



# Makrolon® GP-V sheet

## General purpose

Makrolon® GP-V sheet is a polished surface, UV stabilized, transparent polycarbonate product. GP-V is a flame retardant grade with a UL 94 V-2 rating at 0.060" and greater, then improves to V-0 rating at 0.220" and greater. Other properties include outstanding impact strength, superior dimensional stability, high temperature resistance, and high clarity. This lightweight thermoformable sheet is also easy to fabricate and decorate. Makrolon GP-V sheet is offered with a five (5) year Limited Product Warranty against breakage. The terms of the warranty are available upon request.

## Applications

Industrial parts and components of electrical devices requiring UL 94 V-rated performance, thermoformed and fabricated parts

## 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
<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	18
Izod Impact Strength, Unnotched @ 0.125"	ASTM D 256	ft-lbs/in	60 (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
Arc Resistance			
Stainless Steel Strip electrode	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	1040
Ignition Temperature, Flash	ASTM D 1929	°F	824
Flame Class @ 0.060"	UL 94	–	V-2
Flame Class @ 0.220"	UL 94	–	V-0
Building Materials, surface-burning 0.060" - 0.250"	UL 723	Flame Spread Smoke Developed	5** 75**

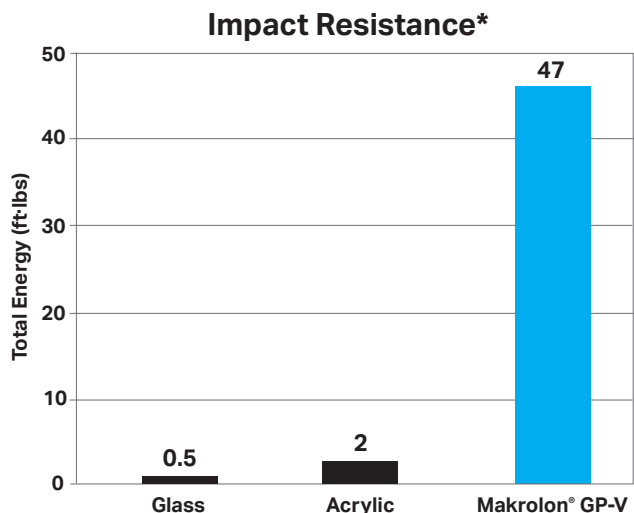
\*Some properties characterized using non-textured sheet.

\*\*Flame spread and smoke developed data recorded while material remained in original test position. Ignition of molten residue on the furnace floor resulted in higher values. See UL File #R21646 for more information.



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\*Instrumented Impact per ASTM D 3763, sample thickness 0.125" nominal

## Standard Products 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 <sup>2</sup>	0.75 lb/ft <sup>2</sup>	1.60 lbs/ft <sup>2</sup>
Thermal Expansion Rate	–	$3.75 \times 10^{-5}$ in/in/°F	$4.10 \times 10^{-5}$ in/in/°F	$5.0 \times 10^{-6}$ 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 <sup>2</sup> ·°F	0.83 BTU/hr-ft <sup>2</sup> ·°F	0.92 BTU/hr-ft <sup>2</sup> ·°F
U Factor – Winter		0.92 BTU/hr-ft <sup>2</sup> ·°F	0.91 BTU/hr-ft <sup>2</sup> ·°F	1.02 BTU/hr-ft <sup>2</sup> ·°F
Sound Transmission Class	0.236"	29	30	27

## Regulatory code compliance and certifications

ANSI Z97.1-2009, 2015: American National Standard for Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test, Class A, Unlimited

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

UL 94: Flammability File #E351891

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

UL 723: Building Materials, UL File #R21646

UL 746C: Suitability for Outdoor Use, UL File #351891\*

\*Makrolon® GP-V products have limited weathering properties, for more information contact your Covestro representative.

