GlasArmor™
BALLISTIC RESISTANT COMPOSITE PANELS

PolyOne™

PRODUCT DESCRIPTION

GlasArmor™ panels are constructed from layers of 0-90° woven E-glass fiber reinforcements with a proprietary resin system in several sizes, from 36″ x 84″ to 48″ x 120″, with other panel lengths available. Panels are available for protection to UL 752 levels 1, 2 & 3 and NIJ Levels I, II & IIIA test standards for ballistic resistance. Additional protection against higher power ammunitions can be achieved by layering multiple GlasArmor panels; contact PolyOne Glasforms for more information regarding your specific application.

CUSTOMIZED SOLUTIONS

GlasArmor panels can be tailored to your design and performance specifications. Our custom capabilities include:

- Drilling
- Routing
- Machining
- Finishing
- Custom colors
- Unique panel sizes

KEY CHARACTERISTICS

Military grade protection

GlasArmor ballistic resistant panels are constructed to provide the latest in military grade protection from armed attackers for any facility. Originally developed for protection from mortar fire, fiber-reinforced composite panels offer superior ballistic resistance at less than 25% of the weight of a comparable steel panel.

Resistant security

The unique composite matrix of the panels allows for retention of the projectile to avoid potentially hazardous ricochet. These fiber-reinforced panels offer ballistic-resistant security with additional performance advantages, including durability, corrosion resistance, electrical non-conductivity, low thermal conductivity and reduced weight.

USES AND APPLICATIONS

GlasArmor composite ballistic panels are suitable for indoor and outdoor use in commercial, governmental, industrial and residential applications:

- Banks
- Check cashing stations
- Pawn shops
- Loan and bail/bond offices
- Courtrooms
- Police stations
- Detention facilities
- Bonded warehousing
- Security buildings
- Equipment shielding locations
- Safe rooms
- Storm shelters
- Judges' chambers
- Military structures
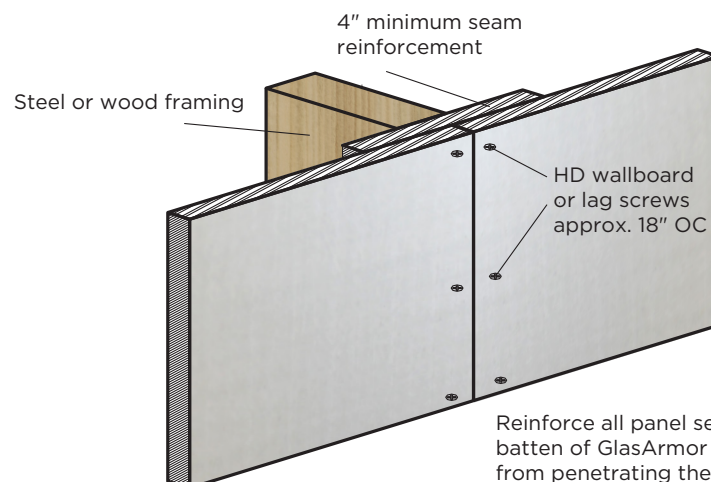- Infrastructure facilities and equipment

INSTALLATION INSTRUCTIONS

GlasArmor panels can be field-fabricated using simple installation methods and common carpentry tools. Proper installation is necessary to achieve optimum ballistic resistance.

1. Lay out the project to utilize the largest GlasArmor panel sizes to minimize the number of seams.

2. Fabricate the GlasArmor panels to the desired size by cutting with a circular saw equipped with a diamond abrasive blade. Be sure to wear appropriate safety equipment including safety glasses and dust masks when fabricating.

3. Secure the GlasArmor panels to steel or wood framing by mechanically fastening with heavy-duty wallboard or lag screws.

4. When constructing walls, rest the initial course of GlasArmor panels firmly on the floor to avoid any unsupported panel weight on the wall framing.

5. Reinforce all panel seams with a minimum 4″ batten of additional GlasArmor material. Position these batten strips to cover the seam and attach to both panels using appropriate wallboard screws (see diagram).

6. Use overlapping butt joints when installing panels into corners.

7. GlasArmor panels expand to absorb ballistic impact. When covering a sensitive substructure such as glass, shim the panels 3/8″ to prevent impact shock damage.

8. GlasArmor panels can be finished by covering with drywall, paneling, painting or wall covering. Painting or wall covering will require the use of a suitable primer.

TYPICAL PANEL JOINT DETAIL

4″ minimum seam reinforcement

Steel or wood framing

HD wallboard or lag screws approx. 18″ OC

Reinforce all panel seams with a 4″ minimum batten of GlasArmor to prevent projectiles from penetrating the seam

UL 752 & NIJ STANDARDS FOR BALLISTIC RESISTANT PROTECTIVE MATERIALS

UL Rating	NIJ Level	Ammunition	Velocity (fps)	No. Shots	GlasArmor Panel	Nominal Thickness	Nominal Weight
Level 1		9mm full metal copper jacket with lead core	1175	3	Level 1	0.256" (1/4")	2.7 lbs/ft^2
Level 2	Level II-A	.357 magnum jacketed lead soft point	1250	3	Level 2	0.384" (3/8")	4.0 lbs/ft^2
Level 3	Level III-A	.44 magnum lead semi-wadcutter gas checked	1350	3	Level 3	0.500" (1/2")	5.4 lbs/ft^2
Level 4		.30 cal. rifle lead core	2450	1			
Level 5		7.62mm rifle lead core full metal copper jacket, military ball	2750	1			
Level 6	Level II	9mm full metal jacket with lead core	1400	5			
Level 7		5.56mm rifle full metal copper jacket with lead core	3080	5			
Level 8	Level III	7.62mm rifle lead core full metal copper jacket, military ball	2750	5			

Customized solutions are available. Contact PolyOne Glasforms for application-specific information.

GLASARMOR PANEL SELECTION GUIDE

Overall Width	Overall Length	Thickness	Color	Part Number
LEVEL 1				
36"	96"	0.256"	Natural	EM01001016WE
36"	120"	0.256"	Natural	EM01001014WE
48"	96"	0.256"	Natural	EM01001006WE
48"	108"	0.256"	Natural	EM01001009WE
48"	120"	0.256"	Natural	EM01001008WE
LEVEL 2				
36"	96"	0.384"	Natural	EM01001013WE
36"	120"	0.384"	Natural	EM01001012WE
48"	96"	0.384"	Natural	EM01001007WE
48"	108"	0.384"	Natural	EM01001011WE
48"	120"	0.384"	Natural	EM01001010WE
LEVEL 3				
36"	96"	0.500"	Natural	EM01001017WE
36"	120"	0.500"	Natural	EM01001019WE
48"	96"	0.500"	Natural	EM01001001WE
48"	96"	0.500"	Grey	EM10039911WE
48"	96"	0.500"	White	EM10041127WE
48"	96"	0.500"	Tan	EM10036994WE
48"	108"	0.500"	Natural	EM01001023WE
48"	108"	0.500"	Grey	EM01001025WE
48"	120"	0.500"	Natural	EM01001004WE
48"	120"	0.500"	Grey	EM01001024WE
48"	120"	0.500"	White	EM10041001WE

Customized panel sizes and colors available. Contact PolyOne Glasforms for information.

MATERIAL PERFORMANCE DATA (TYPICAL VALUES)

Physical	Typical Value (English)	Typical Value (SI)	Test Method
Density (Cured)	0.066 lb/in^3	1.80 g/cm^3	ASTM D-792
Mechanical			
Tensile Modulus	2.6–3.5 msi		ASTM D-638
Tensile Strength	45–60 ksi	310–414 MPa	ASTM D-638
Flexural Modulus	2.1–2.7 msi	14.5–18.6 GPa	ASTM D-790
Flexural Strength	65 ksi	448 MPa	ASTM D-790
Compressive Strength	40 ksi	276 MPa	ASTM D-695
Hardness			
Barcol Hardness	50–60		ASTM D-2583
Additional Information			
Glass Content – Continuous Glass Fiber	55.0 wt%		
Fire Rating	1 hour		ASTM E-119-09c
Flame Spread Rating	45*		ASTM E-84-08a
Smoke Developed Rating	165*		ASTM E-84-08a

* NFPA & IBC Class B rating achieved

glasForms

To learn more about PolyOne Advanced Composites – Glasforms ballistic panel applications and solutions, please call +1.866.POLYONE (+1.866.765.9663)

PolyOne | Advanced Composites