



SAINT-GOBAIN PERFORMANCE CERAMICS & REFRACTORIES

TOTAL BURNER SOLUTIONS

CERAMIC SYSTEMS



SCAN ME

TO DOWNLOAD





SAINT-GOBAIN



1 in 4 products
did not exist 5 years ago



170.000+
employees



2022 sales of
€ 51.2 billion



represented in
76
countries



-27%
carbon emissions
reduction (vs. 2017 on scope 1+2)



8
main R&D centres

OUR MISSION

Saint-Gobain designs, manufactures and distributes materials and solutions which are key ingredients in the well-being of each of us and the future of all.

OUR PURPOSE

MAKING THE WORLD A BETTER HOME.



WE ARE COMMITTED TO BEING CARBON FREE BY 2050.

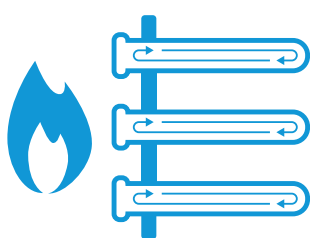
SAINT-GOBAIN

PERFORMANCE CERAMICS & REFRACTORIES

OUR MISSION

To design, develop and **supply solutions** and **services** for **extreme operating industrial conditions**. Our **engineered ceramics** and **refractory** products are manufactured to the **highest industrial standards** and deliver **enhanced performance** while **minimizing environmental impact**.

PIONEERING CERAMIC SOLUTIONS FOR EXTREME INDUSTRIAL APPLICATIONS AND A GREENER WORLD.

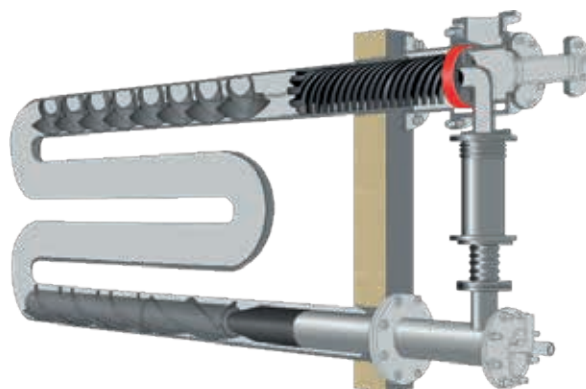
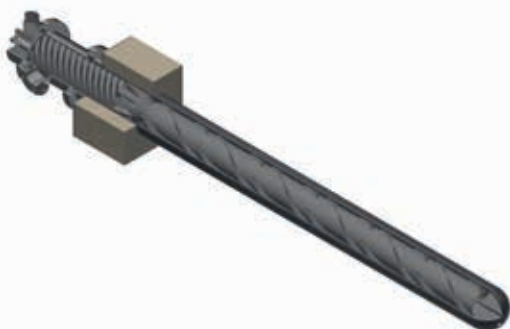


BURNER SOLUTIONS TECHNOLOGIES

Our engineered ceramic products are custom designed, co-developed and manufactured for industrial heating applications. They deliver value in your toughest challenges related to efficiency, throughput, emissions and maintenance.

SINGLE ENDED RADIANT TUBE (SERT) SOLUTIONS

PERFORMANCE ENHANCING THERMAL DESIGNS FOR U- AND W-TUBES



KEY MARKETS & APPLICATIONS



NON FERROUS
ALUMINIUM, ZINC,
COPPER



STEEL
CONTINUOUS ANNEALING
CONTINUOUS GALVANIZING



CHEMICAL
HIGH TEMPERATURE PROCESSING

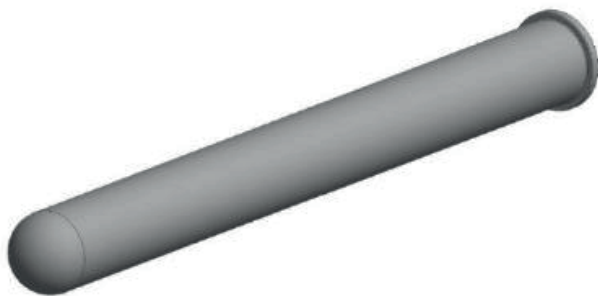


CERAMIC
DIRECT & INDIRECT HEATING



AUTOMOTIVE
METAL HEAT TREATMENT

up to **3.500 mm** length
and **300 mm** diameter



CERAMIC RADIANT TUBE

The foundation for our Burner Solutions is the silicon carbide radiant tube, that offers higher productivity at lower energy consumption. Our largest ceramic single ended radiant tube is 3.5 m long and withstands application temperatures up to 1.380°C / 2.500°F and can input up to twice as much energy as alloy radiant tubes into the furnaces. Available for straight and single-ended applications.

BENEFITS

By comparing a ceramic radiant tube to a metal alloy system, you benefit on:



Increased service-life



Reduced maintenance costs



Lower energy consumption



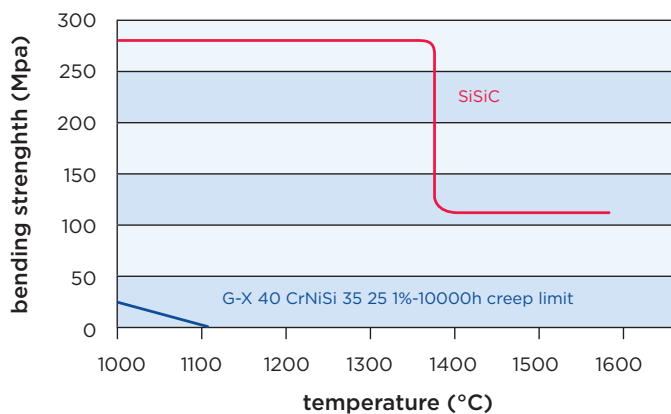
Optimum efficiency



Excellent creep resistance up to
max. application of $T = 1.380^{\circ}\text{C}$

CERAMIC VS. METAL ALLOYS

High temperature properties of Silit® SKD radiant tubes are superior in comparison to metal alloys. Strength of Silit® SKD is appr. 10 times higher and max. application temperature of 1.350°C compared to 1.100°C.



MORE POWER

- For both horizontally and vertically installed tubes, Silit® SKD can resist net heat outputs of appr. 50kW/m² (up to 1.050°C) whereas steel reach only 50% = 25kW/m².

LOW MAINTENANCE AND WEAR

- Strength of Silit® SKD is very good, no support for horizontal installation is necessary. Significantly higher resistance to bending rotation.
- No scaling on the ceramic tube. Therefore no wear and no cleaning of the tubes.

RECUPERATORS

up to
75%
efficiency
improvement

Our recuperators that are integrated into burner systems for both direct and indirect-heating applications. Recuperator serves to recycle energy. Traditional ceramic recuperators allow for efficiencies of up to 75% in more sophisticated burner systems.



FLAME TUBES / DIFFUSERS

0%
apparent
porosity

Flame tubes (diffusers) act as a guide for the flow of combustion and combustion gas in single-ended radiant tube applications.



BURNER NOZZLES

many different
shapes
possible

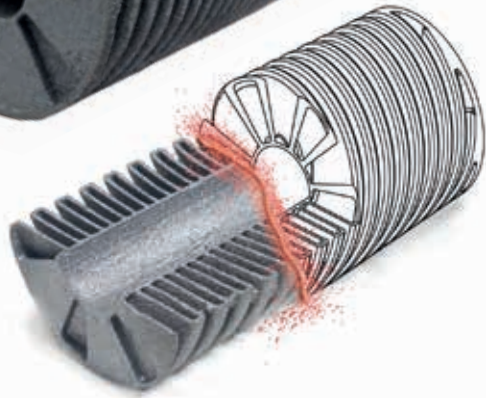
We provide a wide range of industrial, domestic oil or wood pellet boiler burners for direct heating. Amasic-3D® Additive Manufacturing, 3D printing capabilities enable us to offer burner nozzle designs of novel configurations and innovative designs to enhance performance.



HEATCOR™ RECUPERATOR



up to
80%+
efficiency
improvement



Saint-Gobain also possesses a heat exchanger technology, enabled by its Amasic-3D® manufacturing platform that allows recuperators and burner systems to exceed 80% efficiencies. Known as HeatCor™, the unique twisted-channel design enables surface areas of up to 3x more than traditional recuperators that fit the same footprint.

FEATURES

- Thin-Wall Silicon Carbide
- Variable Twist / Channel Cross-Section
- 3D Printed End-Sets
- Novel Metal-Ceramic Interface

BENEFITS



Excellent thermal conductivity



3x higher rates of heat transfer



Custom designs for optimizing application variability



Minimizes long-term failures



Low pressure drop



Working temperature up to 1.350°C

3D PRINTED END-SETS

for unlimited entrance and exit conditions maximize retrofit possibilities. It allows us to customize HeatCor™ recuperators for each application.

CASE STUDY

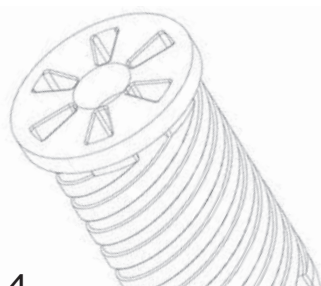
Continuous annealing line,
U-type Radiant Tube w/metal recuperator

Energy Savings: 9% to 16%

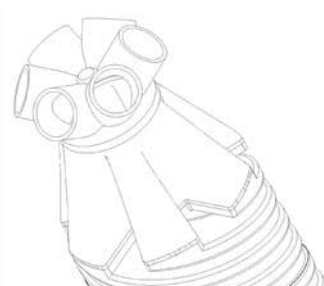
NOx Reduction: 39%

Metal recuperator	Efficiency	70 - 72%
	NOx	320 ppm
HeatCor™-140	After with HeatCor™-140	79% to 83%
	NOx	195 ppm

FLANGE



DIRECTIONAL
NOZZLE



ROUND

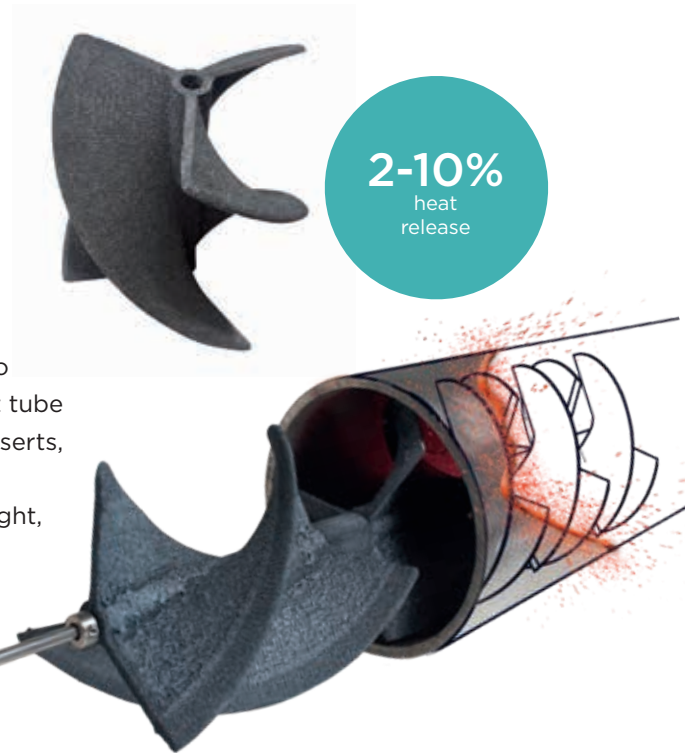


INTEGRAL BURNER
NOZZLE



SPYROCOR® RADIANT TUBE INSERTS




These inserts can be easily retrofitted into existing radiant tubes to improve efficiency and bolster the amount of heat that the radiant tube is re-radiating into the furnace chamber. By implementing these inserts, users can experience energy savings of up to 15% or throughput improvements of up to 5%. Available for simple installation in straight, U-type, W-type, and tri-type radiant tubes. Also applicable in P-type and double-P-type radiant tubes.

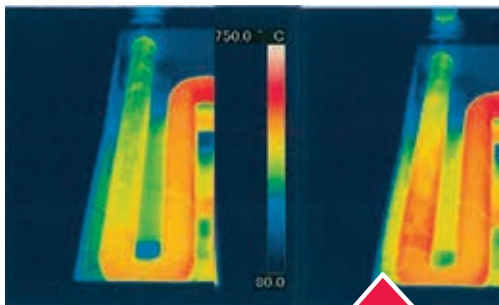


FEATURES

- Patented twist fin design
- Absorbs heat energy
- Re-radiates heat back into the furnace
- 2 - 6 % throughput improvements

BENEFITS

-  Reduction of exhaust temperature
-  Improved energy efficiency
-  Reduction of polluting emissions



More heat into the furnace
allows operators to reach
YOUR desired temperature
faster and boost throughput.

CASE STUDY

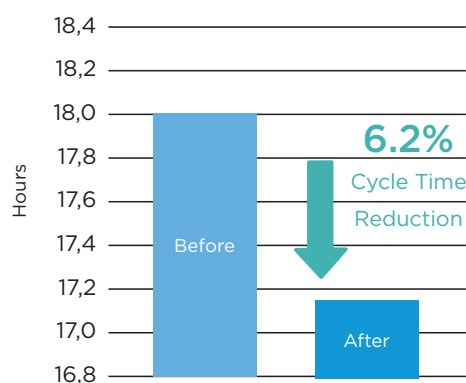
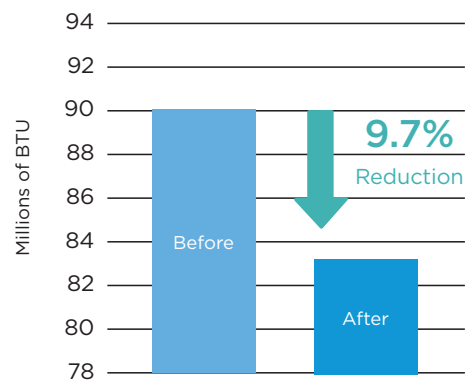
Aluminum slab reheating furnace with
W-type Radiant Tube & 567,000BTU/Hr burner

Energy saving: 9.7%

Additional capacity: +28 cycles / year

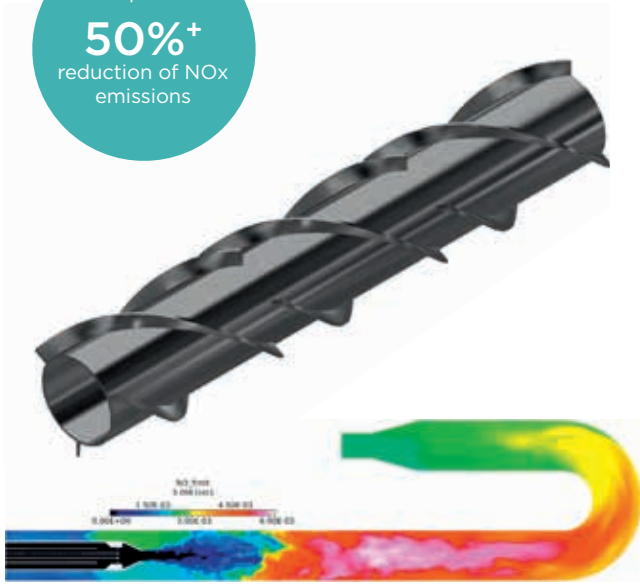
ROI*: 4 months

Natural gas consumed per furnace cycle



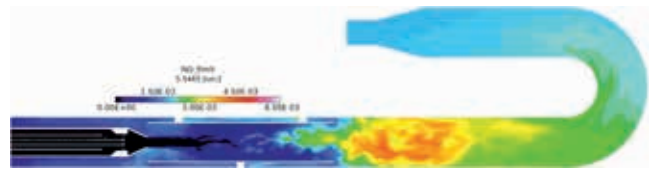
*Energy savings represents an average at gas cost of \$4.00/MMBZU.

up to
50%+
reduction of NOx
emissions



NOXBUSTER® RADIANT TUBE INSERT

NOxBuster® patented design permits the recirculation of flue gasses within the radiant tube. With the NOxBuster® shape, you can significantly reduce flame temperature and lower NOx emissions by up to 50%!



BENEFITS



Significant energy and maintenance savings via hot-spot elimination



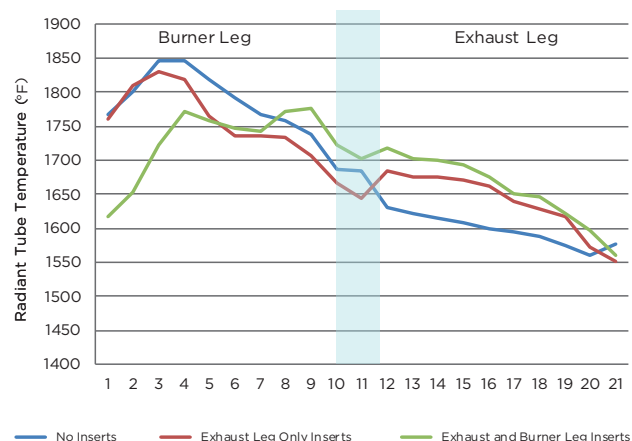
Combined with SpyroCor®, achieve temperature uniformity up to 150°F / 83°C



PYROCOR™ FLAME TUBE

An uniquely designed flame tube, modified and developed for use in U-tubes and W-tubes, that protects the radiant tubes by eliminating hot spots caused by direct flame impingement and increases the life of the radiant tube. The spiral shape can be custom engineered to promote excellent temperature uniformity.

Radiant Tube Temperature Profile

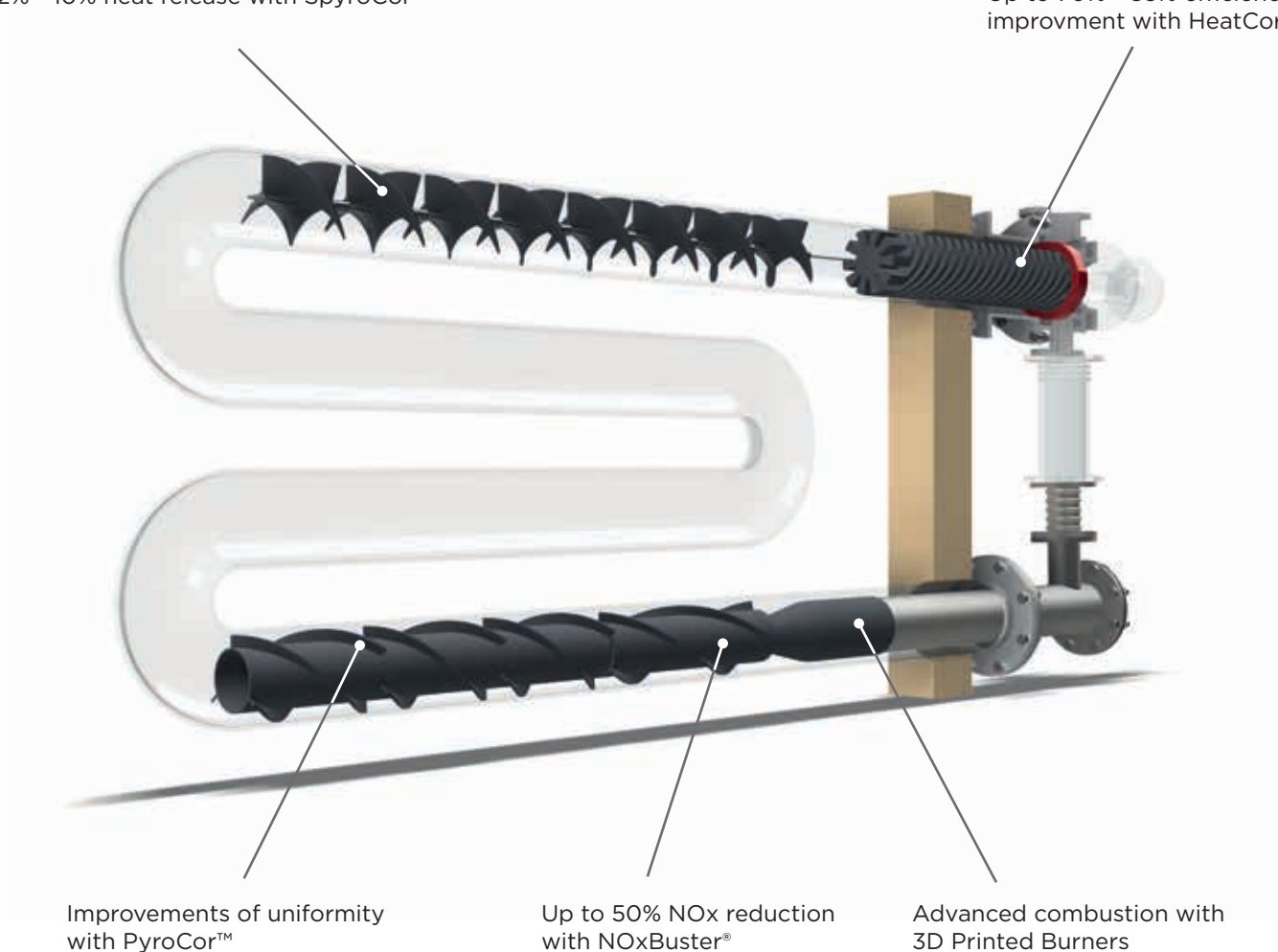


PERFORMANCE ENHANCING THERMAL DESIGNS

The combined benefits of Saint-Gobain's Thermal Designs make them the best total sustainable solution for you. Apply them to your system to help achieve your performance objectives.

2% - 10% heat release with SpyroCor®

Up to 70% - 85% efficiency improvement with HeatCor™



SERT

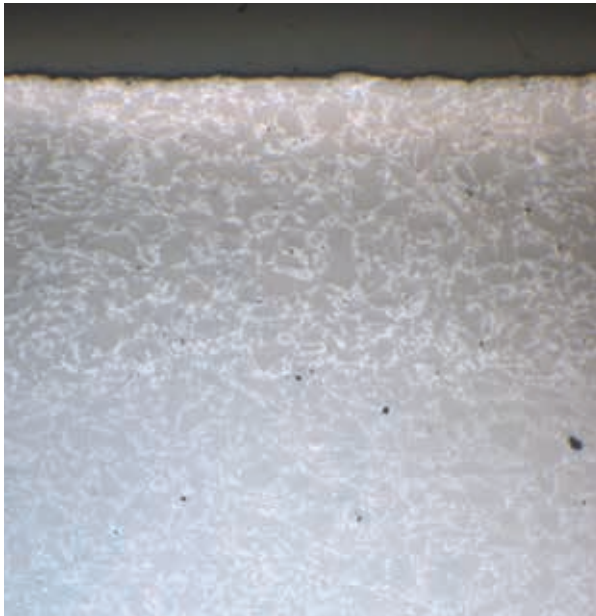


U-TUBE



W-TUBE





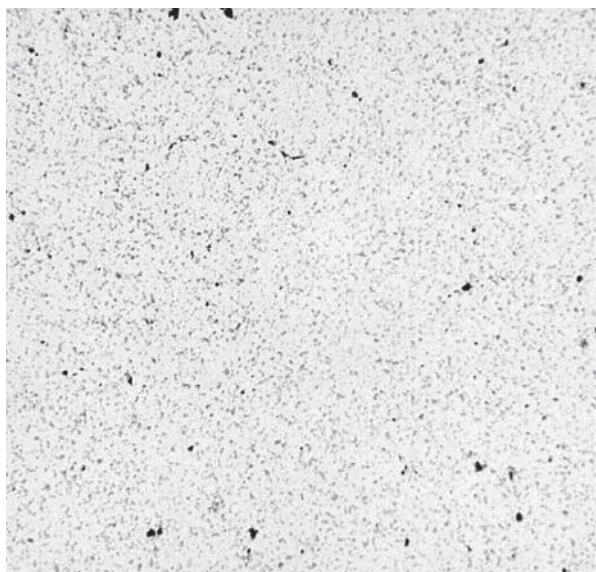
Photomicrograph
of Silit® SKD (100x)

SILIT® SKD / AMASIC-3D®

Silit® SKD and Amasic-3D® are a reaction-bonded, siliconinfiltrated silicon carbide (SiSiC).

FEATURES & BENEFITS

- Gastightness
- Very high thermalshock resistance
- Dimensional stability till maximum application temperature
- Very high thermal conductivity
- Low mass
- High efficiency
- High operational reliability and operating efficiency
- Amasic-3D®: 3D-printable SiSiC



Photomicrograph
of Hexoloy® SA SiC
(200x)

HEXOLOY® SA SiC

Hexoloy® SA SiC is a pressureless, sintered form of alpha silicon carbide, with a density greater than 98% theoretical. It has a very fine grain structure (4 - 10 microns) for excellent wear resistance and contains no free silicon, which makes it highly chemically resistant in both oxidizing and reducing environments.

FEATURES & BENEFITS

- Near universal corrosion resistance
- Excellent resistance to wear
- Exceptional strength at high temperature
- High oxidation resistance, up to 1.650°C in air
- Low thermal expansion
- High thermal conductivity

PROPERTIES OVERVIEW

Saint-Gobain's application engineers are available to assist you with your technical project in designing cost effective high performing products that will meet your need now and in the future.

	Test specification	Unit	Silit® SKD	Amasic-3D®	Hexoloy®
Main components	SiC	%	85	60	> 99
	Si		15	40	
Maximum application temperature ¹⁾		°F / °C	2510 / 1380	2460 / 1350	3450 / 1900
Bulk density	EN 993-1	g/cm ³	3,0	2,8	3,1
Apparent porosity	EN 993-1	Vol. %	0	0	0
Young's modulus RT ²⁾	EN 843-2	Gpa	340	155	430
Modulus of rupture RT ²⁾	EN 993-6	Mpa	260		380
Coefficient of thermal expansion α RT ... 1.300°C	EN 993-10	10 ⁻⁵ /K	4,5	4,8	4,0
Thermal conductivity 1.000°C	EN 993-15	W/(m*K)	35	40	126

1) Dependent on the corresponding operating conditions

2) Ambient temperature



SAINT-GOBAIN'S TOTAL BURNER SOLUTIONS

The combined benefits of Saint-Gobain's Total Burner Solutions makes it the most sustainable solution for you. Apply them to your systems to help achieve up to

10%
throughput

50%
reduced emissions

30%
energy savings

3x
life

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PERFORMANCE CERAMICS & REFRACTORIES

