



Makrolon® polycarbonate sheet

Forced entry, ballistic and blast solutions for window and door glazing



Makrolon® AR

–no compromise to performance



Hygard® CG and Hygard® BR

Four levels of protection against multiple threat types

Multi-shot resistant 9 mm submachine gun- UL level 6 listed

Hard-coat surface technology resists weathering, abrasion, and graffiti



Hygard® EX explosion resistant laminate

Meets Anti-Terrorism Force Protection requirements per UFC 4-010-01 for charge weight I & II at conventional construction stand-off distances

Glazing Materials Comparison

Property	Polycarbonate	Acrylic	Glass
Impact Resistance, Drop Ball Test, 0.5 lb	No Break	1.75 ft-lbs	0.7 ft-lbs
Cold Bend, Bend Radius	100x material thickness	180x material thickness	Not possible
Sheet Weight, 0.125"	0.78 lb/ft ²	0.75 lb/ft ²	1.60 lbs/ft ²
Thermal Expansion Rate	3.75 x 10 ⁻⁵ in/in/°F	4.10 x 10 ⁻⁵ in/in/°F	5.0 x 10 ⁻⁶ in/in/°F
Shading Coefficient, 0.236" clear sheet	0.97	1.01	1.03
U Factor – Summer, 0.236"	0.85 BTU/hr-ft ² ·°F	0.83 BTU/hr-ft ² ·°F	0.92 BTU/hr-ft ² ·°F
U Factor – Winter, 0.236"	0.92 BTU/hr-ft ² ·°F	0.91 BTU/hr-ft ² ·°F	1.02 BTU/hr-ft ² ·°F

Hygard EX 250 Dual Glazed System - Window Size 48" x 66"

Pressure	Impulse	Test Method	Qualified	ATFP
6 psi	42 psi-msec	GSA/ISC-GSATS01	Performance Condition 2	Meets
6 psi	42 psi-msec	UFC 4-010-01	Protection Level Medium	Meets
6 psi	42 psi-msec	ASTM F 1642	No Hazard Level	Meets
6 psi	42 psi-msec	AAMA 510.06*	Complies	–

*The window was tested in accordance with the Voluntary Guide Specifications for Blast Hazard Mitigation for Fenestration Systems AAMA 510-06.

Hygard EX 525 Performance

Specification	Standard / Test Method	Protection Level
Blast Resistance EX 525 6 psi / 42 psi-msec	UFC 4-010-01 ASTM F 1642 GSA / ISC - TS01	No break Condition 1
Blast Resistance EX 525 System* 10 psi / 89 psi-msec	UFC 4-010-01 ASTM F 1642 GSA / ISC - GSA-TS01	No hazard Condition 2
Containment / Forced Entry	H.P. White TP 0500.03	Level 1 Sequence 8
Forced Entry and Containment	ASTM F 1915 ASTM F 1233-08	Grade 3 Class 2 Body Passage
Flammability	International Building Code	CC1

*Dual Glazed System with Glass

Security Tests & Product Ratings Overview

Product	Forced Entry Test, Ratings				Ballistics Tests, Ratings			
	Gauge Inches	ASTM F 1233 Class Achieved	ASTM F 1915 Security Grade	HPW TP-0500 Level	HPW TP-0500 Level	UL 752 Level	NIJ 0108 Level	
AR	.500	2.0 BP* / 1.4C*	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			
BR 750	.780				B	1		
BR 1000	1.05	5 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		

Regulatory code compliance and certifications

ICC-ES Evaluation report ESR-2728

Miami-Dade NOA #12-0605.05
Florida Building Code 2010

CPSC 16 CFR 1201 Category I and Category II: Safety Standard for Architectural Glazing Materials

ANSI Z97.1-2004: American National Standard for Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test

UL 972: Burglary Resistant Glazing Materials, UL File #BP2126

Code compliance and certifications for Makrolon AR and Makrolon 15

* BP - Body Passage; C - Contraband

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.



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