

Performance Beyond the Limits of Ordinary Polycarbonate



Performance Beyond the Limits of Glass

SuperGlazing

The MAKROLON® portfolio of ultra-high performance architectural glazing materials.



Bayer MaterialScience

Exceptional Performance Against Extreme Threats — With No Compromise



MAKROLON® HYGARD laminates provide exceptional performance for diverse security glazing requirements. Unlike glass systems, HYGARD EX meets the most rigorous blast test standards without compromising protection against interior splintering. They also provide ballistic performance unavailable with glass systems. All HYGARD products have advanced abrasion and weather resistant hard-coat technology to maintain appearance long term and are suitable for use with energy efficient dual-glazed systems.

HYGARD® EX Blast Resistant Sheet and Laminates



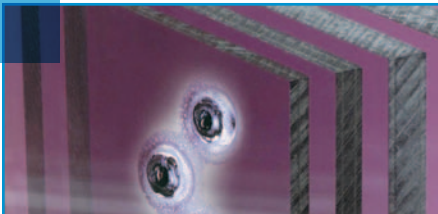
- Provides highest level of blast resistance among security glazing materials.
- Exceeds current GSA and UFC anti-terrorism force protection standards.
- Prevents broken glass shards from penetrating into the building envelope.
- Remains in frame after blast impact, eliminating falling and flying glass.
- Absorbs shrapnel and protects against steel balls, nails, and other bomb debris.
- Unlike laminated glass systems, offers blast plus ballistic protection.

HYGARD® SD Electronic Signal Defense Laminates



- Electronic surveillance protection based on proprietary “signal defense” technology.
- Defends against acquiring electronic data or voice transmission through window glazing using surveillance microphones.
- Maintains ambient light transmission.

HYGARD® BR Bullet Resistant Laminates



- Four levels of protection against multiple threats.
- Multi-shot resistance against 9mm submachine gun — UL Level 6 listed.
- Hard-coated surface technology resists weathering and abrasion.

HYGARD® CG Institutional and Correctional Facility Containment Laminates



- Three levels of protection proven to resist the most rigorous physical attack.
- Meets or exceeds typical containment test agency standards.
- Hard-coat technology resists weathering, abrasion, and graffiti.

Unsurpassed Performance for Tough, Longer Life, Break-Resistant Architectural Glazing

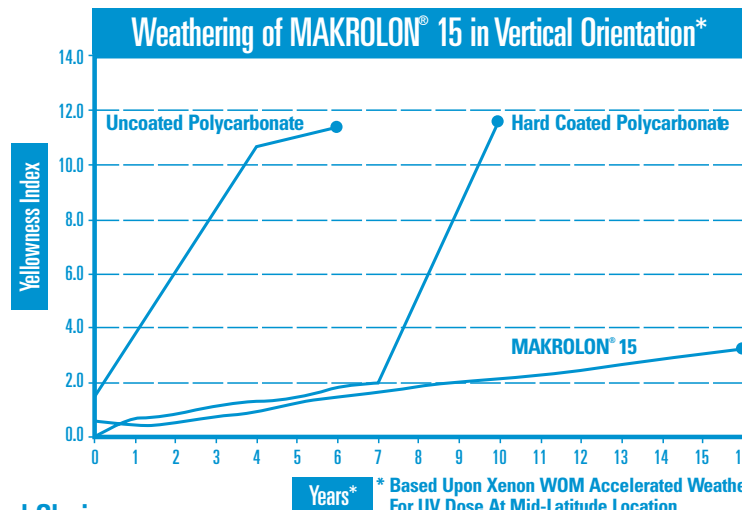


MAKROLON® architectural glazing combines the toughness of polycarbonate with exceptional protection against severe elements and physical contact. Specific grades provide glazing solutions for high traffic areas and for overhead glazing exposed to intense sunlight and extreme weather and may be used as direct replacement for monolithic glass windows or as part of a dual-glazed system. Comprehensive warranties cover all architectural grades.

MAKROLON® MAK™ 15 Sheet for Vertical Architectural Glazing



- Up to twice the abrasion and weathering resistance of other polycarbonate glazing.
- Unprecedented 15-year warranty covers breakage, abrasion, yellowing and weathering failure.
- Available in a range of standard glazing tints.
- Eliminates bars and wire mesh often required with glass.
- Glazed with standard materials and framing.



MAKROLON® UV Sheet for Overhead Glazing



- Cut and cold-form in place for economical installation on site.
- Glass must be thermally pre-formed. Acrylic cannot match MAKROLON sheet's minimum cold bend radius.
- Provides lasting protection for covered walkways, shelters, sky lighting and curved overhead glazing.

MAKROLON® AR Abrasion Resistant Sheet for High Traffic Interiors



- Superior durability for interior partitions, entry areas and doorways.
- Exceptional level of abrasion and mar resistance to withstand routine abuse and cleaning.
- Ideal for cleanrooms, doorlites.

Security Tests & Product Ratings Overview

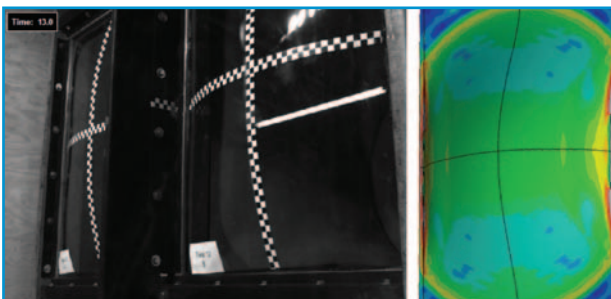
Security Tests & Product Ratings Overview											
Forced Entry Test, Ratings					Ballistics Tests, Ratings			Air Blast Tests, Product Resistance			
Product		ASTM F1233 Class Achieved	ASTM F1915 Security Grade	HPW TP-0500 Level	HPW TP-0500 Level	UL 752 Level	NIJ 0108 Level	ASTM 1642 Air blast	GSA / ISC TS01-03	DoD UFC 4-010-01	
Containment Grades	AR 500	.500	2.0 BP* / 1.4 C*	3	I						
	CG 375	.390	2.8 BP / 1.4 C	3	I						
	CG 500	.530	II**	2	I	A					
	CG 750	.780	III**	1	II	A					
Ballistics Grades	BR 750	.780				B	1				
	BR 1000	1.05	5.0 BP / 2.4 C	1	IV		2				
	BR 1250	1.30	5.0 BP / 2.5 C	1	IV		3	II/IIIA			
	MS 1250	1.30					6				
Blast Resistant Grades	EX 1000	1.05	5.0 BP / 2.4 C	1	IV		2		16.1 psi / 124.0 psi-msec	16.1 psi / 124.0 psi-msec	Minimum Anti-terrorism/ Forced Protection stds. for Fed. Bldgs.
	EX 1250	1.30	5.0 BP / 2.5 C	1	IV		3		21.9 psi / 268.0 psi-msec	21.9 psi / 268.0 psi-msec	Minimum Anti-terrorism/ Forced Protection stds. for Fed. Bldgs.
	EX 1300	1.30					6		14.6 psi / 131.2 psi-msec	14.6 psi / 131.2 psi-msec	Minimum Anti-terrorism/ Forced Protection stds. for Fed. Bldgs.
* BP-Body Passage; C - Contraband										** ASTM F1233-98	

As with any security glazing, performance of HYGARD products is based on use in appropriate framing systems. For information on glazing system suppliers and full details on performance, test results and agency listings, visit www.sheffieldplastics.com.

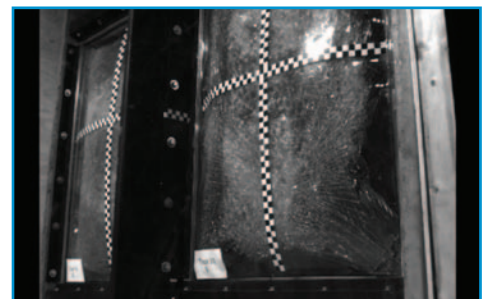
Bayer MaterialScience Computer Modeling Optimizes Window Design

Bayer MaterialScience's computer modeling capabilities help define HYGARD laminate thickness and frame design required to withstand defined blast conditions.

These images from a high speed video of blast simulation tests show the performance of HYGARD EX in a framed window system under various test conditions.

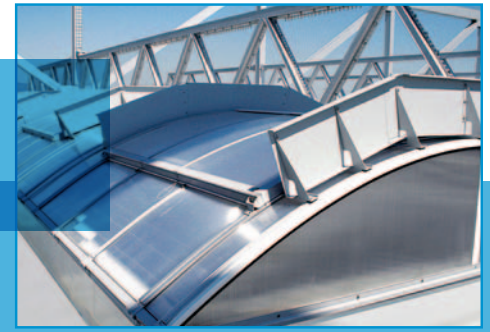


HYGARD EX glazing withstands blast pressure in a window system without splintering, fragmenting or separating from the frame.



HYGARD EX installed as a spall shield behind glass captures and stops glass fragments from entering building interior.

High Strength Coupled with Ultra Light Weight and Exceptional Energy Savings



MAKROLON® Multi UV Sheet for Dramatic Cost-Saving Architectural Designs



- Exceptional thermal insulation significantly reduces energy costs compared to any other glazing material.
- Ability to cold-form during installation opens totally new levels of architectural design versatility.
- High strength to weight ratio proven to cut sub-structure costs 20-30% in roofs and panels.
- An array of channel geometries and coating variations afford a vast range of design possibilities and performance levels.

Light Weight, Energy Savings:

MAKROLON® Multi UV Sheet: Lbs/ft², Thermal Insulation Values

Makrolon multi UV	6/16-20	5M/25-20	5M/32-20	5M/40-20
Gauge mm/inches	16/0.629	25/0.984	32/1.26	40/1.575
Structure				
Weight lbs/ft ²	0.573	0.697	0.758	0.861
U-value	0.32	0.23	0.19	0.18

Pebble Finish MAKROLON® GP for Attractive, Low Cost Privacy and Security with the Inherent Toughness of Polycarbonate

MAKROLON® GP Pebble for light-transmitting curved and flat glazing and partitions.



- Pebble finish hides scratches and affords an aesthetic alternative to clear glazing for visual privacy with good light transmission.
- Can be cold-formed on installation for curved designs.
- Bronze tint helps maintain lasting appearance for overhead walkway glazing and shelters.
- Provides both visual and physical security as cost-effective over-glazing for vulnerable industrial and facilities areas.
- Rated "Burglar Resistant" per UL 972.

MAKROLON® High Performance Glazing

Technology from Bayer MaterialScience Global R&D ...Driven by Sheffield Plastics' Focus on Individual Customers.

Over our 60-year history, Sheffield has become a leader in polycarbonate sheet products. We attribute our growth to a close working relationship with our individual distributors and end-users. As part of Bayer MaterialScience LLC, Sheffield now links the worldwide technology and innovation of a leader in high performance polymers and coatings to our sheet products customers' needs. We do so with a sustained commitment to individual customer service, technical support and a focus on the environment.

Technical Support and Customer Services: www.sheffieldplastics.com

- Codes, standards compliance and agency reports
- Glazing system suppliers for MAKROLON® and HYGARD sheet products
- Material properties, design parameters, and product selection guidelines
- Fabrication, installation and forming guidelines



Regulatory Code Compliance and Certifications

- Miami-Dade NOA # 10-0329.03
- Florida Building Code 2007
- ANZI Z97.1 Safety Glazing Used in Buildings - Safety Performance Specification and Methods of Test
- CPSC 16 CFR 1201, Category I and Category II: Safety Standard for Architectural Glazing Materials
- UL 972: Burglary Resistant Glazing Materials UL File #BP2126



Bayer MaterialScience

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Disclaimer

The manner in which you use and the purpose to which you put and utilize our products, technical assistance and information (whether verbal, written or by way of production evaluations), including any suggested formulations and recommendations are beyond our control. Therefore, it is imperative that you test our products, technical assistance and information to determine to your own satisfaction whether our products, technical assistance and information are suitable for your intended uses and applications. This application-specific analysis must at least include testing to determine suitability from a technical as well as health, safety, and environmental standpoint. Such testing has not necessarily been done by us. Unless we otherwise agree in writing, all products are sold strictly pursuant to the terms of our standard conditions of sale which are available upon request. All information and technical assistance is given without warranty or guarantee and is subject to change without notice. It is expressly understood and agreed that you assume and hereby expressly release us from all liability, in tort, contract or otherwise, incurred in connection with the use of our products, technical assistance, and information. Any statement or recommendation not contained herein is unauthorized and shall not bind us. Nothing herein shall be construed as a recommendation to use any product in conflict with any claim of any patent relative to any material or its use. No license is implied or in fact granted under the claims of any patent.

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