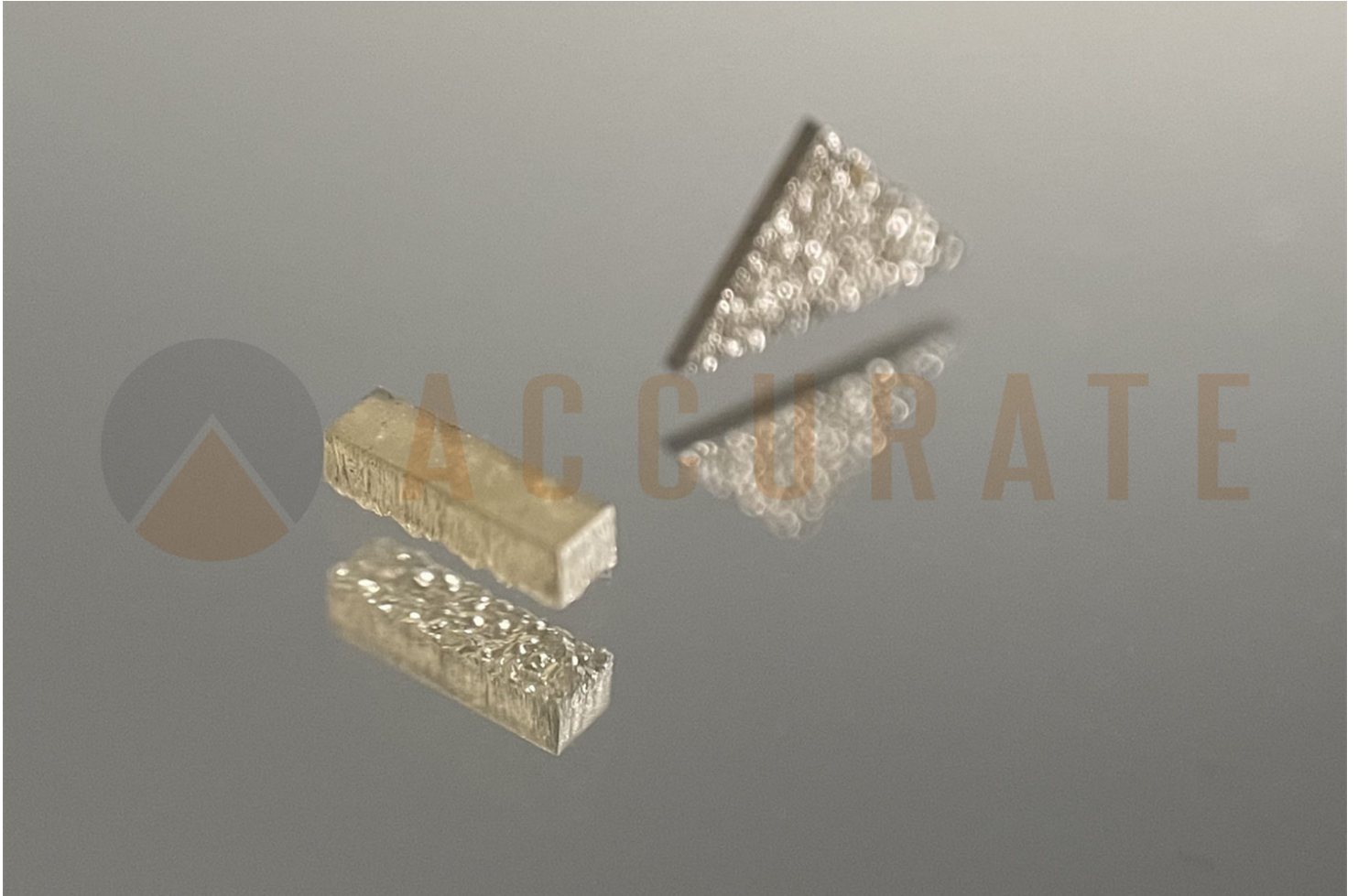




ACCURATE

mechanical and thermal applications
CVD Diamond Polycrystalline



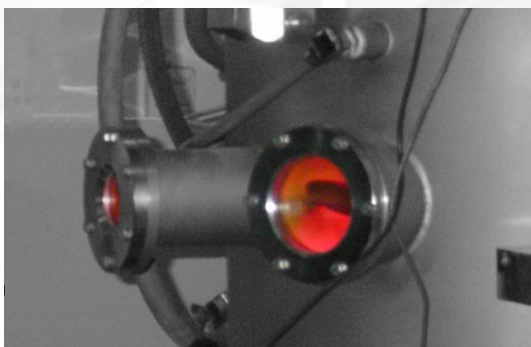
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CVD Diamond Polycrystalline

In our synthetic diamond product range, the CVD diamond polycrystalline, we call it as CVD-P for short, is freestanding pure diamond film, created in a vacuum furnace, by dc arc plasma jet chemical vapor deposition (CVD) method.

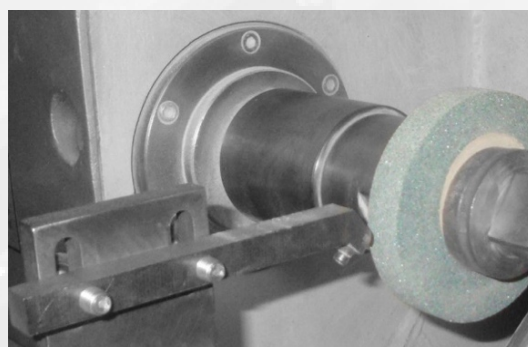
At sub-atmospheric pressure, a mixture of carbon-containing gas (methane) and hydrogen is excited and decomposed to form carbon atoms, which are deposited on the substrate and alternately grown into polycrystalline diamond, and the growth keeps a high speed to form a diamond film. This method can also be used for coating tools and workpieces.

Created in the vacuum condition, the CVD diamond polycrystalline is high quality pure diamond of consistent wear resistance and high thermal stability and thermal conductivity, free from any metallic or non-metallic bonding.



CVD diamond deposited in the vacuum chamber

In vacuum condition, the mixture of carbon-containing gas (methane) and hydrogen is excited and decomposed to form carbon atoms, which are deposited on the substrate and alternately grown into polycrystalline diamond.



Wear resistance testing of CVD diamond films

A sample tip of CVD diamond blank will be cut from the diamond thin film, and to fulfill the wear resistance testing on the grinding wheel.

Properties of CVD Diamond Polycrystalline

The physical properties of CVD diamond polycrystalline are very close to those of natural diamond in mechanical, thermal and optical aspects. As a result, the CVD diamond films can be laser cut into customized dimensions and be used for making diamond dressing tools, diamond cutting tools, wire drawing dies, heat sink components, and optical windows.

Properties Comparison with Natural Diamonds

Properties	Natural diamond	CVD diamond polycrystalline
Vicker hardness	>8000 kg/mm ²	>8000 kg/mm ²
Density	3.51 g/cm ³	3.51 g/cm ³
Thermal conductivity	>2500 W/m.K	1000 - 2000 W/m.K
Young's modulus	>1200 Gpa	>1000 Gpa
Friction coefficient	0.1	0.1
Chemical stability	Insoluble in any acid and alkali	Insoluble in any acid and alkali



Substrate face polishing and growth face lapping

The CVD diamond films will be polished on the substrate face or lapped on the growth face of the wafer on request, in order to meet the dimension tolerances and different customers' applications requirements.



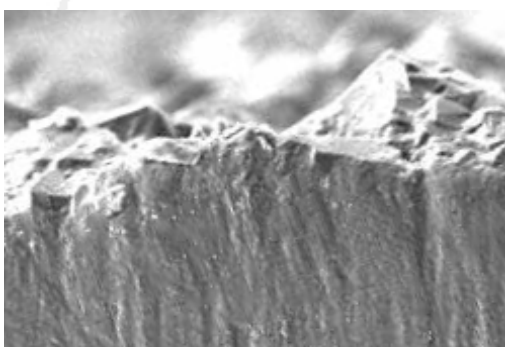
Substrate face polishing and growth face lapping

According to the customer's applications, to laser cut the CVD diamond films to the shapes and geometries as required.

Polycrystalline CVD Diamond Dressing Tool Blanks

The CVD diamond dressing tool blanks are always available in shapes of rectangular logs (sticks), which can be used to make single point dressers, multi-point dressers, blade dressers, roller dressers for dressing applications, such as dressing the aluminum oxide and silicon carbide grinding wheels.

The wear resistance of our CVD dressing tool blanks are from standard grade, high grade to premium grade, in order to meet different hardness of machining targets, and to help tool makers to achieve high cost-performance.



Microstructure under scanning electron microscope


In the chart below are standard sizes of the dressing tool blanks, other dimensions are available by laser cutting according to drawings on request.

Properties of Suggested Grades

	DPC	DPG
Comparison	<ul style="list-style-type: none"> ● standard type ● good wear resistance 	<ul style="list-style-type: none"> ● higher quality type ● very good wear resistance
Wear resistance	++	++++
Vicker hardness	8000 kg/mm ²	10000 kg/mm ²
Density	3.51 g/cm ³	3.51 g/cm ³
Thermal conductivity	> 1000 W/m.K	> 1500 W/m.K
Young's modulus	1000 GPa	1100 GPa
Break strength (T=0.5mm)	350 MPa	550 MPa
Thermal stability (in the air)	800°C	800°C

Polycrystalline CVD Diamond Dressing Tool Blanks

General Dimensions of Dressing Tool Blanks

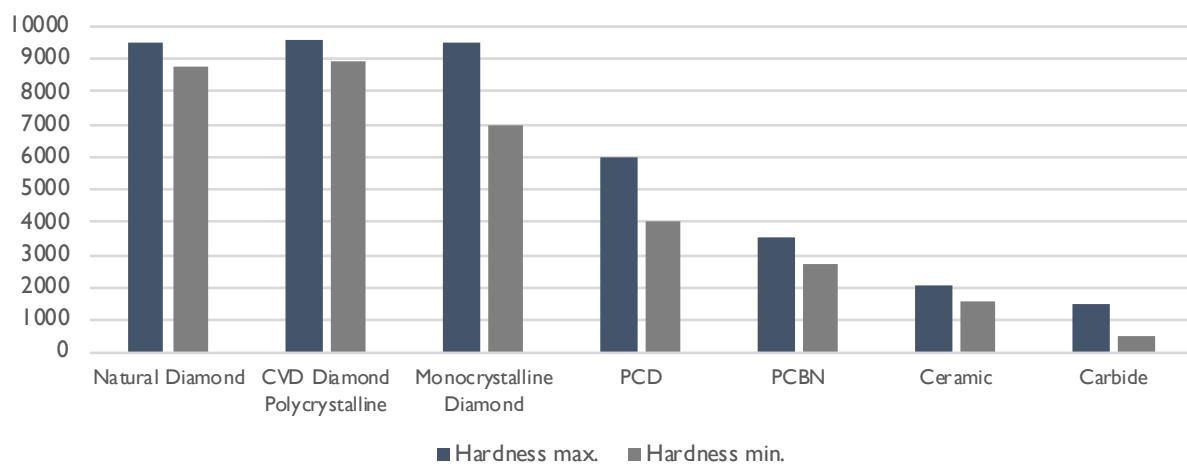
Width x Thickness	Length (L)	Code number	Reference
0.40 x 0.40 mm	0.40 - 5.00 mm	0404L	
0.60 x 0.60 mm	0.60 - 8.00 mm	0606L	
0.80 x 0.80 mm	0.80 - 10.00 mm	0808L	
1.00 x 1.00 mm	1.00 - 10.00 mm	1010L	
1.50 x 1.50 mm	1.50 - 10.00 mm	1515L	
2.00 x 2.00 mm	2.00 - 10.00 mm	2020L	

Other sizes are available on request.

Features

- high quality of polycrystalline, semitransparent films
- high thermal stability and conductivity
- pure diamond, without any metal or non-metal bonding
- high wear resistance which is close to that of natural diamonds
- consistent wear resistance are not varied from orientation
- customized sizes are available by laser cutting

Hardness (kg/mm²)



Polycrystalline CVD Diamond Heat Spreader

Diamond has an excellent thermal conductivity among the known materials in nature, coupled with good insulation performance, making CVD diamond an ideal material for electronic heat sink devices, which are used in the production of heat spreaders for laser diode, high-power semiconductor devices, microwave devices and large-scale integrated circuits.

The thermal conductivity of our CVD diamond heat spreaders can reach 1200 to 2000W/m.K, and the wafers are available with polished substrate side and lapped growth side.

In the chart below are the properties and standard sizes of CVD diamond heat spreaders, other dimensions are available on request.

Properties and Standard Dimensions of Thermal Grade DPS

Grade name	DPS	Reference
Vicker hardness	8000 - 10000 kg/mm ²	
Thermal conductivity	1200 - 2000 W/m.K	
Young's modulus	1000 - 1100 Gpa	
Dimensions	length x width < 25 x 25 mm	
Thickness	300 μm ± 50 μm	
Surface finish	substrate side Ra < 30nm	
	growth side Ra < 100nm	
Flatness	< 4 μm/cm	

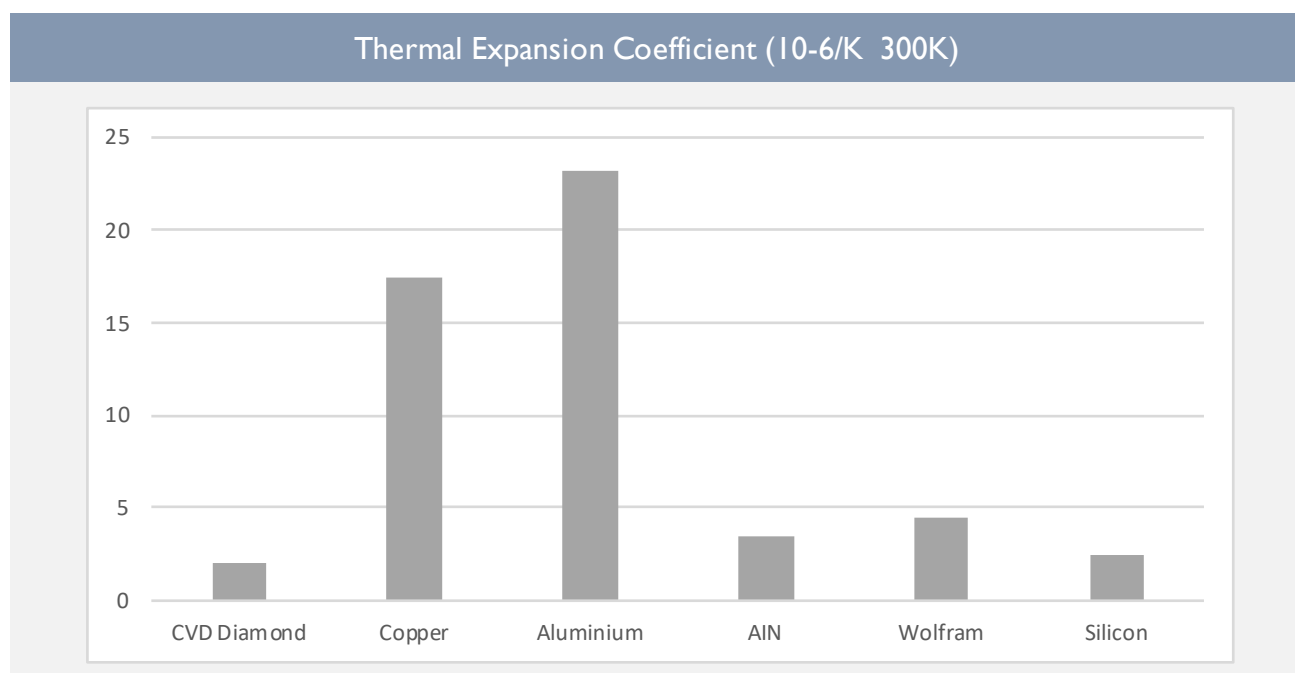
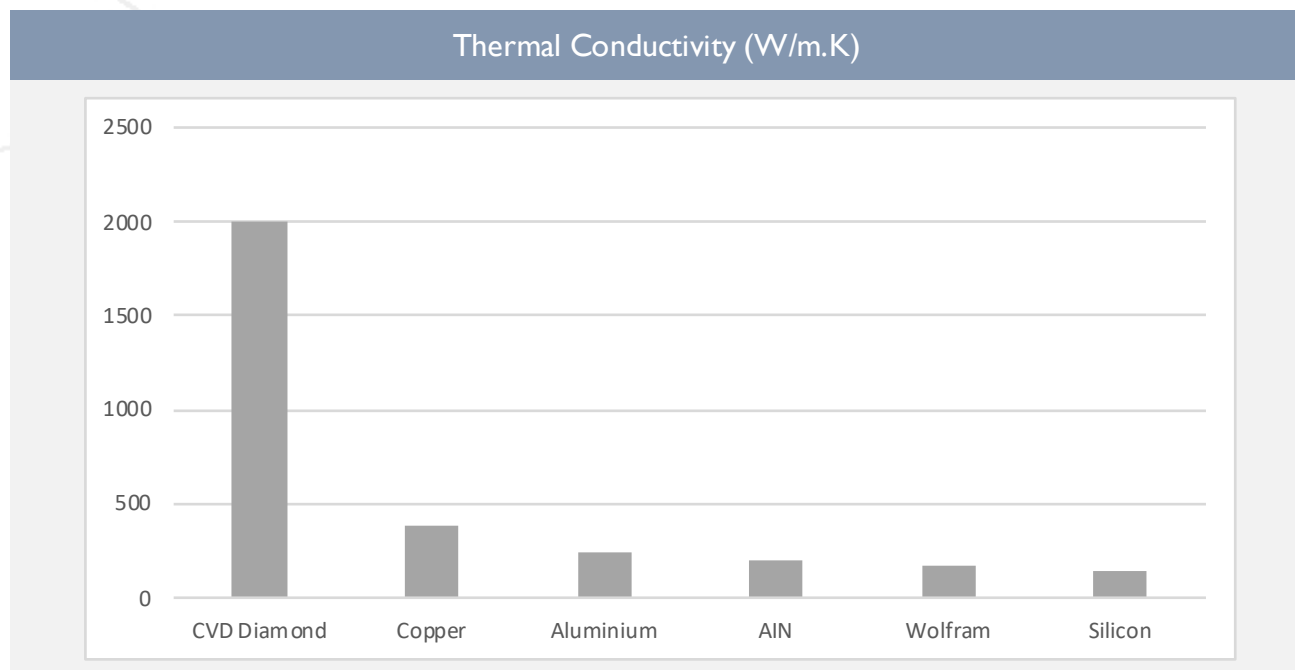


Other dimensions and requirements are available on request.

Features

- highest thermal conductivity
- electric insulation
- low thermal expansion coefficient
- metallic coating are available

Polycrystalline CVD Diamond Heat Spreader



For other applications of polycrystalline CVD diamond films including optical windows, cutting tools, wire drawing dies and work-pieces CVD diamond coatings, please let us have the dimensions, working conditions and surface finishing requirements, we would be able to provide.

About Us

With more than 20 years' experience in super-hard material industry, we have been supplying the diamonds materials and the related products for years, we are using our know-how to help customers to find accurate solutions, the word "ACCURATE" fits our culture very much, with that, we provide not only the product itself, but also our services.

Our Product Range

- CVD diamond polycrystalline (CVD-P)
for dressing tools, heat spreading and optics
- Monocrystalline diamond (CVD and HPHT)
for high surface finishing and precision machining
- Polycrystalline diamond (PCD) carbide based
for woodworking and aluminum



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