 (100) 1/2			1.5 ^{+0.3} _{-0.0}
	UP 3510 (100) 1/2		3.5	1.0 ^{+0.2} _{-0.0}
	UP 3512 (100) 1/2			1.2 ^{+0.3} _{-0.0}
	UP 3515 (100) 1/2			1.5 ^{+0.3} _{-0.0}
	UP 4010 (100) 1/2		4.0	1.0 ^{+0.2} _{-0.0}
	UP 4012 (100) 1/2			1.2 ^{+0.3} _{-0.0}
	UP 4015 (100) 1/2			1.5 ^{+0.3} _{-0.0}
	UP 4020 (100) 1/2			2.0 ^{+0.3} _{-0.0}
	UP 4510 (100) 1/2		4.5	1.0 ^{+0.2} _{-0.0}
	UP 4512 (100) 1/2			1.2 ^{+0.3} _{-0.0}
	UP 4515 (100) 1/2			1.5 ^{+0.3} _{-0.0}
	UP 4520 (100) 1/2			2.0 ^{+0.3} _{-0.0}
	UP 5010 (100) 1/2		5.0	1.0 ^{+0.2} _{-0.0}
UP 5012 (100) 1/2			1.2 ^{+0.3} _{-0.0}	
UP 5015 (100) 1/2			1.5 ^{+0.3} _{-0.0}	
UP 5020 (100) 1/2			2.0 ^{+0.3} _{-0.0}	

The red arrows indicate the direction for easy grinding.

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*4 Some products have ground top surfaces.

Standard Cat. No. (Cutting Position 110 Type)

Dimensions (mm)

Shape	Cat. No.	Stock	øD Minimum guaranteed dimensions	T
<p>Laser cut face (110)</p>	UP 2010 (110) 1/2		2.0	1.0 ^{+0.2} _{-0.0}
	UP 2012 (110) 1/2			1.2 ^{+0.3} _{-0.0}
	UP 2510 (110) 1/2		2.5	1.0 ^{+0.2} _{-0.0}
	UP 2512 (110) 1/2			1.2 ^{+0.3} _{-0.0}
	UP 2515 (110) 1/2			1.5 ^{+0.3} _{-0.0}
	UP 3010 (110) 1/2		3.0	1.0 ^{+0.2} _{-0.0}
	UP 3012 (110) 1/2			1.2 ^{+0.3} _{-0.0}
	UP 3015 (110) 1/2			1.5 ^{+0.3} _{-0.0}
	UP 3510 (110) 1/2		3.5	1.0 ^{+0.2} _{-0.0}
	UP 3512 (110) 1/2			1.2 ^{+0.3} _{-0.0}
	UP 3515 (110) 1/2			1.5 ^{+0.3} _{-0.0}
	UP 4010 (110) 1/2		4.0	1.0 ^{+0.2} _{-0.0}
	UP 4012 (110) 1/2			1.2 ^{+0.3} _{-0.0}
	UP 4015 (110) 1/2			1.5 ^{+0.3} _{-0.0}
	UP 4020 (110) 1/2			2.0 ^{+0.3} _{-0.0}
	UP 4510 (110) 1/2		4.5	1.0 ^{+0.2} _{-0.0}
	UP 4512 (110) 1/2			1.2 ^{+0.3} _{-0.0}
	UP 4515 (110) 1/2			1.5 ^{+0.3} _{-0.0}
	UP 4520 (110) 1/2			2.0 ^{+0.3} _{-0.0}
	UP 5010 (110) 1/2		5.0	1.0 ^{+0.2} _{-0.0}
UP 5012 (110) 1/2			1.2 ^{+0.3} _{-0.0}	
UP 5015 (110) 1/2			1.5 ^{+0.3} _{-0.0}	
UP 5020 (110) 1/2			2.0 ^{+0.3} _{-0.0}	

The red arrows indicate the direction for easy grinding.

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*4 Some products have ground top surfaces.

UPT



General Features

SUMICRYSTAL UPT is a material for bites with a 2-point surface ((110) surface) as the main surface.

Features

- (1) 2-point surface ((110) face) enables use for the same applications as with bites using conventional natural diamonds.
- (2) Distinctive shape minimises the volume removed to make the cutting edge, enabling efficient machining.

Standard Items

Dimensions (mm)

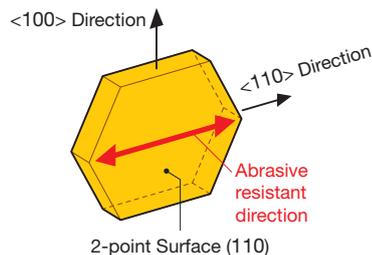
Shape	Cat. No.	Stock	W	L	T
	UPT 2510		≥ 2.5	≥ 2.5	1.0±0.1
	UPT 2512				1.2±0.1
	UPT 3010		≥ 3.0	≥ 2.5	1.0±0.1
	UPT 3012				1.2±0.1

*1 Sizes other than those indicated above can be ordered.

*2 Fine impurities, chipping, etc. within Sumitomo's prescribed range may be present at the top (L/2).

*3 Impurities, chipping, etc. outside the inspection range may be present at the bottom (L/2).

UPT Crystal Orientation



SUMICRYSTAL

M

SUMIDIA
SUMIDIA
BINDERLESS

SUMICRYSTAL

C

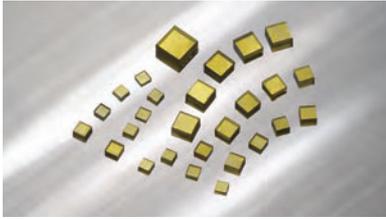
D

S

T

V

W



■ General Features

SUMICRYSTAL CD has optimised crystal orientation and shape as a material for wire drawing dies. Realising excellent performance through high quality and stability.

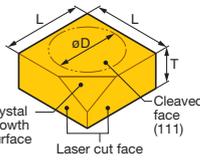
■ Features

- (1) High quality with very low variance.
High-quality crystal with minimal impurities, chipping and distortion is used to achieve high, stable wear resistance. It also eliminates the need for inspection and selection of raw stones as required for natural diamond.
- (2) High fracture strength
Resistant to fracture and cracking during wire drawing.
- (3) Accurate crystal orientation
(111) is used on the top and bottom surface, limiting crystal misorientation, which causes variance in tool life, to within 1°.
- (4) No grinding needed for top and bottom surface
The top and bottom surface are cleaved to form parallel surfaces, eliminating the need for grinding of the top and bottom surface.

■ Standard Type

The outside is machined by laser, achieving a consistent shape for easy setting. Mounting pressure is applied evenly, ensuring sufficient strength even for small volume. Ideal for applications with limited dimensions, such as nozzles and wire guides.

■ Standard Items

Shape	Cat. No.	Stock	Dimensions (mm)			
			øD Minimum guaranteed dimensions	L	T	
 <p>The laser cutting surface orientation is undetermined.</p>	CD 1006(111)	●	0.9	1.0±0.1	0.6±0.1	
	CD 1008(111)	●	0.9	1.0±0.1	0.8±0.1	
	CD 1210(111)	●	1.1	1.2±0.1	1.0±0.1	
	CD 1411(111)	●	1.3	1.4±0.1	1.1±0.1	
	CD 1512(111)	●	1.4	1.5±0.1	1.2±0.1	
	CD 1814(111)			1.7	1.8±0.1	1.4±0.1
	CD 2016(111)			1.9	2.0±0.1	1.6±0.1
	CD 2318(111)			2.2	2.3±0.1	1.8±0.1
CD 2520(111)			2.4	2.5±0.1	2.0±0.1	

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*3 Impurities, chipping, etc. outside the inspection range may be present outside the minimum guaranteed dimensions of these products.

