

Hexoloy® SiC COMPONENTS

Dean P. Owens
Saint-Gobain Advanced Ceramics
Niagara Falls, New York

Silicon Carbide is a unique ceramic material which has come to dominate the world wide mechanical seal market. A brief description of material properties, additional applications and alternate materials will be discussed.



Hexoloy® is a registered trademark of Saint-Gobain Advanced Ceramics, Niagara Falls, New York.

Hexoloy® Silicon Carbide




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ADVANCED CERAMICS

Hexoloy® is a sintered silicon carbide ceramic product of Saint-Gobain Advanced Ceramics and its Structural Ceramics Division.

www.carbo.com

Mechanical Seals




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The first and still the largest application for Hexoloy® silicon carbide is in mechanical seals where erosion and corrosion resistance are required for severe service environments.

www.carbo.com

Bearings



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The bearing industry

— with tight tolerances achieved by diamond grinding

— utilizes Hexoloy® products

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Automotive Water Pump Seals




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Nearly every new vehicle in Europe and North America uses a Hexoloy® seal face in its water pump.

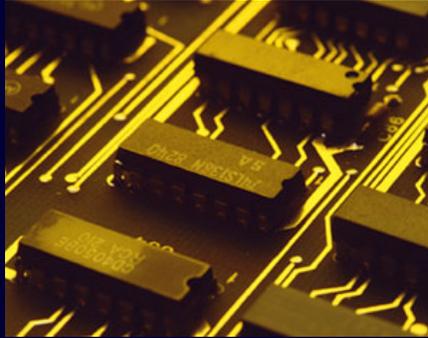
Mining




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**The most severe mining applications
use Hexoloy® SiC in liners and valves.**

Semiconductor



Hexoloy® SiC offers the chemical resistance and mechanical stiffness features desirable for wafer processing.

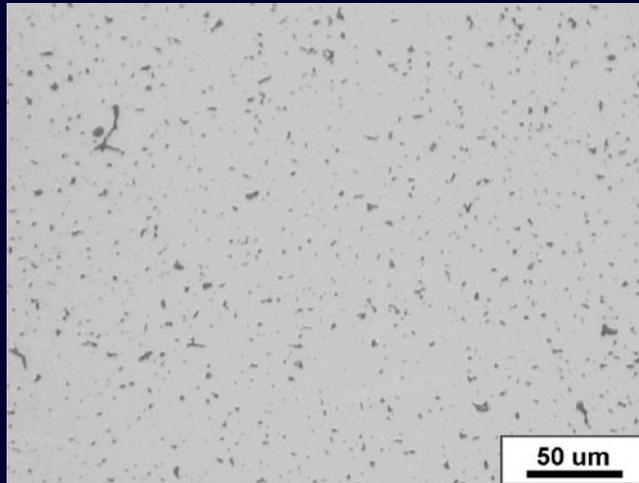
Furnace and Structural Components



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**High temperature strength and oxidation resistance
make Hexoloy[®] SiC an ideal candidate for furnace applications.**

Polished Microstructure Hexoloy® SA

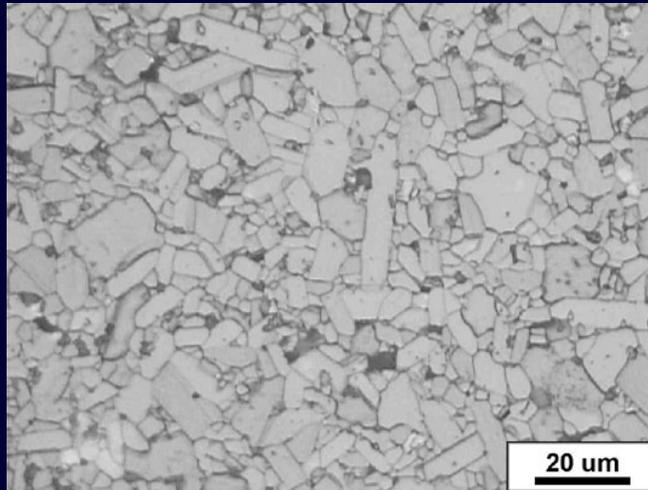


50 μm

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**Photomicrograph of polished surface
showing approximately 2-3% closed porosity**

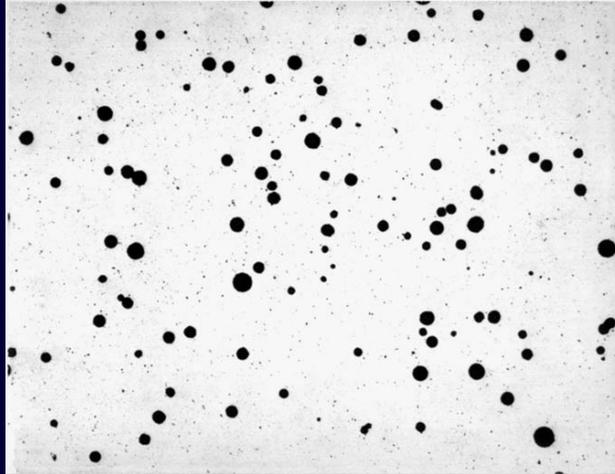
Etched Microstructure Hexoloy® SA



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Photomicrograph of etched surface showing self-sintered grain structure with average grain size 4-10 microns and no secondary phase, which might be susceptible to erosion and corrosion. Historical seal face tungsten carbide has Co bond and alumina glass phase holding grains together

Polished Microstructure Hexoloy® SP



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**Photomicrograph of polished surface
showing induced spherical porosity
at average size >40 microns.**

Hexoloy® Thermal Conductivity

Thermal Conductivity @ RT	W/m °K Btu/ft h °F	125.6 72.6
@200°C	W/m °K Btu/ft h °F	102.6 59.3
@400°C	W/m °K Btu/ft h °F	77.5 44.8

**Lower density and higher thermal conductivity
 give Hexoloy® SiC advantages
 over other seal face candidates
 such as tungsten carbide and alumina.**

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Typical Properties of Comparative SiC Materials

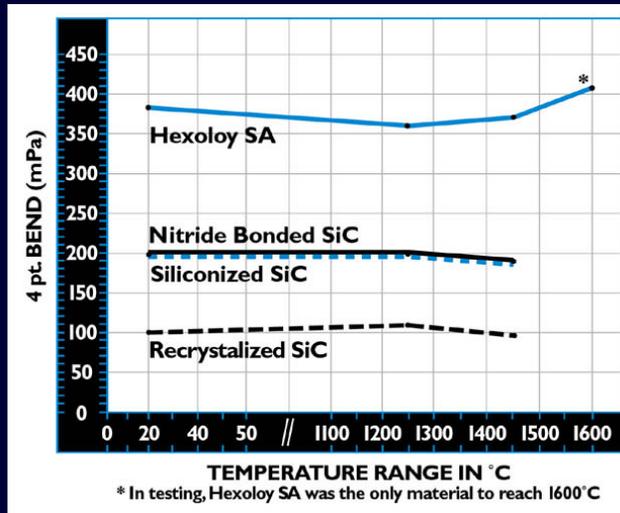
Material	Hexoloy SA SiC	Recrystallized SiC	Siliconized SiC	Nitride Bonded SiC
Maximum Use Temperature	1650°C	1600°C	1350°C	1450°C
Flexural Strength (MPa) @RT	380	100	200	200
@1450°C	370	100	195	195
@1600°C	410	-	-	-
Density (g/cc)	>3.10	2.70	3.00	2.80
Apparent Porosity (%)	0	16	0	12


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- Siliconized SiC was a popular seal material choice but continuous Si metal phase resulted in erosion/corrosion issues
- Nitride bonded SiC offers outstanding wear resistance
- Recrystallized SiC's purity is important in the semiconductor industry

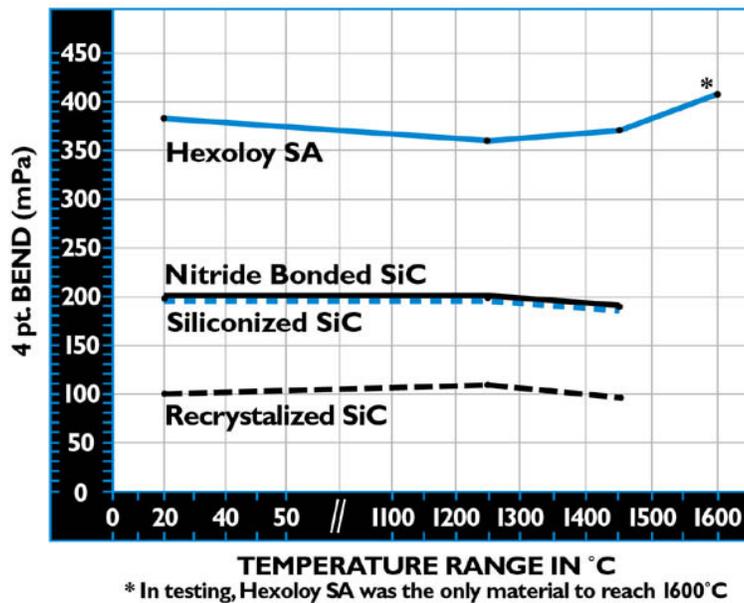
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High Temperature Strength

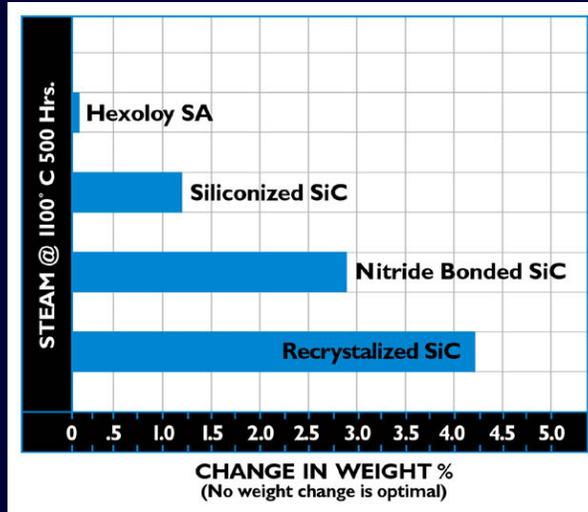


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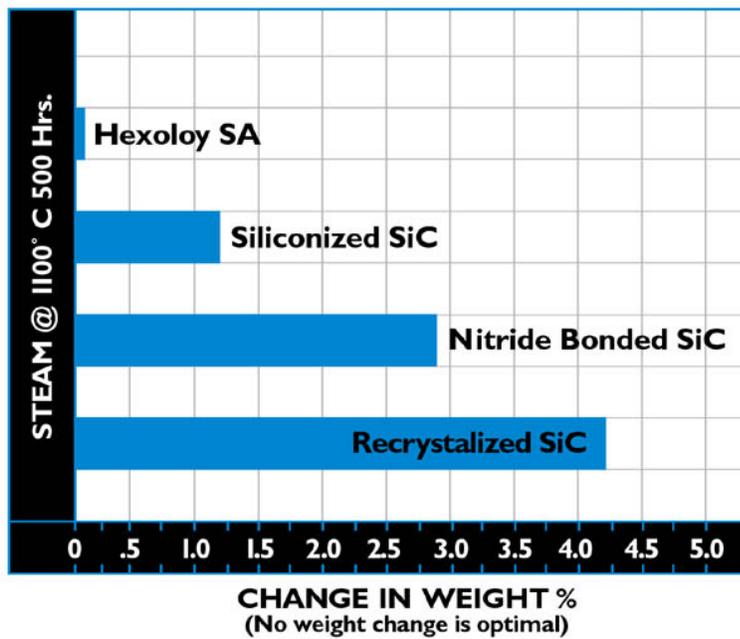
Hexoloy[®] SA SiC exhibits dramatic strength advantage over alternate SiC materials with no drop off at elevated temps.



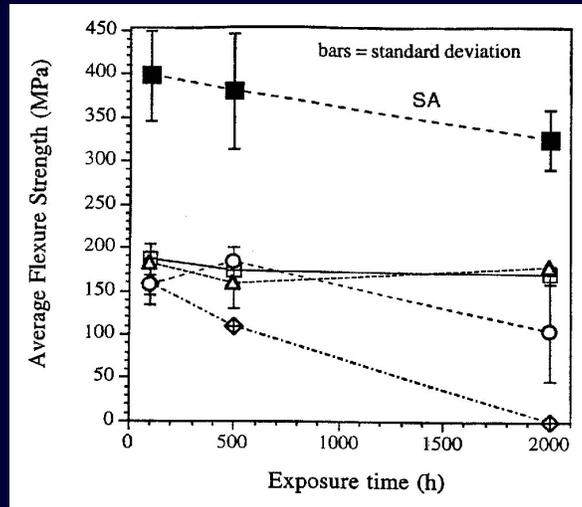
Oxidation Resistance



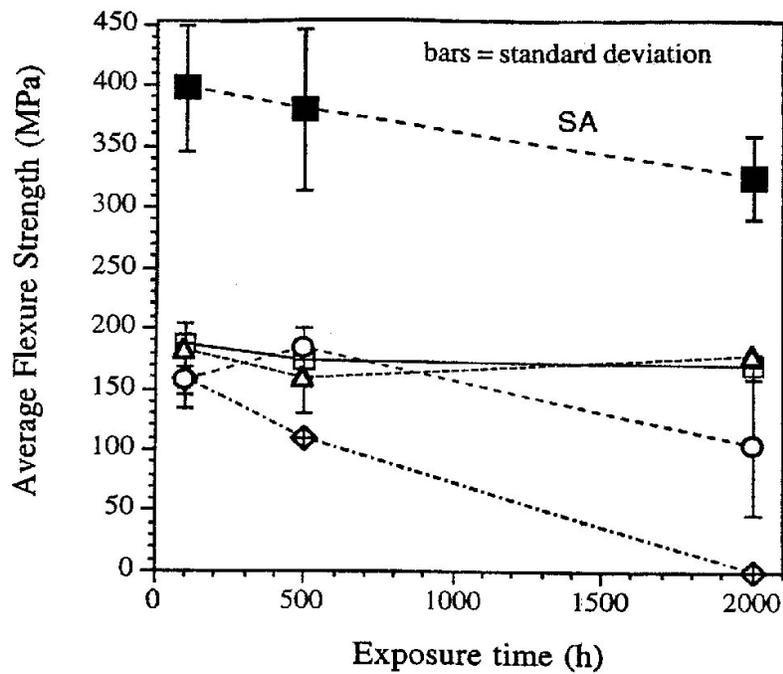
Hexoloy[®] SA shows negligible weight and dimensional change in oxidizing atmospheres.



Flexural Strength in Steam



Testing at Oak Ridge National lab
at 1260°C and 50% water shows
significant strength advantage
maintained over other ceramic materials.



Hexoloy® SiC

Cost-effective solutions
for a wide range
of applications
in a variety of shapes




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