

ISOPO S.L.



Commercial Presentation 2023 | Defense

H Servicios de Ingeniería
ISOPO S.L.

www.iso.es



About us



HISOPO, S.L. is a spanish company founded in 2018 in the field of engineering dedicated to advanced composite materials.

The company's focus is to develop high performance and lightweight composite materials, namely multiscale composites, gradient composites and sensitive. Our focus is on the defense, aerospace, mobility. As a guarantee of excellent quality, we provide the most developed manufacturing and processing techniques.

Our goal is to guarantee the best quality, placing us as a reference in the area.

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Skills



- Development of composite design
- Prediction of material behavior (Computation Modelling)
- Product development in advance composites
- Monitoring of projects



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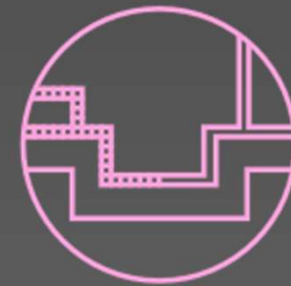
Technological Capacities



Hot and Cold
Compression
Moulding



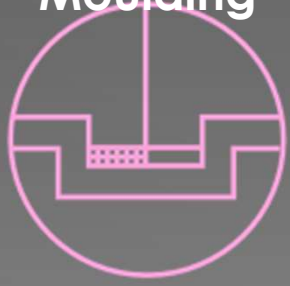
Autoclave



Vacuum infusion



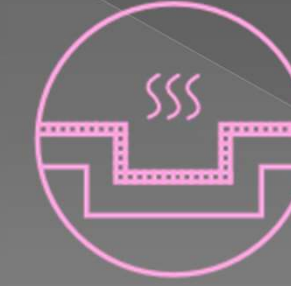
Hand Lay-up



RTM (Resin Transfer
Molding)



CNC machining



Thermoforming



3D printing

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Company Approach



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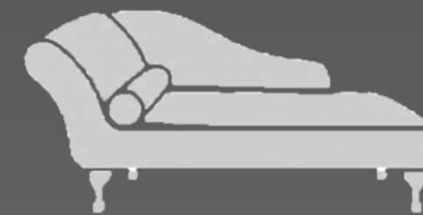
Markets



Defense



Mobility



Architecture

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Lifesaving Composites



Personal Equipment



**Armoured Vehicles and
Aeronautics**



Constructions

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Personal Protection



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Personal Protection



- **Developments**

Ballistic Helmet NIJ Standard 0108.01 Level IIIA



NIJ Standard 0108.01 Level IIIA protection, namely the protection capacity against a 9mm FMJ of 8 gr or of .44 Magnum

SJHP of 15,6 gr with speed of 426 m / s (\pm 9,1 m / s) projectiles;
.Fragments protection according to STANAG 2920 (2nd edition) namely, 17 grams / 1.1 FSP (v50) at 700m / s (\pm 15m / s);



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Personal Protection



- **Developments**
Knee Pads Standard ISO 20344

Personal Protection Knee Pads

The Protection Knee Pads with 7 mm thickness absorbed 86,92% (56,5kN) of 100% (65kN) of the impact energy which they were subjected to in an impact test performed accordingly to the standard ISO 20344 – Personal protective equipment - Test methods for footwear.

The resistance to drilling was evaluated accordingly to the standard EN388, with a performance equal or higher to 125 N.

Immediate protection function against common threats in operational exercises. It can be adapted and integrated in the equipment.



Properties	Value	Standard
Young's Modulus (GPa)	17,12 ± 1,14	ASTM D3039/D3039M
Absorbed energy (kJ)	A56,5 (86,92%)	ISO 20344
Thermal conductivity (W/mK)	75,40 x 10 ⁻³
Density (kg/m ³)	315,8	NP EN 12127
Water absorption (%)	5,94	Internal method
Air permeability (l/m ² /s)	0	NP EN ISO 9237
Flame protection	Fireproof	ISO 15025

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Personal Protection



- **NIJ Standard-0108.01 Solutions**

Ballistic Resistant Protective Materials			
NIJ 0108.01	Ammunition	Mass /m ² (kg)	Thickness (mm) *
IIIA	44 Magnum Lead SWC (426 m/s) 9mm FMJ (426 m/s)	7,5	8mm (Composite)
III	7.62 mm (838m/s) 308 Winchester FMJ (838m/s)	19	20mm (Composite)
IV	30-06 AP (838 m/s)	45	9mm (alumina) + 20mm (Composite)

*Dimensions : (1,5m x 3m)

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Armoured Vehicles and Aeronautics



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NATO STANAG 4569 - Technology solutions



There is a lot of types/calibers of ballistic threats (according to STANAG standard):

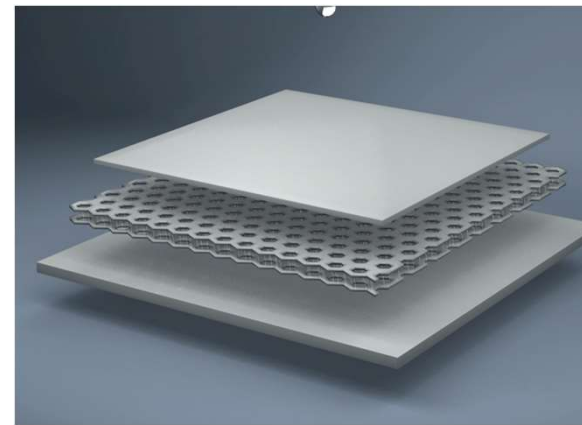
	Low caliber	Medium caliber		Heavy caliber	
STANAG Level	I	II	III	IV	V
Gun	Rifle	Infantry Rifle	Sniper Rifle	Heavy Machine Gun	Automatic Cannon
Bullet	 <p>7.62 x 51 NATO Ball 5.56 x 45 NATO SS109 5.56 x 45 M193</p>	 <p>7.62 x 39 API BZ</p>	 <p>7.62 x 51 (WC core) 7.62 x 54R B32 API</p>	 <p>14.5 x 114AP / B32</p>	 <p>25 mm APDS-TM-791</p>
Velocity (m/s)	833 - 937	695	854 - 930	911	1258

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Impact Resistance Skills



- **Lightweight**
- **Durability**
- **Sustainability**
- **Performance**
- **Custom Developments**



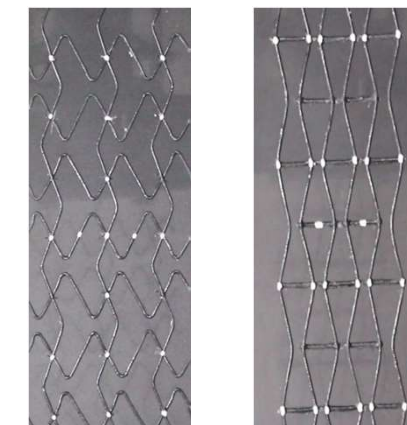
3D structures



Advanced fibrous structures



High energy absorption structures



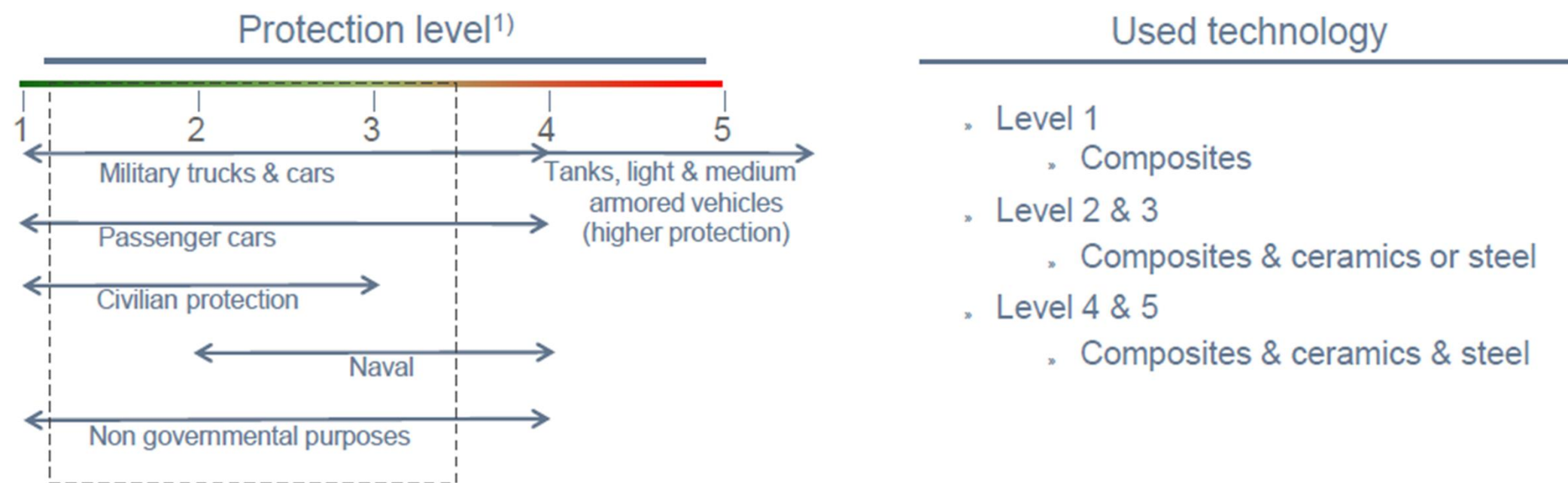
Auxetic structures

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NATO STANAG 4569 - Technology solutions



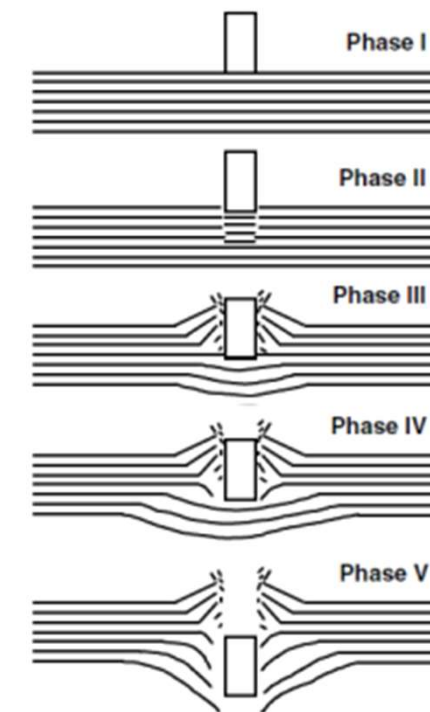
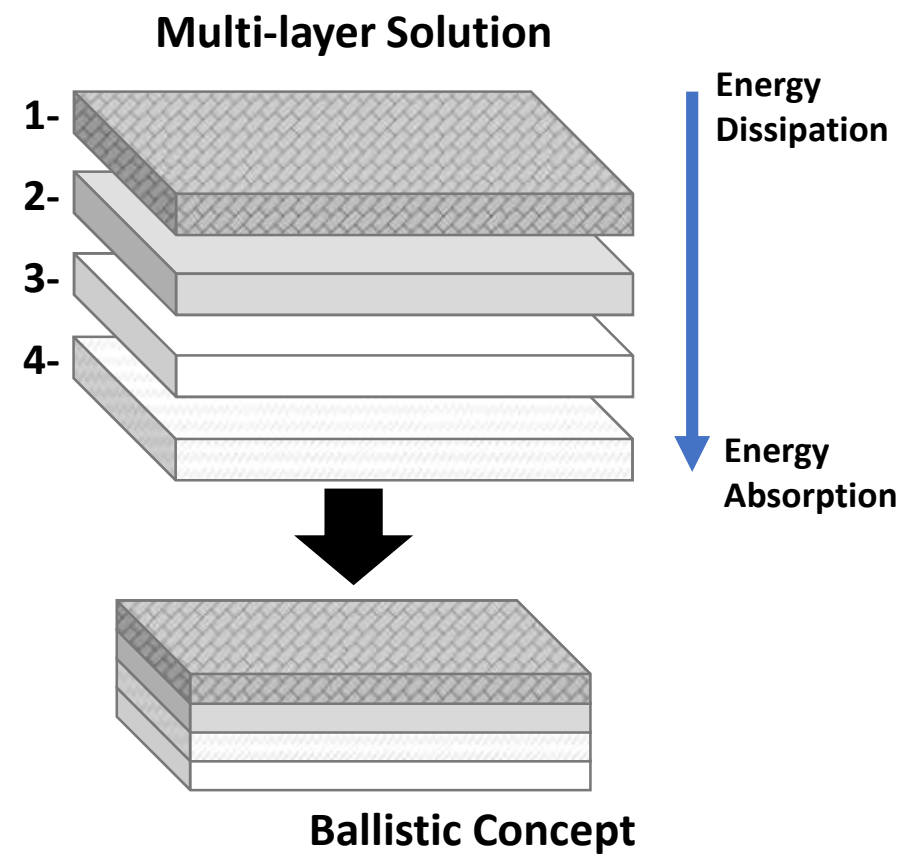
Solutions/products and technology used, for each STANAG 4569 level.



To higher levels of protections, it is necessary the combination of ceramic or metal materials with the composites, and to extremely cases, there is necessary the combination of this three.

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Impact Resistance Skills



Composite Behaviour

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Vehicles



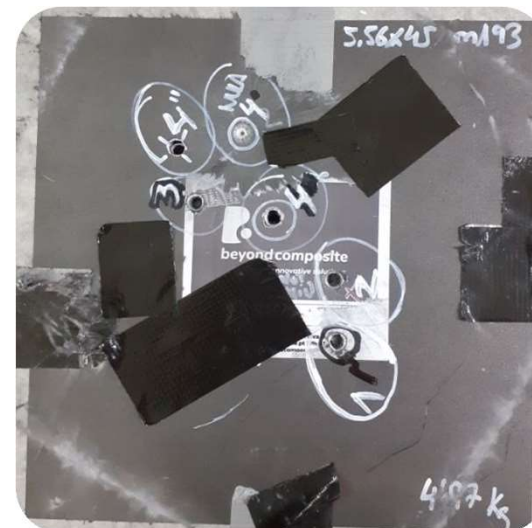
- **STANAG 4569 Developments**

Level 1

Hybrid composite solution: **8 Kg/m²** in combination with steel plate;
Thickness: 9mm (Composite) + 5mm (Steel A500)

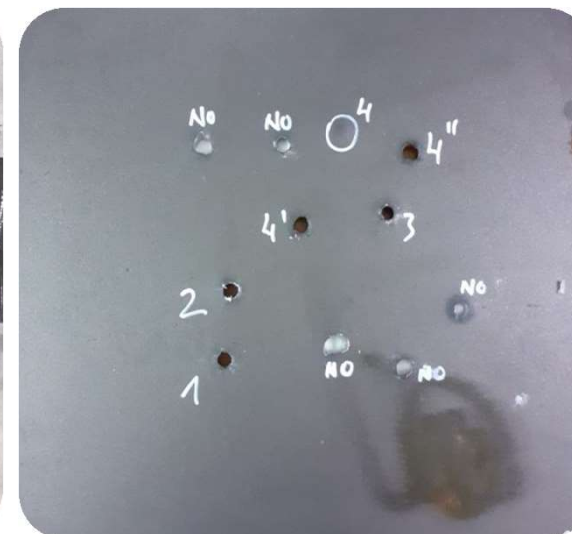


7.62 X 51 MM Nato Ball



Steel after shot

Impact Face



Composite after shot

Back Face

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Vehicles



- STANAG 4569 Developments

Level 2

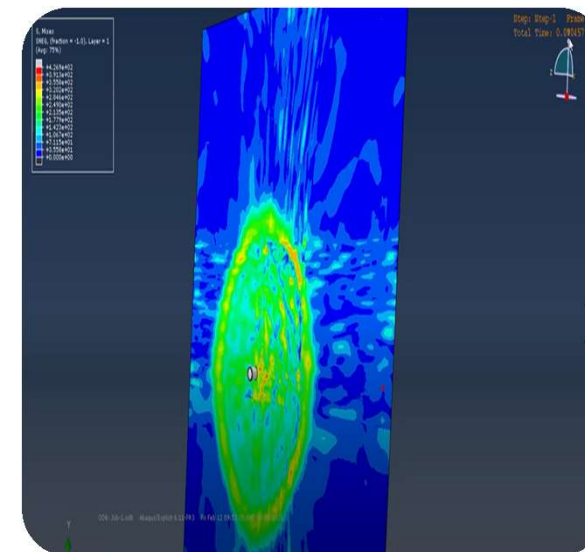


Hybrid composite solution: **20 Kg/m²** in combination with steel plate;
Thickness: 19mm (Composite) + 5mm (Steel)



Steel after shot

Impact Face



Composite after shot

Back Face

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Vehicles

- STANAG 4569 Developments

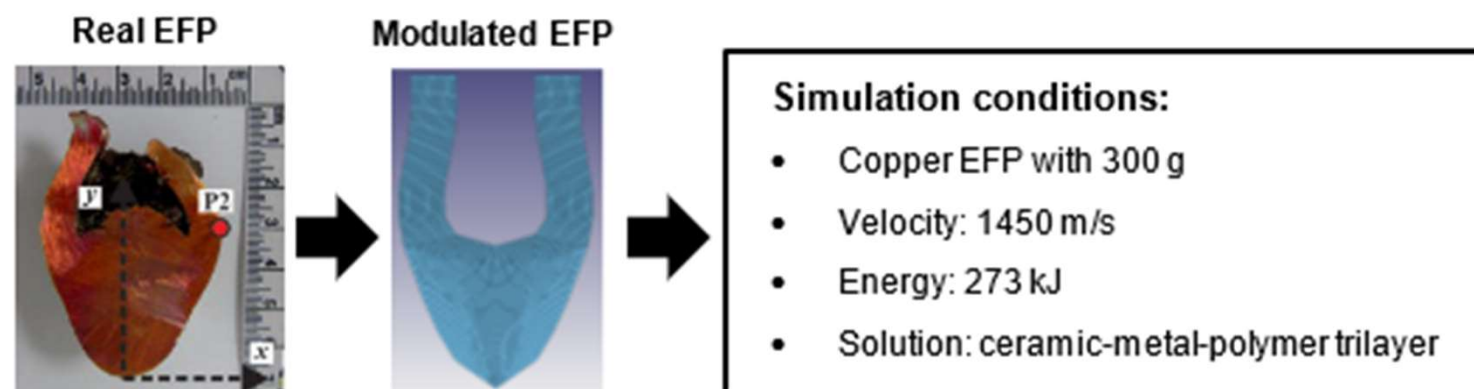


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Vehicles

- STANAG 4569 Developments

Level 4/5



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Vehicles



- **STANAG 4569 Solutions**

Protection Levels for Occupants of Logistic and Light Armoured Vehicles			
STANAG 4569	Ammunition	Mass /m ² (kg)	Thickness (mm)
1	7.62 mm x 51 NATO ball (833 m/s)	48	9mm (Composite) + 5mm (Steel A500)
	5.56 mm x 45 NATO SS109 (900 m/s) 5.56 mm x 45 M193 (937m/s)	20	19mm (Composite)
2	7.62 mm x 39 API BZ (695 m/s)	58	19mm (Composite) + 5mm (Steel)
3	7.62 mm x 54R B32 API (854 m/s) 7.62 mm x 51 AP (WC core) (930 m/s)	85	22mm (Composite) + 8mm (Steel A500)
4	14.5 mm x 114 API/B32 (911 m/s)	On Going (NATO Project)	

*Dimensions : (1,5m x 3m)

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Constructions



SURFORMA[®]

by Sonae Indústria

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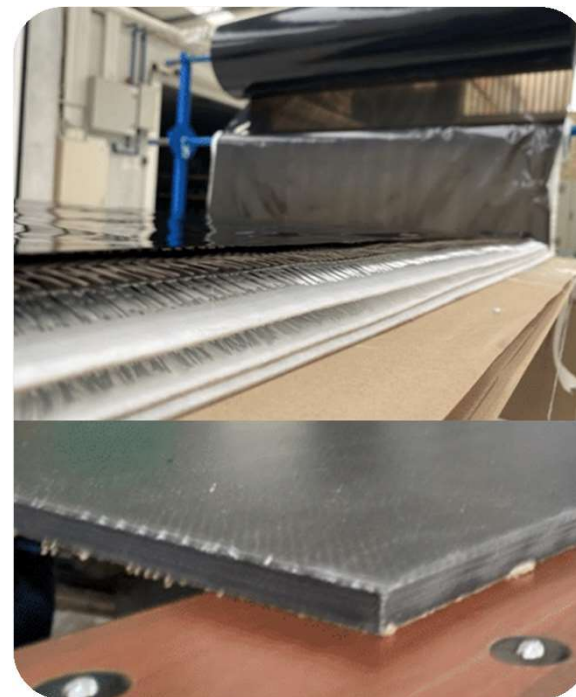
Constructions



- **NIJ Standard-0108.01 Developments**

Level III, IIIA and IV

With level III, IIIA and IV , the CompactShield, a ballistic plate for use in urban environments with civil risks, aimed at more demanding markets for the protection of people.



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Constructions



- **NIJ Standard-0108.01 Solutions**

Ballistic Resistant Protective Materials			
NIJ 0108.01	Ammunition	Mass /m ² (kg)	Thickness (mm) *
II	357 Magnum JSP (425 m/s) 9mm FMJ (358 m/s)	18	9mm (Composite)
IIIA	44 Magnum Lead SWC (426 m/s) 9mm FMJ (426 m/s)	22	11mm (Composite)
III	7.62 mm (838m/s) 308 Winchester FMJ (838m/s)	60	29mm (Composite)

*Dimensions : (1,2m x 3m)

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Constructions

- **Polyurethane/Polyurea-based products**

High-performance, explosion-resistant coating suitable for a wide variety of applications.



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