



# Makrolon® AR sheet

## Abrasion resistant

Makrolon® AR sheet is a one or both sides hard-coated polycarbonate product that adds higher abrasion resistance and surface hardness to polycarbonate's inherent performance benefits of impact strength and clarity. The proprietary hard-coat also provides chemical resistance and long lasting outdoor weathering performance. This product is available in clear, a range of standard tints, or can be custom matched to any color. Makrolon AR sheet has a seven (7) year Limited Product Warranty against breakage, yellowing, and hazing. The terms of the warranty are available on request.

## Applications

Flat architectural glazing, machine guards, and laminates

## Regulatory code compliance and certifications

ICC-ES Evaluation Report ESR-2728

Miami-Dade County NOA  
#12-0605.05

Florida Building Code 2010

High Velocity Hurricane

Zone Classified

CPSC 16 CFR 1201 Safety Standard

UL 94 Flammability File #E351891

UL 972: Burglary Resistant

File #BP2126

## Typical Properties\*

Property	Test Method	Units	Values
<b>PHYSICAL</b>			
Specific Gravity	ASTM D 792	-	1.2
Refractive Index	ASTM D 542	-	1.586
Light Transmission, Clear @ 0.118"	ASTM D 1003	%	86
Light Transmission, I30 Gray @ 0.118"	ASTM D 1003	%	50
Light Transmission, K09 Bronze @ 0.118"	ASTM D 1003	%	50
Light Transmission, I35 Dark Gray @ 0.118"	ASTM D 1003	%	18
Water Absorption, 24 hours	ASTM D 570	%	0.15
Poisson's Ratio	ASTM E 132	-	0.38
Chemical Resistance	ASTM D 1308	-	Pass
Taber Abrasion @ 100 Cycles, Delta Haze CS-10F Wheel @ 500 g load	ASTM D 1044	%	2
<b>MECHANICAL</b>			
Tensile Strength, Ultimate	ASTM D 638	psi	9,500
Tensile Strength, Yield	ASTM D 638	psi	9,000
Tensile Modulus	ASTM D 638	psi	340,000
Elongation	ASTM D 638	%	110
Flexural Strength	ASTM D 790	psi	13,500
Flexural Modulus	ASTM D 790	psi	345,000
Compressive Strength	ASTM D 695	psi	12,500
Compressive Modulus	ASTM D 695	psi	345,000
Izod Impact Strength, Notched @ 0.125"	ASTM D 256	ft-lbs/in	16
Izod Impact Strength, Unnotched @ 0.125"	ASTM D 256	ft-lbs/in	No Break
Instrumented Impact @ 0.125"	ASTM D 3763	ft-lbs	>47
Shear Strength, Ultimate	ASTM D 732	psi	10,000
Shear Strength, Yield	ASTM D 732	psi	6,000
Shear Modulus	ASTM D 732	psi	114,000
Rockwell Hardness	ASTM D 785	-	M70 / R118
<b>THERMAL</b>			
Coefficient of Thermal Expansion	ASTM D 696	in/in/°F	3.75 x 10 <sup>-5</sup>
Coefficient of Thermal Conductivity	ASTM C 177	BTU-in/hr-ft <sup>2</sup> -°F	1.35
Heat Deflection Temperature @ 264 psi	ASTM D 648	°F	270
Heat Deflection Temperature @ 66 psi	ASTM D 648	°F	280
Brittleness Temperature	ASTM D 746	°F	-200
Shading Coefficient, Clear @ 0.236"	NFRC 100-2010	-	0.97
Shading Coefficient, Gray or Bronze @ 0.236"	NFRC 100-2010	-	0.77
U factor @ 0.236" (summer/winter)	NFRC 100-2010	BTU/hr-ft <sup>2</sup> -°F	0.85/0.92
U factor @ 0.375" (summer/winter)	NFRC 100-2010	BTU/hr-ft <sup>2</sup> -°F	0.78/0.85
<b>ELECTRICAL</b>			
Dielectric Constant @ 10 Hz	ASTM D 150	-	2.96
Dielectric Constant @ 60 Hz	ASTM D 150	-	3.17
Volume Resistivity	ASTM D 257	Ohm-cm	8.2 x 10 <sup>16</sup>
Dissipation Factor @ 60 Hz	ASTM D 150	-	0.0009
<b>Arc Resistance</b>			
Stainless Steel Strip Electrodes	ASTM D 495	Seconds	10
Tungsten Electrodes	ASTM D 495	Seconds	120
Dielectric Strength, in air @ 0.125"	ASTM D 149	V/mil	380
<b>FLAMMABILITY</b>			
Horizontal Burn, AEB	ASTM D 635	in	<1
Ignition Temperature, Self	ASTM D 1929	°F	1022
Ignition Temperature, Flash	ASTM D 1929	°F	824
Flame Class @ 0.060"	UL 94	-	HB
Flame Class @ 0.236"	UL 94	-	HB

\*Typical properties are not intended for specification purposes



**makrolon®**  
AR

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## Security ratings for AR 0.500<sup>~</sup>

Forced Entry & Containment
ASTM F 1233.08 Class 2.0 Body Passage
ASTM F 1233.08 Class 1.4 Contraband Passage
ASTM F 1915 Grade 3
H.P. White TP 0500 Level 1 Sequence 8

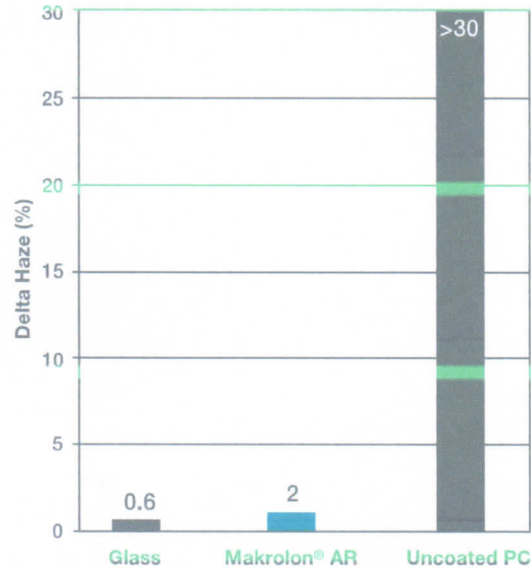
## Chemical Resistance\*

Chemical Tested	Resistance Time
Acetone	>24 hrs
Ammonia (10% concentration)	>24 hrs
Antifreeze (50/50)	>24 hrs
Benzene	>24 hrs
Bleach (Clorox concentrated)	>24 hrs
Chloroform	>24 hrs
Denatured Alcohol	>24 hrs
Di (2-ethylhexyl) phthalate	>24 hrs
Diesel Oil	>24 hrs
Isopropyl Alcohol (IPA)	>24 hrs
Kerosene	>24 hrs
Methyl Alcohol	>24 hrs
Methyl Butyl Ketone	>24 hrs
Methyl Ethyl Ketone	>24 hrs
Methylene Chloride	>24 hrs
Naphthalene, 1-bromo-	>24 hrs
Potassium Hydroxide - Lye (10%)	>24 hrs
Sodium Hydroxide (10%)	>24 hrs
Toluene	>24 hrs
Turpentine	>24 hrs
Unleaded Gasoline (87 Octane)	>24 hrs
Vinegar	>24 hrs
Xylene	>24 hrs
<b>Acids:</b>	
Hydrochloric Acid (20%)	>24 hrs
Nitric Acid (20%)	>24 hrs
Sulfuric Acid (20%)	>24 hrs

\*Tested in accordance to ASTM D 1308-02

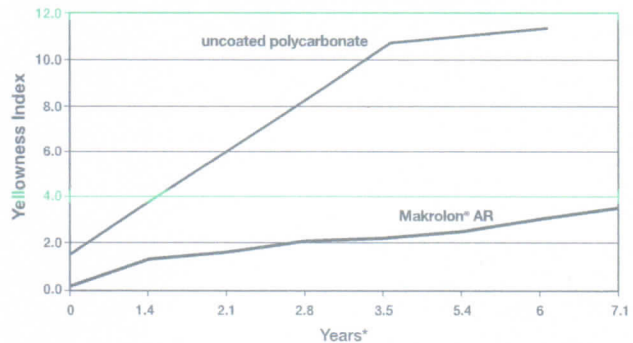
Always keep hazardous chemicals away from uncoated edge of Makrolon Polycarbonate

## Abrasion Resistance\*



\*Taber Abrasion per ASTM D 1044, 100 cycles using CS-10F wheels at 500 g load

## Weathering Behavior of Makrolon® in Vertical Orientation



\*Based upon Xenon WOM accelerated weathering for UV dose at mid-latitude location



**Bayer MaterialScience**

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