

Hexoloy® SE Silicon Carbide Kiln Support Beams and Hexoloy® SA SiC Kiln Tiles



Maximize Kiln Capacity And Productivity

Product Application

Hexoloy®SE silicon carbide (SiC) kiln support beams offer true low mass design potential for high temperature furnace applications. The excellent strength of Hexoloy SE allows for reduction of beam cross-section by 50% versus traditional refractory SiC materials, without compromising load-carrying capability.

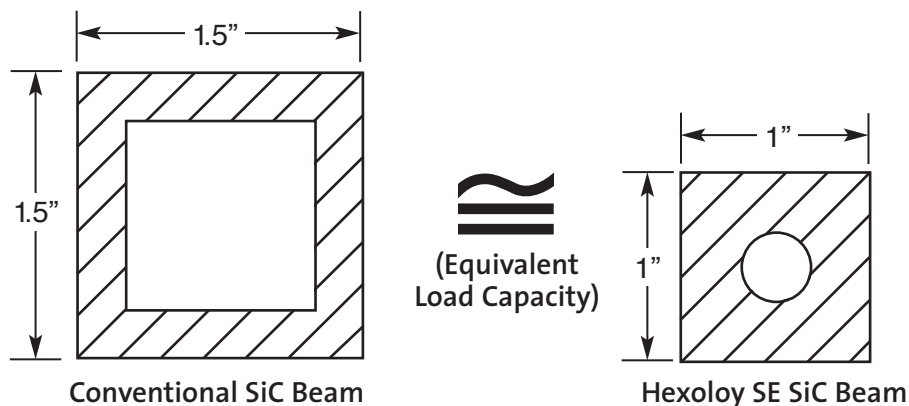
Product Description

Hexoloy SE is produced by pressureless sintering of submicron silicon carbide powder. The sintering process results in a self-bonded, fine-grained (less than 10 μm) SiC product which is 94% dense. Hexoloy SE's outstanding high temperature properties (strength, oxidation resistance, low creep) make it an ideal material for kiln support beams.



Hexoloy SE SiC Beams

Comparison of Typical Beam Cross-Section



Low mass Hexoloy beams handle equivalent load for greater productivity.

- 50% reduction in beam cross-section
- 40% reduction in mass (weight)

Hexoloy SE Kiln Support Beams

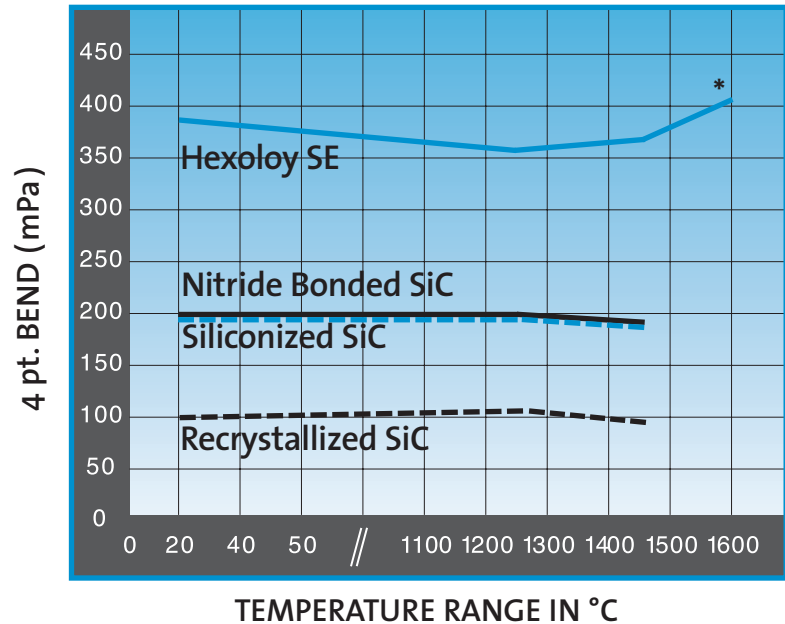
Product Properties

High Temperature Strength

Hexoloy SE exhibits strength of 2-3 times that of nitride-bonded and recrystallized SiC refractory materials. Hexoloy SE's strength is also nearly twice that of siliconized SiC and nitride bonded SiC materials. More importantly, Hexoloy SE retains its strength at temperatures of up to 1650°C (air) and up to 1900°C (inert).

Creep Resistance

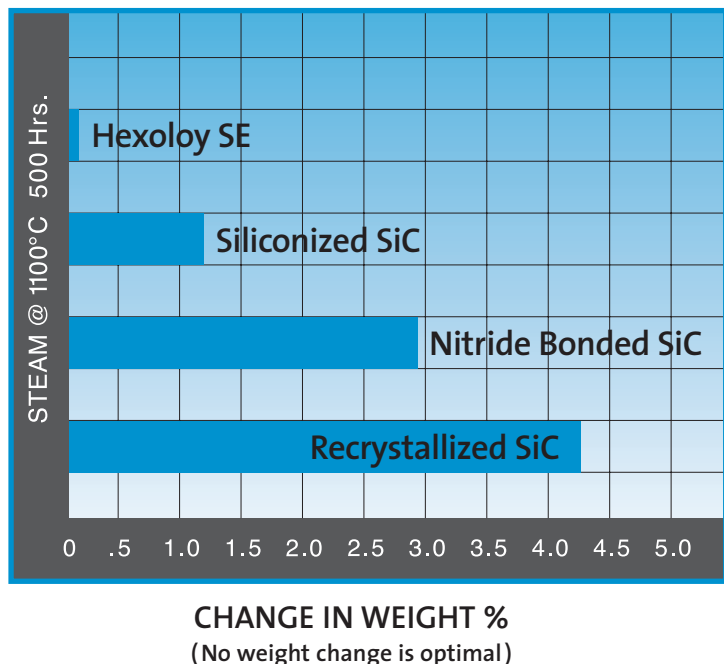
Hexoloy SE has unequalled creep resistance at elevated temperatures. In tests performed at 1600°C, Hexoloy SE shows improvement in creep resistance of greater than 400% compared to recrystallized and nitride-bonded SiC materials.



* In testing, Hexoloy SE was the only material to reach 1600°

Oxidation Resistance

In extended duration testing in steam (1100°C), Hexoloy SE exhibited outstanding oxidation resistance as evidenced by its extremely low weight gain compared to traditional SiC refractory materials.



Hexoloy SE Beams for Low Mass Kiln Cars

A Technically Superior, Cost-Effective Solution

Hexoloy SE beams can provide a technically superior, cost-effective solution in demanding, high temperature kiln applications. They can handle much higher loads—with a lower mass—at higher temperatures for a longer period of time versus traditional, bulkier SiC materials.

Features & Benefits

- ❑ Reduced beam volume and weight mean more product per kiln run.
- ❑ Performs at temperatures other materials cannot (>1650°C air; >1900°C inert).
- ❑ Excellent oxidation resistance translates to long beam life.
- ❑ Excellent creep resistance minimizes beam warp.
- ❑ Excellent thermal shock resistance, allows for faster cycles—heat up and cool down.
- ❑ Overall lower operating costs and increased productivity.

Typical Properties of Comparative SiC Materials

Material	Hexoloy SE SiC	Recrystallized SiC	Siliconized SiC	Nitride Bonded SiC
Maximum Use Temperature	1650°C (air) 1900°C (inert)	1600°C –	1350°C –	1450°C –
Flexural Strength (MPa)				
@ room temp	380	100	200	200
@ 1450°C	370	100	195	195
@ 1600°C	410	–	–	–
Density (g/cc)	3.07	2.70	3.00	2.80
Apparent Porosity (%)	0.6	16	0	12
Modulus of Elasticity (GPa)				
@ 20°C	350	280	300	200
@ 1200°C	300	190	200	200
Thermal Conductivity (W/mK) @ 1200°C	30	21	40	18
Coefficient of Thermal Expansion	4.02x10 ⁻⁶ /°C	4.8 x10 ⁻⁶ /°C	4.3 x10 ⁻⁶ /°C	4.3 x10 ⁻⁶ /°C

Hexoloy® SA Kiln Tiles

Ultra-thin, strong, lightweight Hexoloy SA kiln tiles offer a number of advantages including:

- ❑ Thinner tiles/batts allow more usable kiln space.
- ❑ As thin as 2 mm with overall tile size dependent on tile thickness.
- ❑ Less non-product to heat and cool.
- ❑ Excellent thermal shock resistance for rapid cycling.

Additional Hexoloy SA Components

Hexoloy SA is an excellent alternative material to superalloys and other ceramics with exceptional properties such as:

- ❑ High thermal conductivity
- ❑ Thermal shock resistance
- ❑ Impervious to gases up to 1093°C even at 4000 psi
- ❑ Emissivity of .9 (an excellent black body)

Additional Hexoloy SA components are available to meet a variety of high temperature and severe environment applications including:

- ❑ Thermocouple protection tubes
- ❑ Nozzles
- ❑ Wear tile liners
- ❑ Heat exchanger tubing
- ❑ Custom components
- ❑ Rollers (for roller hearth furnaces)
- ❑ Special shapes



Hexoloy SA SiC Tiles

FIELD REPORT

Hexoloy® SE Silicon Carbide Support Beams

Tunnel kiln retrofit enables addition of fifth deck, increases capacity by 25%

The tunnel kiln system used to process high alumina at 1520°C to 1540°C was retrofitted with Hexoloy SE beams. The higher strength of Hexoloy SE enabled the use of thinner beam cross-sections of 1/2" versus a 1-1/2" beam. This allowed for redesign and the addition of a fifth deck to a typical 4-deck arrangement within the same kiln.

This leading manufacturer of high alumina tile made this capital investment to cost-effectively improve both total capacity and overall productivity. They are responding to a growing market demand for their product.

The new Hexoloy 5-deck system:

- ❑ Results in a 2-year payback. The annual savings and revenue realized will more than justify the investment by avoiding more costly capacity expansion alternatives.
- ❑ 25% increase in kiln capacity & productivity. Increases usable setting volume, allowing the live load to increase proportionately.
- ❑ Features beams measuring 1/2" x 1/2" x 30" each and spanning 24" with a maximum load of 500 pounds per deck.
- ❑ Avoids the negative economic impact of using periodic kilns (increased fuel and labor costs) to meet capacity requirements.

Hexoloy SE offers improved oxidation resistance for longer life.

In addition to increased capacity advantages, Hexoloy SE kiln furniture has longer service life than traditional SiC refractory materials. The higher density (lower porosity) of Hexoloy SE results in beams that are less susceptible to oxidation.

Oxidation is often the cause of failure for SiC kiln furniture. In the example cited in this field report, its improved oxidation resistance extended the expected life to two times that of the beams used previously.



Before Retrofit
4 decks with conventional 1-1/2" beams



After Retrofit
5 decks with conventional 1/2" Hexoloy SE beams

For More Information

To find out more about the advantages provided by Hexoloy SE kiln support beams and Hexaloy SA kiln tiles, contact the Saint-Gobain Ceramics location nearest you.

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Form No. A-12100
4/06



Hexoloy SE Kiln Support Beams and Hexaloy SA Kiln Tiles for high temperature furnace applications.

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