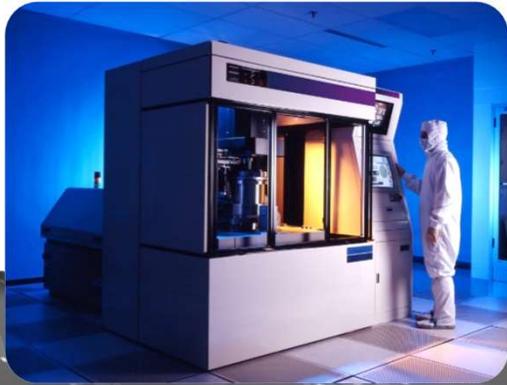




Industriekeramik Hochrhein GmbH

Fine Technical Ceramic Powders
Advanced Technical Ceramics
Since 1994





IKH DEFENCE

Technical Ballistic Ceramics
Ballistic Solution Provider

2025

Advanced Technical Ceramics

General Ceramic Information



Boron Carbide – B₄C

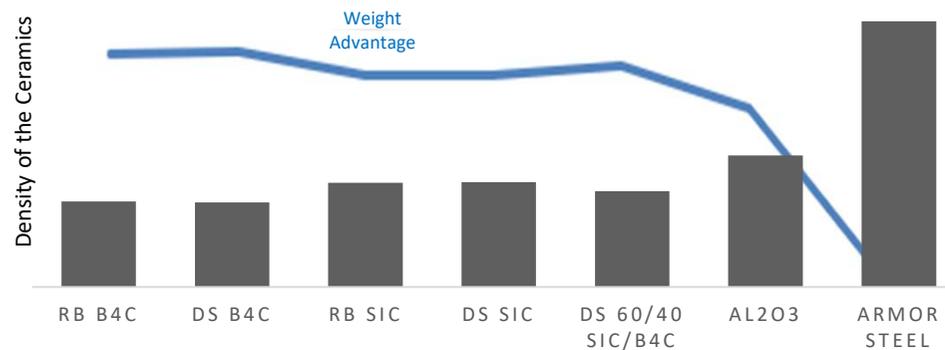


Silicon Carbide - SiC



Alumina – Al₂O₃

<u>Technical Points</u>	Low-Density, Hardness (2nd after Diamond), Resistance to mech. corrosion, Leading to highest solutions	Versatile material for optimal density that falls between Al ₂ O ₃ & B ₄ C with its cost and weight effectiveness, High effective choice for all protective applications	Cost effective and Versatile material, Product adaptability leads to ideal choice for various Applications, High resistance to ballistic and blast threats
<u>Weight</u>	+++	++	+
<u>Performance</u>	+++	+++	++
<u>Application</u>	<u>Personal Ballistic Protection</u> , <u>Aerial Platforms</u>	<u>Personal Ballistic Protection</u> , Land and Naval Platforms	<u>Personal Ballistic Protection</u> , Land and Naval Platforms



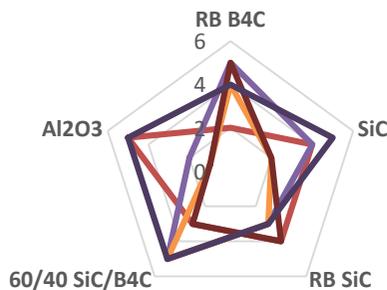
Advanced Technical Ceramics

IKH Advanced Ceramics Portfolio

Monolithic Ceramics	Type of ceramic	Density	Available Thicknesses (+ 0,3 / - 0,1 mm)		Available Sizes (+ 3 / - 3 mm)	Hardness	Fracture Toughness	Elastic Modulus
	RB B4C	2,55 g/cm3 (+/- 0,04)	min 5,5 mm	> 13 mm	All sizes	> 2550 HV	3.0-5.0 MPa m1/2	400-420 GPa
	DS SiC	3,12 g/cm3 (+/- 0,03)	min 3 mm	> 12 mm	All sizes	> 2200 HV	3.0-4.0 MPa m1/2	400-420 GPa
	RB SiC	2,95 g/cm3 (+/- 0,03)	min 5,5 mm	> 12 mm	All sizes	> 2400 HV	3.5-4.5 MPa m1/2	380-400 GPa
	DS SiC/B4C 60/40	2,85 g/cm3 (+/-0,05)	min 3 mm	> 12 mm	All sizes	> 2300 HV	3.0-4.5 MPa m1/2	380-400 GPa
	Al2O3	3,92 g/cm3 (+/-0,05)	min 3 mm	> 12 mm	All sizes	> 1650 HV	3.8-4.8 MPa m1/2	370-390 GPa
Tile Ceramics	Type of ceramic	Density	Available Ceramic Thicknesses (+ 0,15 / - 0,15 mm)		Available Sizes (+ 0,2 / - 0,2 mm)	Hardness	Fracture Toughness	Elastic Modulus
	DS B4C	2,55 g/cm3 (+/- 0,04)	min 5 mm	> 100 mm	All Shapes	> 2400 HV	3.5-4.5 MPa m1/2	380-400 GPa
	DS SiC	3,12 g/cm3 (+/- 0,03)	min 3 mm	> 100 mm	All Shapes	> 2200 HV	3.0-5.7 MPa m1/2	380-420 GPa
	DS SiC/B4C 60/40	2,85 g/cm3 (+/-0,05)	min 4 mm	> 100 mm	All Shapes	> 2300 HV	3.0-4.5 MPa m1/2	380-400 GPa
	Al2O3	3,92 g/cm3 (+/-0,05)	min 3 mm	> 100 mm	All Shapes	> 1650 HV	3.8-4.8 MPa m1/2	370-390 GPa

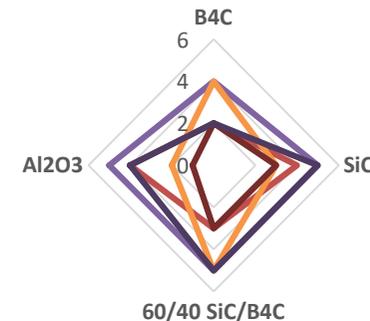
Monolithic Ceramics

— Cost Advantage
 — Ballistic Performance
 — Weight Advantage
 — Hardness
 — Application Availability



Tile Ceramics

— Cost Advantage
 — Ballistic Performance
 — Weight Advantage
 — Hardness
 — Application Availability





IKH DEFENCE
Personal Protection
Monolithic Ceramics

2025

Personal Protection Monolithic Ceramics

Monolithic Ceramics for personal protective hard ballistic plates are designed to meet international standards and provide protection against a wide range of threats. By using various advanced ceramics, we offer balanced solutions in terms of weight and protection. Our in-house production capabilities enable us to respond quickly to high volumes of demand.



NIJ 0101.04 / NIJ 0101.06:
Level III, III+, III++, IV

NIJ 0101.07:
RF1, RF2, RF3

VPAM APR 2006:
Level 6 up to 11

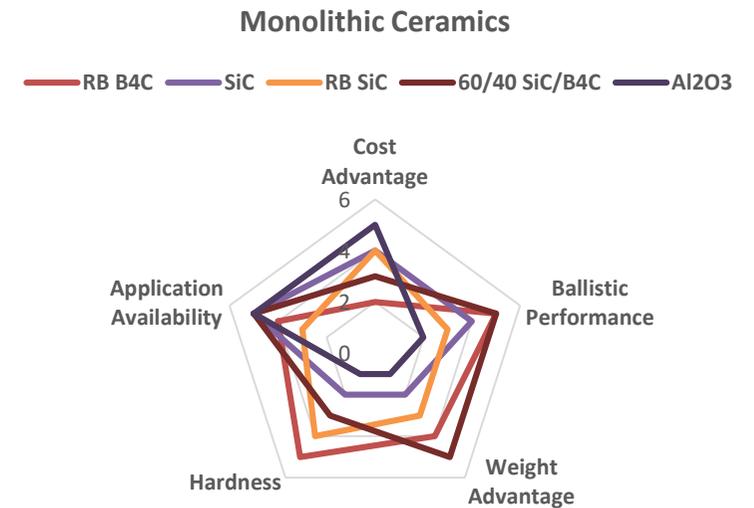


Advanced Technical Ceramics

As a Solution Provider

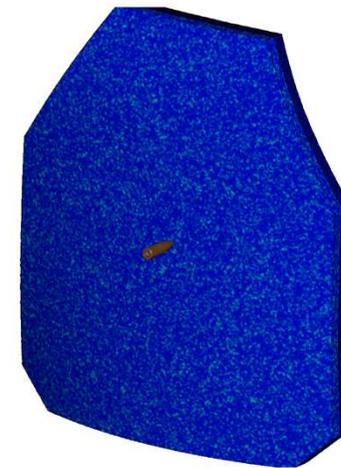
Monolithic Ceramics for Personal Armors	Thickness (Min.)	Thickness (Max.)	Tolerances (Dimension)	Tolerances (Thickness)	Protection Level	Multi-Hit Resistant	Solutions For Stand Alone Protection	Solutions For ICW Protection	Multi - Curve / Single - Curve
RB B4C	5,5 mm	12mm +	+ 3 / - 3 mm	+ 0,3 / - 0,1 mm	VPAM 6 up to VPAM 10 NIJ Lvl 3++ up to NIJ Lvl 4 (NIJ 01.01.06) RF1, RF2, RF3 (NIJ 01.01.07) K3ABC up to K4	YES✓	YES✓	YES✓	Multi - Curve
SiC	3 mm	12mm +	+ 3 / - 3 mm	+ 0,3 / - 0,1 mm	VPAM 6 up to VPAM 10 NIJ Lvl 3++ up to NIJ Lvl 4 (NIJ 01.01.06) RF1, RF2, RF3 (NIJ 01.01.07) K3ABC up to K4	YES✓	YES✓	YES✓	Multi - Curve Single - Curve
RB SiC	5,5 mm	12mm +	+ 3 / - 3 mm	+ 0,3 / - 0,1 mm	VPAM 6 up to VPAM 10 NIJ Lvl 3++ up to NIJ Lvl 4 (NIJ 01.01.06) RF1, RF2, RF3 (NIJ 01.01.07) K3ABC up to K4	YES✓	YES✓	YES✓	Multi - Curve
60/40 SiC/B4C	3 mm	12mm +	+ 3 / - 3 mm	+ 0,3 / - 0,1 mm	VPAM 6 up to VPAM 10 NIJ Lvl 3++ up to NIJ Lvl 4 (NIJ 01.01.06) RF1, RF2, RF3 (NIJ 01.01.07) K3ABC up to K4	YES✓	YES✓	YES✓	Multi - Curve

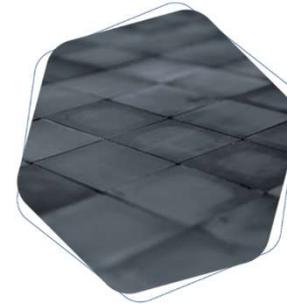
* The values given may vary depending on the project criteria.



Advanced Technical Ceramics

Technical Support - Terminal Ballistic Analysis





IKH DEFENCE
Personal and Vehicle Platform Protection
Tile Ceramics

Personal Protection Tile Ceramics

To provide a high level of protection in accordance with international standards with ballistic shields, solutions are required to be designed and customized specifically. Using advanced ceramics for shields creating a balance between lightness and effective protection against various threats.

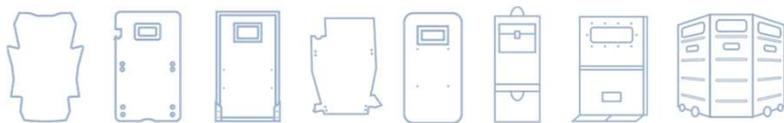
We offer ceramic products for different operational requirements which are specially designed according to the any protection levels.



NIJ 0101.04 / NIJ 0101.06:
Level III, III+, III++, IV

NIJ 0101.07:
RF1, RF2, RF3

VPAM APR 2006:
Level 6 up to 11



Vehicle Platform Protection

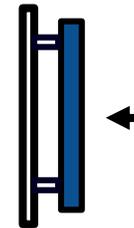
Optimized Solutions for Armor Types



Stand-alone Armor

Stand-Alone armor structure provides complete protection against the threat on its own.

Ideal for gun turrets.



Add-on Armor

The add-on armor structure works in tandem with the vehicle's existing body armor.

It allows the existing protection level of the body armor to be increased with minimal additional weight.

Vehicle Platform Protection

As a Solution Provider

Add-On solutions that meet STANAG 4569 AEP 55 Vol.1 from Level 1 to 6 and can be adapted to various materials, sizes and shapes.

We offer various advanced technical tile ceramics to achieve different areal weights, cost-effective designs and a wide range of add-on armor using different ceramics. For ultra-light ballistic protection for airborne platforms SiC and Al₂O₃ ceramics in add-on armor enhances ballistic defence without compromising mobility and allows easy installation.



MIL-PRF-46103E

STANAG 4569 Vol. 1

Level 1	30-35 kg/m ² Stand Alone
Level 2	40-45 kg/m ² Stand Alone
Level 3	40-52 kg/m ² Add-on (*)
Level 4	70-90 kg/m ² Add-on (**)
Level 5-a/6	150-170 kg/m ² Add-on (***)

* Hull Material: 25mm aluminum

** Hull Material : 8mm MIL-DTL-46100 steel

*** Hull Material : 12 mm MIL-DTL-46100 steel

Note: The values given may vary depending on the project criteria.

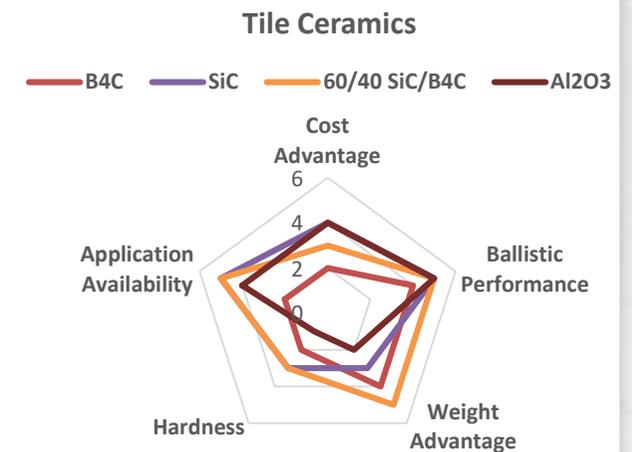


Advanced Technical Ceramics

As a Solution Provider

Tile Ceramics for Vehicle/Platform Armors	Thickness (Min.)	Thickness (Max.)	Tolerances (Dimension)	Tolerances (Thickness)	Protection Level	Multi-Hit	Shape	Solutions for Add-on / Stand Alone Armor
B4C	5mm	100mm	+ 0,2 / - 0,2 mm	+ 0,15 / - 0,15 mm	STANAG 4569 Level II up to Level IV Improvised Explosive Devices (IEDs) FSP Threats	YES✓	Hexagonal Squares Other Geometries	Both✓
SiC	3mm	100mm	+ 0,2 / - 0,2 mm	+ 0,15 / - 0,15 mm	STANAG 4569 Level II up to Level IV Improvised Explosive Devices (IEDs) FSP Threats	YES✓	Hexagonal Cylinder Squares Other Geometries	Both✓
Al2O3	3mm	100mm	+ 0,2 / - 0,2 mm	+ 0,15 / - 0,15 mm	STANAG 4569 Level II up to Level IV Improvised Explosive Devices (IEDs) FSP Threats	YES✓	Hexagonal Cylinder Squares Other Geometries	Both✓
60/40 SiC/B4C	4mm	100mm	+ 0,2 / - 0,2 mm	+ 0,15 / - 0,15 mm	STANAG 4569 Level II up to Level IV Improvised Explosive Devices (IEDs) FSP Threats	YES✓	Hexagonal Cylinder Squares Other Geometries	Both✓

* The values given may vary depending on the project criteria.



Advanced Technical Ceramics

Technical Support - Ballistic Analysis





IKH DEFENCE

We Provide

2025

We Provide Excellence in Production

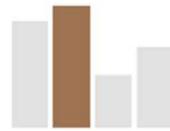
Ceramic Production and Wide Capacity for Personal and Vehicle Armor Solutions with impressive production achievements such as more than 1 million monolithic ceramics for hard ballistic plates; more than 45 million ceramic tiles for more than 15.000 ballistic shields and 800 armored vehicle platforms.



45m

Ceramic Tiles

Used in shields and vehicle armor



1m

Body Armor

Protecting security forces around the world



800

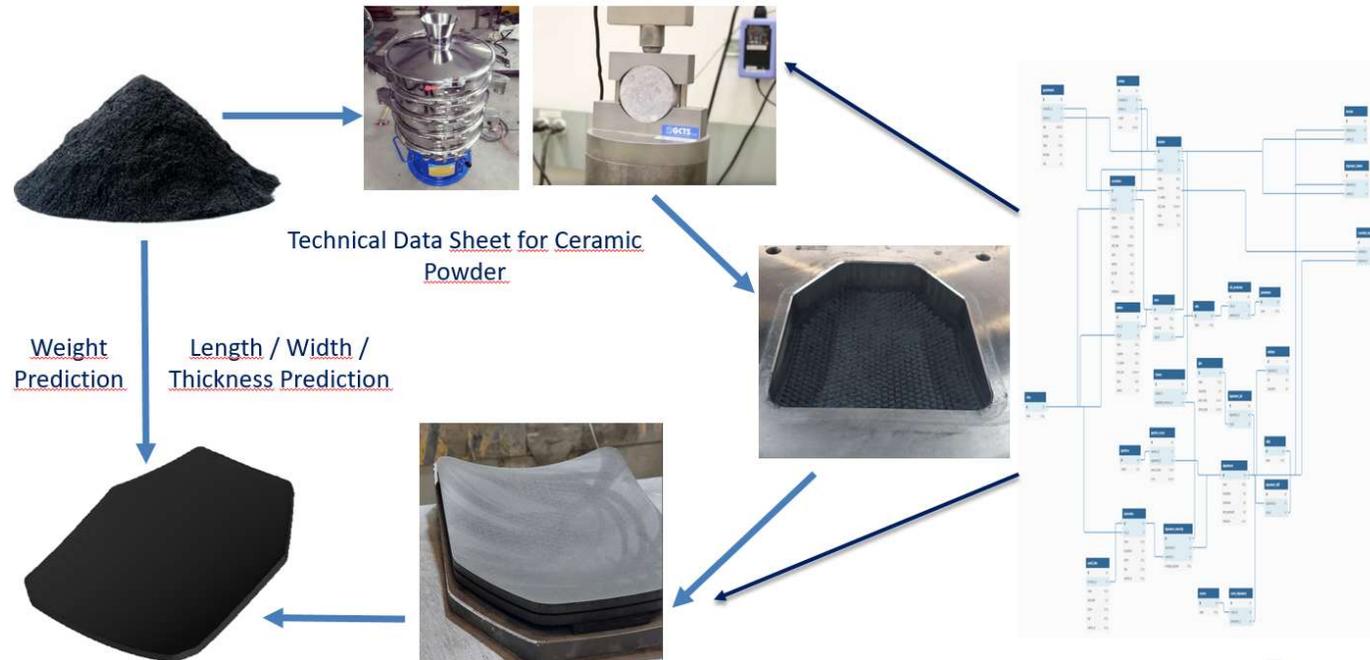
Vehicles Armored

Land Naval and Air Platforms

We Provide

From Powder To Power R&D

Goal-oriented Researches and Developments



We Provide Rapid Start for Sample Production Wide Range of Production Capacity Plan

A strong production capacity capable of producing Monolithic Ceramic Plates and Ceramic Tiles in different geometries.

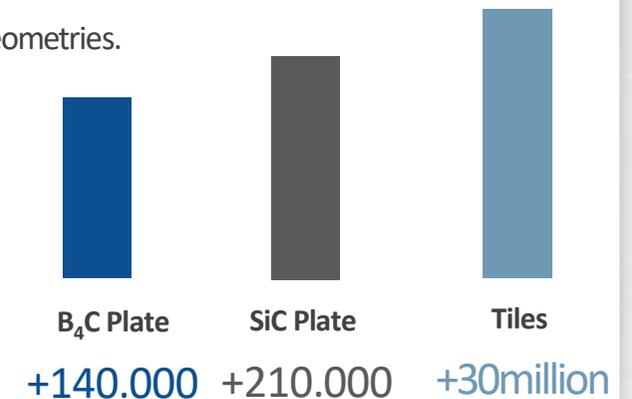
Our facilities are equipped with state-of-the-art machinery park including

15 Sintering Furnaces,

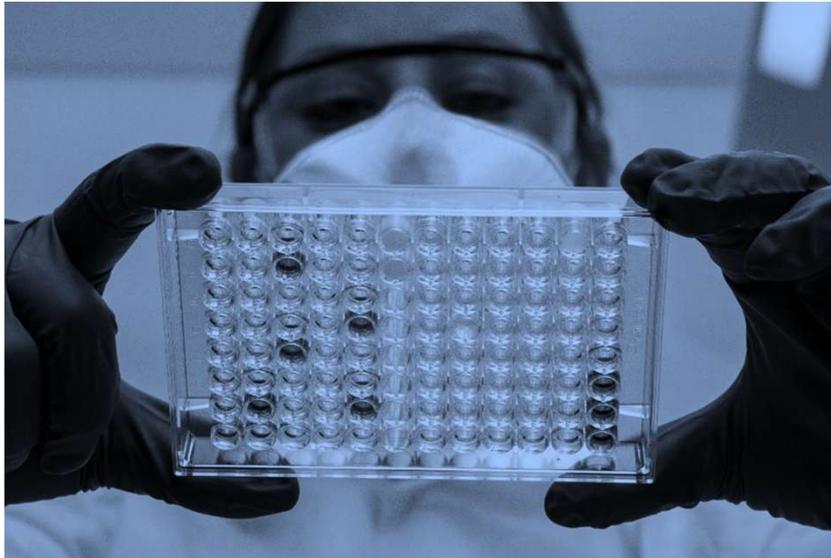
8 Cold Forming Presses,

5 Ceramic Finishing Lines,

for high-quality products with a continuous development.



We Provide Quality Assurance



Certificates & Quality Management System:



We Provide Ballistic Shooting Tests



We have the capability to perform ballistic tests according to the international standards under accreditation certificate.

- NIJ 0101.04
- NIJ 0101.06
- NIJ 0115.00
- NIJ 0108.01
- NIJ 0106.01
- STANAG 2920
- STANAG 4569
- MIL-PRF-46103
- TS EN 1063
- TS EN 1522



We Provide

“From Powder to Power,,

- IKH RTP Powders for Specially Designed Recipe
- IKH Advanced Technical Ceramics
- Optimized Ceramic Geometry Options for Lightest Solutions
- Weight Advantages and Cost Advantages
- Various Ceramic Material Options for the Best Performed Ballistic Solutions
- Terminal Analysis Support for Optimized Ballistic Solutions
- Rapid Action for Sample Support
- Mould and Recipe Design
- Product Optimization
- Product/Project Specific Quality Control Plans and Reports with Traceability
- Ballistic Test Performance with Fully Equipped Accredited Laboratories
- Special Packaging (Anti-Damaging Preventions)
- Process Optimization
- New Materials Studies for Continuous Development



Industriekeramik Hochrhein GmbH

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Industriekeramik Hochrhein GmbH

