

Polycrystalline diamond (PCD)

Grade: CMX850

elementsix™
DE BEERS GROUP

Key material characteristics

- 0.85 µm diamond grain size
- ≥15 % cobalt ratio (wt %)
- High chip resistance

Ideal for milling and rough cutting of aluminium alloys where extreme chip resistance is required, can also be used for machining titanium and composites. Sub- micron grain size. CMX850's ultra-fine grain structure is suitable for applications where mirror finishes are required due to its extreme edge sharpness/retention.

Typical microstructure



BEC

20 kV

X500 Magnification

50 µm



Behaviour in application		Processing characteristics		
Grade Grain size	Chip resistance	Abrasion resistance	Electro-discharge machinability	Grindability
CMX850 0.85 µm				
CTX002 2 µm				
CTB004 4 µm				
CTB010 10 µm				
CTH025 25 µm				
CTM302 2 - 30 µm				

Size and format available

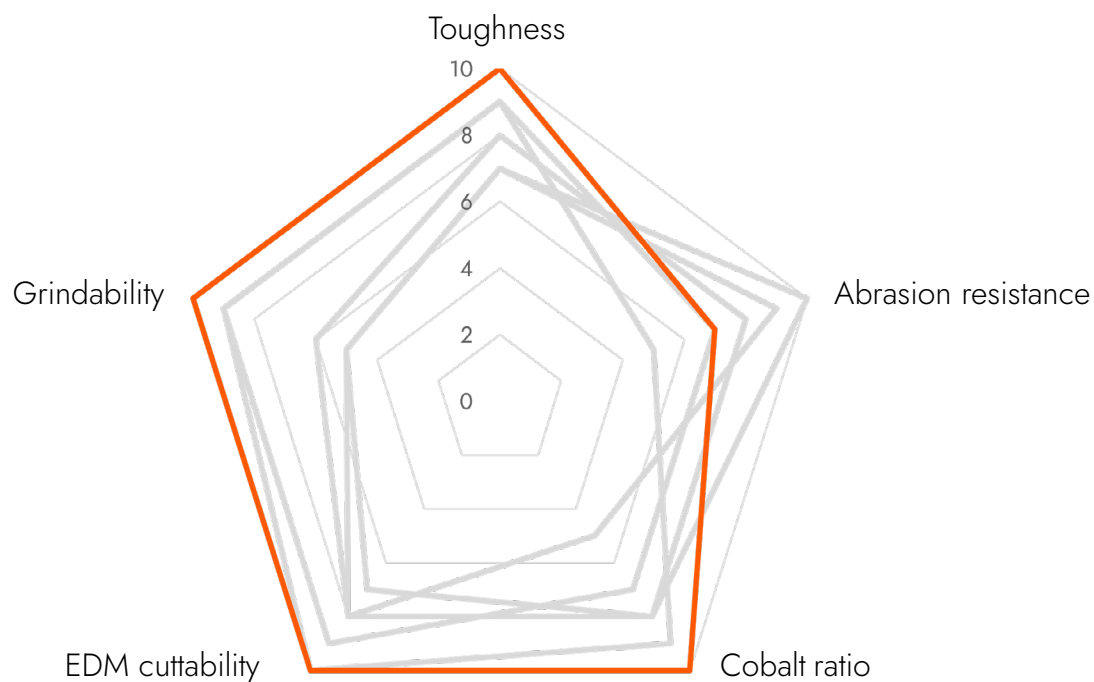
Maximum disc diameter: 76 mm

Maximum PCD certified area: 70 mm

Overall height

PCD layer thickness	0.8	1.0	1.2	1.4	1.6	2.0	3.18	8.0
0.3	✓	✓	✓		✓			
0.5		✓			✓	✓		
1.0							✓	

Material characteristics

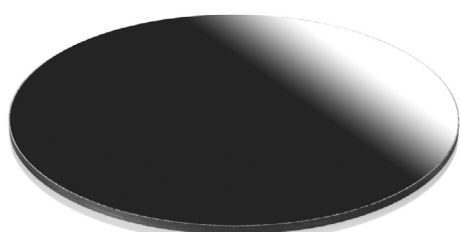


Physical and metallurgical properties

Property	Measurement	Applicable standard
Mean coefficient of thermal expansion ($10^{-6}/^{\circ}\text{C}$) for temperature range 150 °C to 500 °C	4.2	ASTM E228-06
Transverse rupture strenght characteristic strength (MPa)	2387	ASTM C1239
Weibull modulus	6	
Fracture toughness mean ($\text{MPa}\cdot\text{m}^{1/2}$)	11.3 to 15.5	Shetty et al. (1995)
Elastic modulus (GPa)	827	ASTM E494
Poisson's ratio	0.08	
Density (g/cm^3)	4.37	Archimedes principle
Thermal conductivity ($\text{W}/\text{m}/\text{K}$) at 500 °C	253.5	Calculated from thermal diffusivity, specific heat capacity and density
Knoop hardness (Indentation)(GPa)	50	ASTM C1326-03

	Superior	Advanced	Assured
Polish quality	P+	P1	P2
Overall height tolerance + mm	H+ 0.025	H1 0.05	H2 0.1
PCD layer tolerance + mm	L+ 0.1	L1 0.15	L2 0.2

Range	PCD layer (mm)	Certified area (mm)	Overall height (mm)	Nomenclature	Item number
Advanced	0.3	70	1.6	CMX850 R70-160-03 P1H1L1	245-200-0322-01
Advanced	0.3	70	1.2	CMX850 R70-120-03 P1H1L1	245-200-0339-01
Advanced	0.3	70	1.0	CMX850 R70-100-03 P1H1L1	245-200-0351-01
Advanced	0.3	70	0.8	CMX850 R70-080-03 P1H1L1	245-200-0342-01
Superior	0.5	70	1.6	CMX850 R70-160-05 P+H+L+	245-200-0317-01
Advanced	0.5	70	1.6	CMX850 R70-160-05 P1H1L1	245-200-0309-01
Advanced	0.5	70	2.0	CMX850 R70-200-05 P1H1L1	245-200-0329-01
Superior	0.5	70	1.6	CMX850 R70-160-05 P+H1L+	245-200-0314-01
Advanced	0.5	70	1.2	CMX850 R70-120-05 P1H1L1	245-200-0337-01
Superior	0.5	70	1.0	CMX850 R70-100-05 P+H1L+	245-200-0327-01
Advanced	0.5	70	1.0	CMX850 R70-100-05 P1H1L1	245-200-0325-01
Assured	0.5	68	1.6	CMX850 R68-160-05 P2H1L1	245-200-0313-01
Advanced	1.0	70	3.2	CMX850 R70-318-10 P1H1L1	245-200-0333-01
Advanced	1.0	70	3.2	CMX850 R70-318-10 U1H1L1	245-200-0355-01
Assured	0.5	68	1.6	CMX850 R68-160-05 P2H1L1	245-200-0313-01
Advanced	0.5	60	1.6	CMX850 R60-160-05 P1H1L1	245-200-0311-01



Element Six PCD disc and segments



Element Six is a global leader in the development and production of synthetic diamond and tungsten carbide solutions. For over 70 years, our innovation expertise has enabled a wide range of industries, from aerospace and mining, to semiconductors and sensing. Part of the De Beers Group, our primary manufacturing sites are located in the US, UK, Ireland, Germany and South Africa. Our sites in Ireland and Germany are ISO 50001 certified.

Through the De Beers Group, Element Six is a member of the UN Global Compact (UNGC). The UNGC drives business awareness and action towards the UN Sustainable Development Goals (SDGs), focussing on 10 principles around human rights, labour, environment and anti-corruption. Element Six works within the De Beers Group Building Forever commitment and Science Based Target Initiative (STBi), which is also based on the UNGC principles.

We incorporate and take responsibility for these principles through the Element Six Code of Conduct, Our Values, Responsibilities and Policies.

At Element Six, we have active communities working towards sustainability from a variety of angles, such as environmental impact, inclusion, diversity and community outreach, both internally and externally.

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