CoorsTek

Silicon Carbides

Advanced Silicon Carbide for Critical Components

PureSiC™ CVD Silicon Carbide

CoorsTek manufactures bulk SiC using a high-temperature Chemical Vapor Deposition (CVD) process. Ultra-pure raw materials and carefully controlled processing conditions create exceptionally clean, dense, and corrosion resistant SiC. PureSiC can be manufactured to meet custom resistivity requirements.

- Purity greater than 99.9995%
- Excellent mechanical properties
- High thermal conductivity
- Superior corrosion resistance
- Near-net shape deposition
- Sizes up to 20”

Reaction Bonded Silicon Carbide

CoorsTek employs a reaction-bonding process to manufacture SiC that retains approximately 10% metallic silicon. Our bonded SiC can be formed by casting, dry pressing, or isostatic pressing.

- Excellent wear properties
- Sizes up to 20”
- Thermal shock resistance

Direct Sintered Silicon Carbide

CoorsTek produces high-purity SiC using a direct sintering process. This process allows for low-cost forming methods such as casting, dry pressing, and isostatic pressing, while retaining high-purity levels.

- Purity greater than 99%
- Thermal shock resistance
- Near-net shape forming
- Sizes up to 36” x 75”
- Excellent mechanical properties

Graphite Loaded Direct Sintered Silicon Carbide

CoorsTek has combined the lubricating properties of graphite into their already established high-purity sintered silicon carbide to create the next-generation in friction and wear materials. This engineered material designated as SC-DSG offers the stability of sintered silicon carbide and the low frictional characteristics of graphite. This chemically inert combination can be formed utilizing the latest technologies of dry pressing and isostatic pressing.

- Excellent thermal shock properties
- Excellent chemical resistance
- Near net shape forming
- “Built-in” lubrication
- Sizes up to 20”

Materials and Manufacturing Experts

CoorsTek is uniquely capable of providing advanced materials and manufacturing technologies. Let the CoorsTek team help you select the best materials and design for manufacturability. For expert engineering and design assistance, call CoorsTek at +1 303 271 7100.

Property	Units	CeraSiC®-B	SC-RB (SC 2)	UltraSiC™ (SC 30)	UltraSiC™ GI (SC-35)	UltraSiC™ LP (SC-51)	PureSiC® (HR Grade)	PureSiC® (LR Grade)
		Direct Sintered	Reaction Bonded	Direct Sintered	Graphite Direct Sintered	Liquid Phase Sintered	High Resistivity CVD	Low Resistivity CVD
Density,	g/cm^3	3.01	3.10	3.15	2.90	3.22	3.21	3.21
Crystal Size, Thin-Section, Average	µm	-	12	5	5	8	–	–
Color	–	-	BLACK	BLACK	BLACK	BLACK	BLACK	BLACK
Flexural Strength (MOR), 20 °C	MPa	450	462	480	220	620	468	517
Elastic Modulus, 20 °C	GPa	420	393	410	310	420	462	434
Poisson’s Ratio, 20 °C	–	0.18	0.20	0.21	0.18	0.21	0.21	0.21
Compressive Strength, 20 °C	MPa	-	2700	3500	675	3600	–	–
Hardness, Knoop 100 g	GPa	-	24.5	27.4	27.4	24	27	27
Fracture Toughness, K_{ic}, Notched Beam	MPa-m$^{1/2}$	3.5	4	4	3.2	6.0	3.5	3.5
Thermal Conductivity, 20 °C	W/m K	170	125	150	125	80	140	140
CTE, 25-1000 °C	1 X 10^{-6}/ °C	4.5	4.3	4.4	4.4	4.8	4.6	4.6
Specific Heat, 100 °C	J/kg-K	-	820	800	820	820	665	665
Thermal Shock Resistance, ΔT*	°C	450	400	300	600	300	–	–
Maximum Use Temperature, No-Load Cond.	°C	1500	1000	1600	1600	1000	1600	1600
Volume Resistivity 25 °C	Ω-cm	> 10^4	< 10^3	~ 10^5	~ 10^5	–	> 10^5	< 0.1
500 °C	Ω-cm		< 10^3	~ 10^3	~ 10^3	–	–	–
1000 °C	Ω-cm		< 10^3	~ 10^2	~ 10^2	–	–	–

*Thermal Shock Resistance – Tests are run by quenching samples into water from various elevated temperatures. The change in temperature where a sharp decrease in flexural strength is observed is listed as DTc. Charts intended to illustrate typical properties. Property values vary with method of manufacture, size, and shape of part. Data contained herein is not to be construed as absolute and does not constitute a representation or warranty for which CoorsTek assumes legal responsibility. UltraSiC is a trademark of CoorsTek, Inc. CoorsTek and PureSiC are registered trademarks of CoorsTek, Inc.

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