Saint-Gobain Protective Ceramic Materials

Maximum Protection - Minimum Weight

SAINT-GOBAIN

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01 Proven Performance in Demanding Applications

For nearly 50 years, Saint Gobain has led the way in the development of high-performace materials for ceramic armor systems. From the first ceramic body armor system for U.S. troops in Vietnam to the modern body armor system, Saint-Gobain is committed to protecting the warfighter.

As the world's largest ceramic producer, our parts range from high-volume net shape tiles for vehicles and aircraft to complex engineered components for personal protection. We protect the warfighter on the land and in the air.

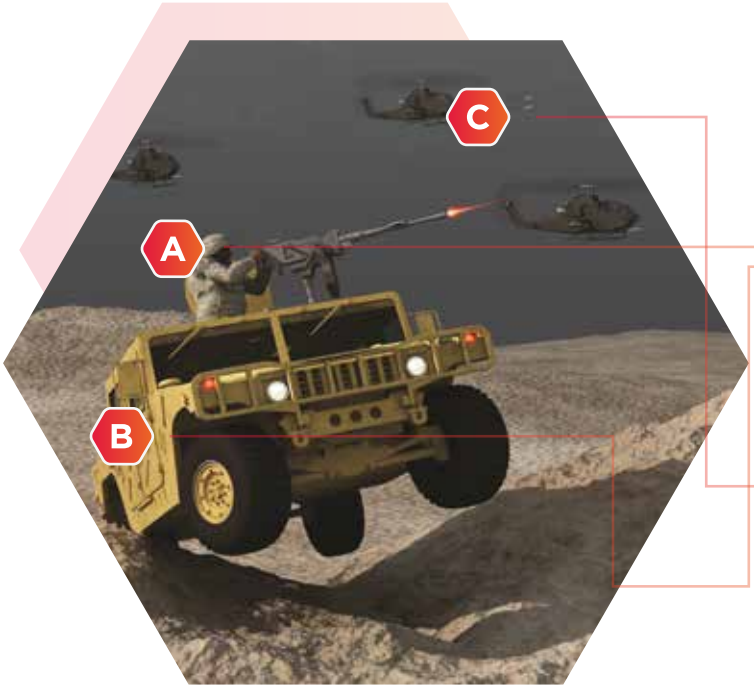
02 Leading the Industry

Our ceramic materials provide performance advantages that are unmatched in the industry:

- Meets or exceeds MIL-STD specifications
- Multi-hit Protection
- Light Weight
- Flexible Design
- High Hardness
- High Strength

03 Collaboration Through Co-Development

Saint-Gobain is strictly a ceramic developer and manufacturer. We do not compete with our customers. Saint-Gobain seeks to collaborate with key partners to develop the most robust, cost-effective designs that provide industry-leading protection.



A Soldier Torso Plates
Side Plates
Helmets
Groin Plates
Deltoid Plate

B Vehicle Tile
Specialized Tile
Panel Kits
Large Plate
(20" x 20") Capability

C Aircraft Tile
Specialized Tile
Panel Kits
C-130 Panels

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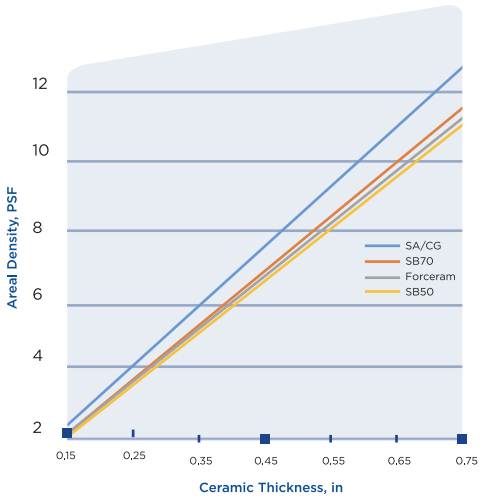
04 Physical Properties - Typical Value

	Forceram®	Hexoloy® SA	Hexoloy® CG	Hexoloy® SB70	Hexoloy® SB50
Performace	Saint-Gobain's extensive portfolio of ceramic materials is available in all shapes and sizes, which meet or exceed Military NIJ and Special Threat specifications.				
Features	Diverse Size and Shape Capability Multi-Hit	Industry-leading Performance	Multi-Hit	Lightweight Multi-Hit	Lightest Weight Multi-Hit
Composition (Phases)	Bonded SiC	Sintered SiC	Sintered SiC	Sintered SiC-B_4C Composite	Sintered SiC-B_4C Composite
Density, g/cc	2.8	3.15	3.15	2.89	2.75
Hardness, kg/mm^2 (Knoop)	1,200	2,500	2,500	2,300	2,300
Flexural Strength, MPa (4 pts bending)	160	380	410	320	300
Elastic Modulus, GPa	250	430	410	400	400
Fracture Toughness, MPam$^{1/2}$	3.5	3	3.5	3.5	3.7

Areal Density vs. Ceramic Thickness



The above graphic is offered as a comparison of the weights of our ceramic matierals

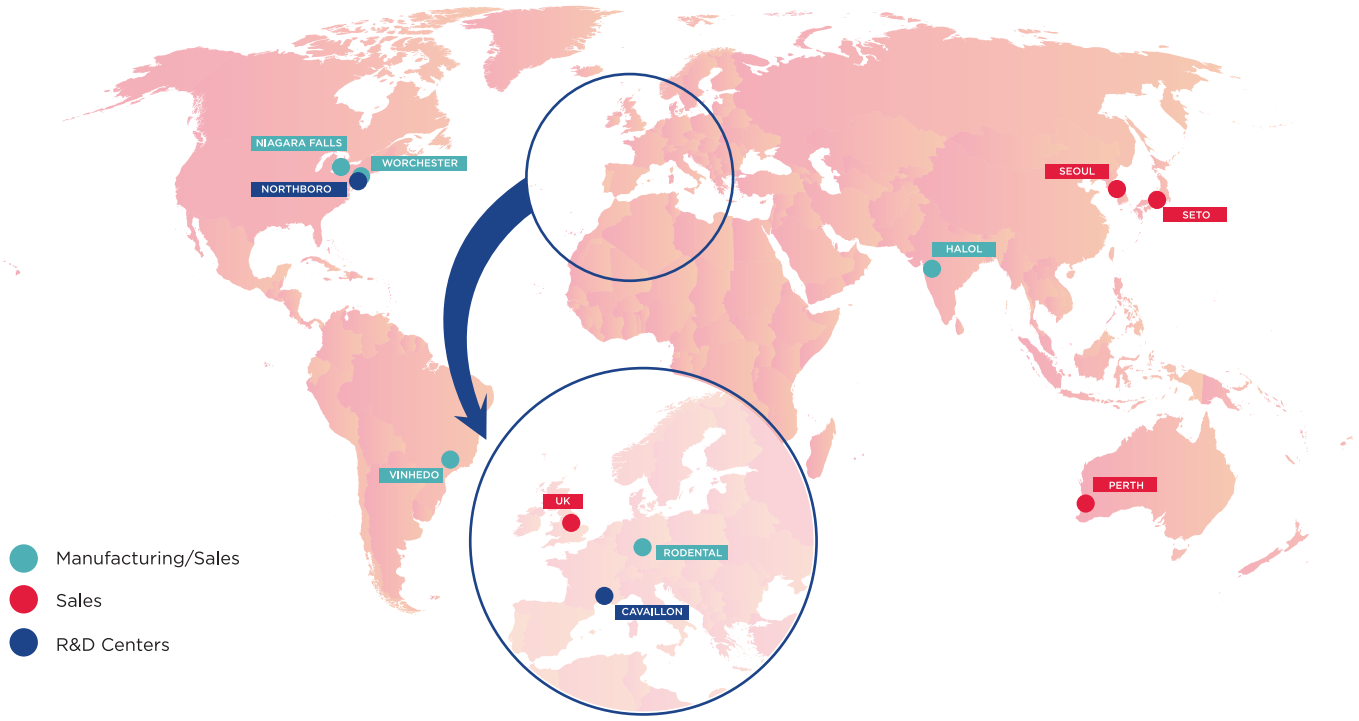
Glossary of Terms

Ceramics	Inorganic, non-metallic materials
Sintered	High -temperature (usually>2500°F/1400°C) bonding of powder into a solid form without melting
SiC	Silicon Carbide, a ceramic compound of elements silicon (Si) and carbon (C)
B_4C	Boron Carbide, a ceramic compound of elements boron (B) and carbon (C)
Bonded SiC	Method of sintering Silicon Carbide with the assistance of other material additives
Density	Mass of material divided by volume
Hardness	Ability to withstand wear before permanent damage is done
Flexural Strength	Resistance to deformation and breaking when a bending force is applied
Elastic Modulus	Measure of non-permanent deformation when force is applied
Fracture Toughness	Amount of energy (not force) that can be absorbed before breaking

Worldwide Armor Supply and Support

Founded more than 350 years ago, Saint-Gobain is one of the top industrial groups in the world, present in 68 countries with more than 180,000 employees and annual sales greater than $41.8 billion. Saint-Gobain Ceramic Materials is a worldwide leader with over $2 billion in revenue and 7,500 employees at 72 manufacturing sites in 21 countries.

Saint-Gobain has global armor presence with worldwide manufacturing capabilities. We can support your ceramic armor needs wherever you are located.



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