

SAINT-GOBAIN PERFORMANCE CERAMICS & REFRACTORIES

# WEAR RESISTANT TECHNOLOGIES





**SAINT-GOBAIN**  
**2024**

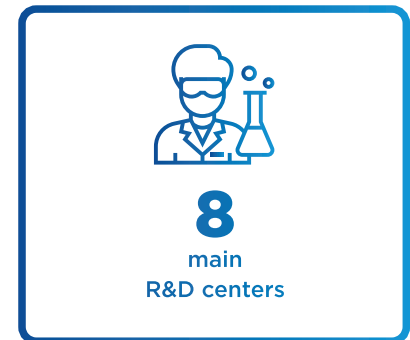
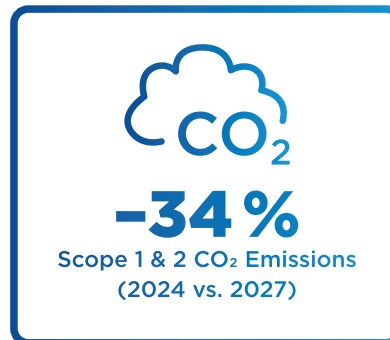
Derwent  
Top 100  
Global Innovator  
2024

 **Clarivate**  
Analytics

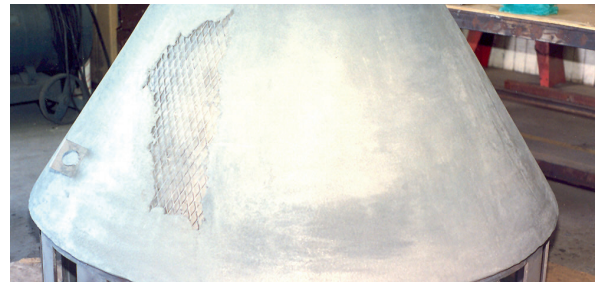
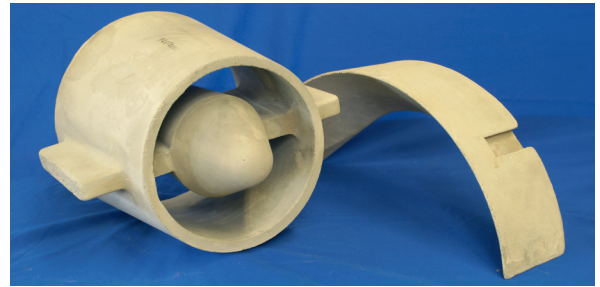
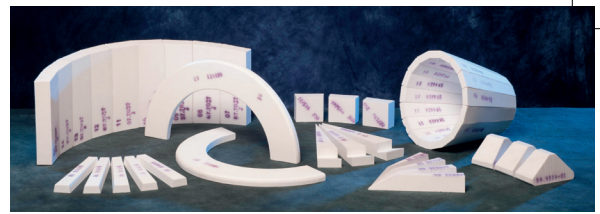
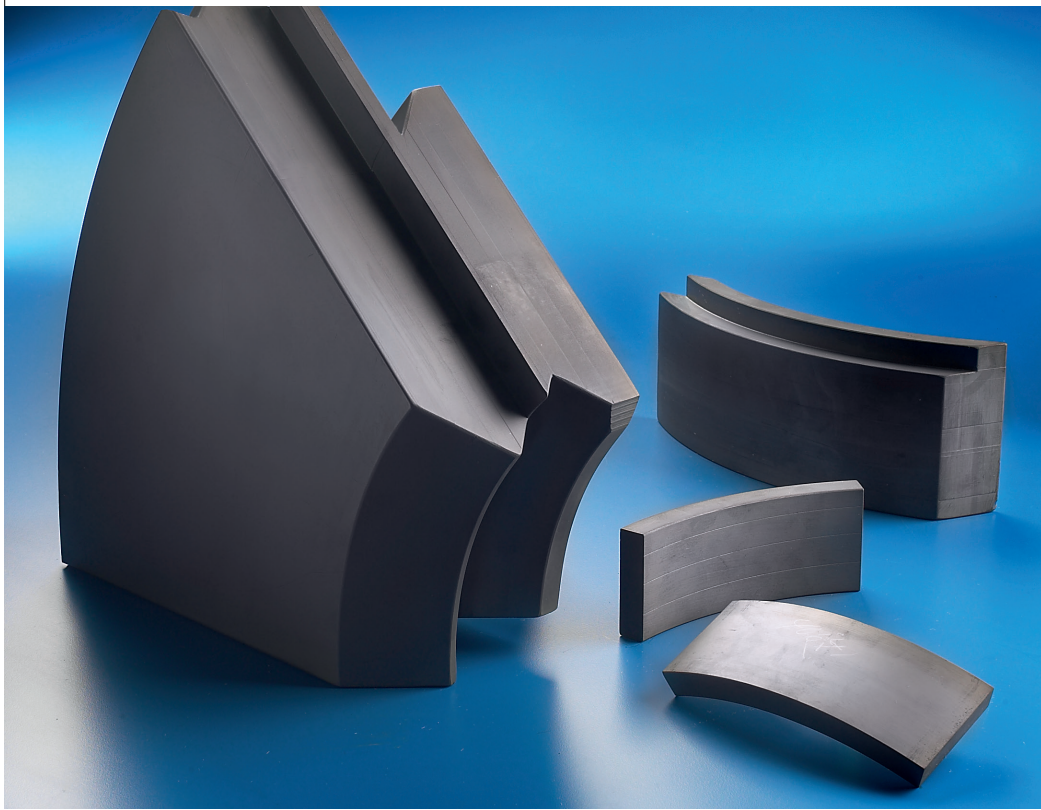
**top**  
EMPLOYER Global  
2025  
FOR A BETTER WORLD OF WORK



**WE ARE COMMITTED TO ACHIEVING  
NET ZERO CARBON EMISSIONS BY 2050**



**PIONEERING  
CERAMICS  
FOR A BETTER  
TOMORROW**



## WEAR RESISTANT TECHNOLOGIES

Saint-Gobain's Wear Resistant products and solutions are developed with a focus on serving applications across various markets that need resistance to numerous types of wear.

Our expertise in material science combined with in-depth knowledge of application, design, manufacturing engineering and installation know-how enables us to offer customized ceramic material solutions for various applications across a multitude of industries.

These solutions are applicable across a wide range of industries. A few of them are listed below.

### KEY MARKETS



Iron Making



Powder & Bulk Solids



Aggregates



Mining & Mineral Processing



Grain Handling



Asphalt



Chemical Processing



Cement



Pulp & Paper



Coal Fired Power



Recycling



Environment

## SOLUTIONS



### ULTRA FINE SINTERED ALPHA- ALUMINA OXIDE (AL<sub>2</sub>O<sub>3</sub>)

Ultrafine-grain, sintered high-grade pressed alumina for various types of abrasion.

#### Durafrax®

- versatile material suitable for a range of applications
- most cost-effective wear-resistant material
- FDA-approved for use in grain & food processing

## NITRIDE BONDED SILICON CARBIDE (NBSiC)



High performance dense NBSiC ceramic refractory with complex shape capabilities.

### CRYSTON® (max. 1590 °C) & CAST REFRAX® (max. 1450 °C) - Cast

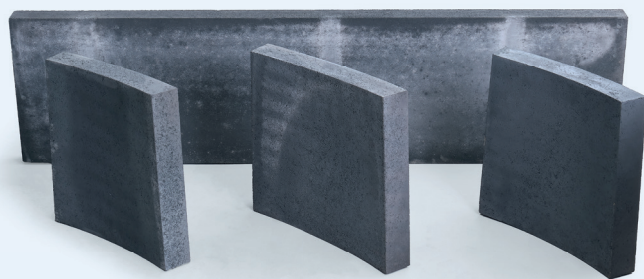
- versatile material suitable for a range of applications
- most cost-effective wear-resistant material
- FDA-approved for grain & food processing

#### CRYSTON® TW - Cast

- improved wear and thermal-shock resistance compared to standard NBSiC
- thin wall components

#### REFRAX® 20 - Pressed

- good wear-resistant pressed material
- improved oxidation and thermal-shock resistance due to higher porosity
- capable of tighter tolerances due to pressed forms
- lower price than Cast SiCs



## REACTION BONDED SILICON CARBIDE (RBSiC / SiSiC)

Premium cast silicon carbide material provides excellent wear resistance and is engineered to resist oxidation and thermal shock.

### NORFRAX® RB (MAX. 1350 °C) & SILIT® SKD (MAX. 1380 °C)

- better wear resistant cast material
- good chemical resistance to molten salts (Na+), Chlorine, Sulphur and Nitrogen Oxides
- large and complex shape capabilities

### HAMMERFRAX®

A patented product, it is an ultra-premium silicon carbide material engineered to resist abrasion and mechanical shock.

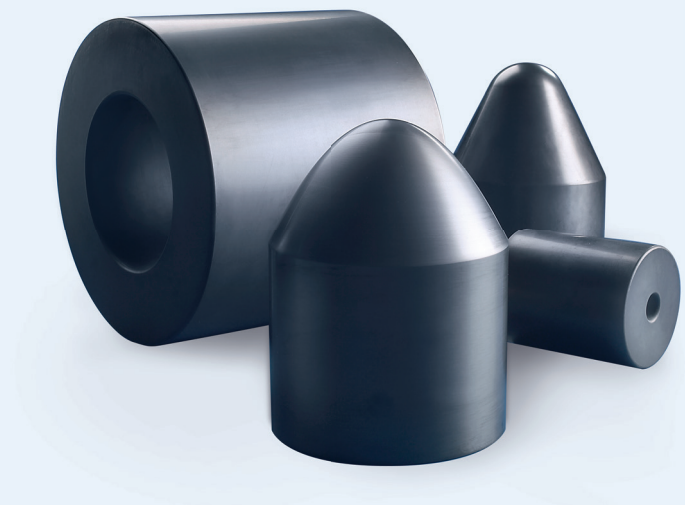
- superior wear resistance compared to other standard SiSiCs
- large and complex shapes with exceptional dimensional accuracy



## HEXOLOY®

Premium sintered alpha silicon carbide pressed or extruded to customizable complex shapes providing maximum performance.

- superior resistance to wear, corrosion and oxidation
- extreme hardness and mechanical resistance
- excellent resistance to thermal shock
- customized complex and intricate shapes
- maximum use temperature 1900 °C



## SOLUTIONS



## ALUMINA ZIRCONIA SILICA (AZS)

Fused cast product with its interlocking crystalline structure, provides resistance to heavy impact, sliding abrasive wear and thermal shock.

### ZAC / CORGUARD®

- highest impact resistant material with exceptional abrasion resistance, edge and fracture toughness
- interlocking grains and impervious structure provides high corrosion resistance to acids and bases
- largest shape capability in our portfolio



## MONOLITHIC CASTABLES

### WEARFRAX®

Silicon carbide and alumina based range of products that can be rammed/troweled/poured and primarily used to provide abrasion resistance in low and high temperature applications where traditional refractory bricks are not feasible or cost effective.

### WEARFRAX® RS58L & RA57L

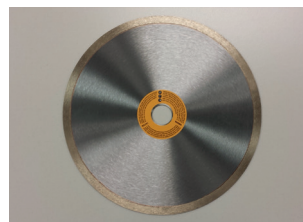
- easy preparation and installation
- no curing spray needed after installation
- 24 hour ambient temperature cure
- designed to withstand thermal shock

## ACCESSORIES



### WEARPAK®

Adhesives, Mortar and Wearing compounds offered in various viscosities and grades to suit every application need.



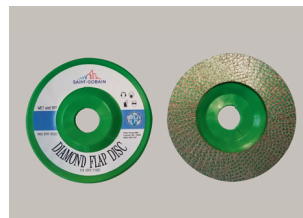
### Diamond Saw Blades

Designed for easy on site jobs, offered in 8", 10", 14" and 20" dia.



### WEARFIX®

A ZAC ceramic based wearing compound used to improve joint wear or as a filling material for improved performance.



### Diamond Flap Discs

Diamond-impregnated discs for fast material removal, edge chamfering or surfaces smoothing, wet or dry.

## OVERVIEW

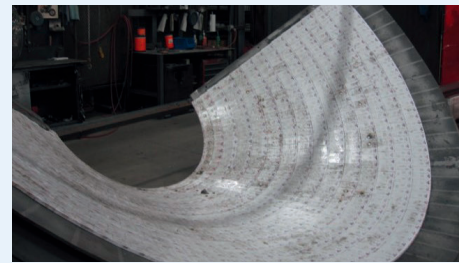
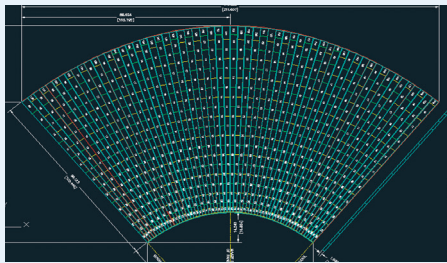
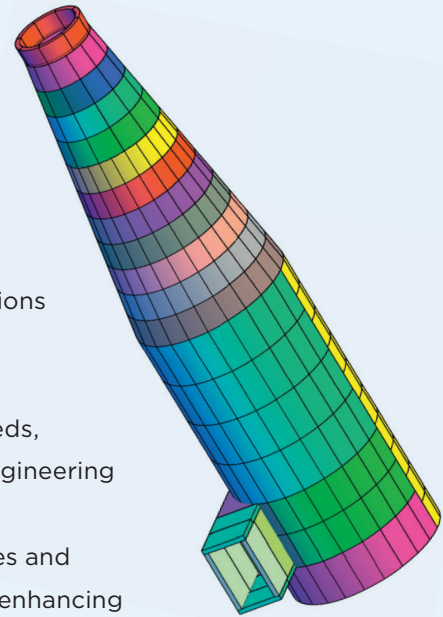
	Aluminum Oxide (Al <sub>2</sub> O <sub>3</sub> )		Silicon Carbide (SiC)				
	Alpha Al <sub>2</sub> O <sub>3</sub>		Nitride Bonded SiC			Reaction Bonded SiC	
	Durafrax®	Cryston®	Cryston® TW	Cast Refrax® 20	Refrax® 20	Norfrax® RB	Silit® SKD
<b>Properties</b>							
Density, g/cm <sup>3</sup>	3.52	2.77	2.77	2.77	2.62	3.05	3.00
Porosity, %	0	8	<1	15	16	0	0
Thermal Conductivity, W/m-K	18	16.3	23.7	13.8	16.3	125	35
Thermal Expansion, x10 <sup>-6</sup> /°C	8.3	3.2	4.3	-	4.7	4.3	4.5
Vickers Hardness, Gpa	9	23	11,6	-	-	22	-
Abrasion Resistance C704	1.0	1.6	1.5	1.9	2.5	0.7	0.7
Max Use Temp, °C	1250	1590	1450	1450	1590	1350	1380
<b>Performance</b>							
Sliding Abrasion	Better	Good	Better	Good	Good	Better	Better
Erosion	Better	Good	Good	Good	Good	Better	Better
Impact	Good	Good	Good	Good	Good	Good	Good
Corrosion Resistance	Good	Good	Good	Good	Good	Better	Better
Thermal Shock	Good	Good	Better	Good	Good	Better	Better
Thermal Insulation	<b>Best</b>	<b>Best</b>	Better	<b>Best</b>	<b>Best</b>	Good	Good
Electrical Insulation	<b>Best</b>	Better	Better	Better	Better	Good	Good
	Silicon Carbide (SiC)		Alumina Zirconia Silica		Castables		
	Reaction Bonded SiC	Sintered Alpha SiC	Zirconia Toughened Alumina	Fused Cast AZS	Silicon Carbide	Aluminum Oxide	
	HAMMERfrax®	Hexoloy®	Durastrike® ZTA	ZAC - Corguard®	Wearfrax® RS58	Wearfrax® RA57	
<b>Properties</b>							
Density, g/cm <sup>3</sup>	3.04	3.10	4.20	3.47 (RN) / 3.72 (RT)		2.45	2.80
Porosity, %	1	0	0	1.15 (Skin)		-	-
Thermal Conductivity, W/m-K	125	125,6	-	-		-	-
Thermal Expansion, x10 <sup>-6</sup> /°C	4.3	4.02	-	-		-	-
Vickers Hardness, Gpa	22	-	-	19.6		-	-
Abrasion Resistance C704	0.7	0.4	0.6	1.1		8.2	7.2
Max Use Temp, °C	1350	1900	1500	1650		500	500
<b>Performance</b>							
Sliding Abrasion	<b>Best</b>	<b>Best</b>	Good	Good	Good	Good	Good
Erosion	Better	<b>Best</b>	Better	Good	Good	Good	Good
Impact	Good	Good	<b>Best</b>	Better	Good	Good	Good
Corrosion Resistance	Better	<b>Best</b>	Better	Better	Good	Good	Good
Thermal Shock	Better	Good	Better	Better	Good	Good	Good
Thermal Insulation	Better	Good	<b>Best</b>	Better	Better	Better	Better
Electrical Insulation	Better	Good	Better	Better	Better	Better	Better

# PRE-ENGINEERED CERAMIC SOLUTIONS

Saint-Gobain Performance Ceramics & Refractories offers Pre-Engineered solutions for Wear Resistant applications.

Our solutions are developed with a deeper understanding of the customer's needs, tailor-made to meet precise requirements through Research & Development, Engineering Design of shapes, Application Engineering, Installation and Analysis.

These solutions are made possible with state-of-the-art manufacturing processes and techniques that enable us to produce geometries from simple to complex, thus enhancing the overall performance of wear resistance to meet every customer need.



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