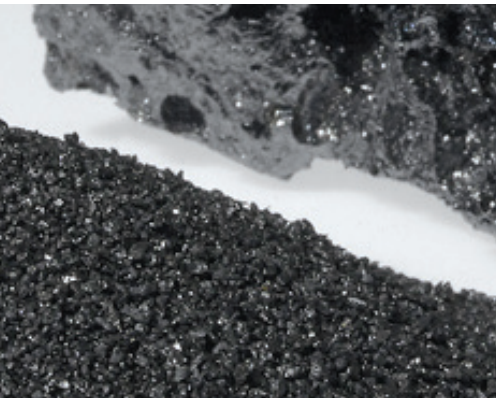


# CERAMIC ARMOR

GRAINS & POWDERS

WASHINGTON MILLS



The ceramic powders that go into your proprietary formula are vital to the performance of your finished ceramic part. Engineering the right ceramic formula takes trial and error, as well as the support of a powder supplier willing to work with your R&D team to produce the right powder for your job. At Washington Mills, we will work with you to develop the right material for your ceramic armor application.

## YOUR PARTNER IN CERAMIC ARMOR

One of the largest manufacturers of fused minerals in the world, Washington Mills offers a full line of high-quality silicon carbide and boron carbide grains and powders for producing ceramic armor. Washington Mills is the only manufacturer of alpha silicon carbide and boron carbide in the United States and has the capacity to produce in large quantities to satisfy your toughest armor requirements.

## PRECISION MANUFACTURING

Washington Mills is one of the world's largest silicon carbide microgrit producers, and has the technical skills and advanced equipment to produce single grit sizes and fine ceramic powders. Our unique process technology and state-of-the-art microgrit facility allow us to carefully classify the grits to meet your specific requirements. With our own silicon carbide manufacturing plants in the United States and Norway producing high-quality crude, we are able to expertly control the raw ingredients, chemistry and quality of the finished product.

Our experience in manufacturing boron carbide extends back to the beginning of the first boron carbide furnace in the United States. Today, we continue to manufacture boron carbide to the highest standards and most rigorous specifications, with a focus on precision and quality. Among the very hardest of man-made materials, boron carbide also possesses a finite melting point low enough for relatively easy fabrication into desired shapes, making it an excellent material for ceramic armor.

Experience expert product development, reliable analytical laboratory services, and top-quality customer service with Washington Mills. Contact us today to discuss your boron carbide and silicon carbide grain and powder needs.

## Silicon Carbide and Boron Carbide Grains & Powders: Typical Technical Specifications

The following data represent typical technical specifications. Our materials experts will work with you to tailor our products to suit your specific requirements, matching all your technical specifications, including surface area, particle size distribution, grain shape, bulk density and chemistry.

### SILICON CARBIDE | SURFACE CHEMICAL VALUES (TYPICAL STANDARD)

Product	Grits	% SiC	% Free C	% Si	%SiO <sub>2</sub>	% Fe <sub>2</sub> O <sub>3</sub>
CARBOREX C-5	F 240 – F	99.0	0.25	0.25	0.30	0.05
(Green)	F 240 – F	97.8	0.30	0.80	0.60	0.20
CARBOREX C-6	F 240 – F	97.8	0.30	0.80	0.60	0.20
(Black)	1200 / Finer	95.0	0.70	0.30	3.00	0.4

Surface chemical values for finer sizes available upon request.

### TYPICAL PHYSICAL PROPERTIES

#### Hardness

Moh's Scale	between 9 and 10
Knoop Scale	25.000 – 30.000 N/mm <sup>2</sup>

#### Thermal Conductivity

20°C	0.41 W/cm °C
1000°C	0.21 W/cm °C

#### Linear Thermal Expansion

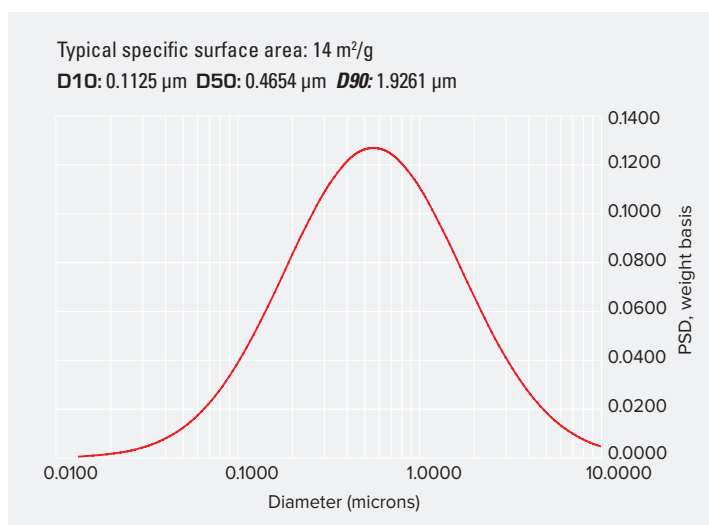
25 - 1000°C	5.1 x 10-6/ °C
25 - 2000°C	5.8 x 10-6/ °C

#### Specific Heat

25°C	0.67 J/g °C
1000°C	1.26 J/g °C

Specific Density	3.21 g/cm <sup>3</sup>
Bulk Density	0.7 – 1.7 g/cm <sup>3</sup>

### PARTICLE SIZE DISTRIBUTION | CARBOREX®



### BORON CARBIDE | TYPICAL CHEMICAL ANALYSIS

	High Purity	Technical
Total Boron	Min. 76.5%	70 - 73%
Total Carbon	21.5%	24%
Total B + C	Min. 98.0%	94%
Iron	.2%	2%

Standard sizes available and special sizes available upon request.

### TYPICAL PHYSICAL PROPERTIES

Crystallography	Rhombohedral
Color	Black
Specific Gravity	2.52
Knoop <sub>100</sub> Hardness	2800
Shape	Blocky – Angular
Melting Point	2350°C
Grading	FEPA 42-GB-1984 (R1993)

**Contact us today to experience Washington Mills' ceramic powders expertise.**

#### General Inquiries, Sales and Customer Service

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**WASHINGTON MILLS**