

**Makrolon® AL2447 RE**

 Covestro - Polycarbonates - *Polycarbonate*

## General Information

**Product Description**

MVR (300°C/1.2 kg) 19 cm<sup>3</sup>/10 min; Automotive lighting; low viscosity; UV stabilized; easy release; injection molding - melt temperature 280 - 320°C; available in clear transparent colors and in various signal colors; headlamp lenses for automotive forward lighting

**General**

Material Status	• Commercial: Active		
Availability	• Africa & Middle East	• Europe	• North America
	• Asia Pacific	• Latin America	
Additive	• UV Stabilizer		
Features	• Good Mold Release	• Low Viscosity	• UV Stabilized
Uses	• Automotive Applications	• Lenses	• Lighting Applications
RoHS Compliance	• RoHS Compliant		
Appearance	• Clear/Transparent	• Colors Available	
Processing Method	• Injection Molding		
ISO Designation	• PC		

 Properties <sup>1</sup>

Physical	Nominal Value	Unit	Test Method
Density (73°F)	1.20	g/cm <sup>3</sup>	ISO 1183
Apparent (Bulk) Density <sup>2</sup>	0.66	g/cm <sup>3</sup>	ISO 60
Melt Mass-Flow Rate (MFR) (300°C/1.2 kg)	20	g/10 min	ISO 1133
Melt Volume-Flow Rate (MVR) (300°C/1.2 kg)	19	cm <sup>3</sup> /10min	ISO 1133
Molding Shrinkage			
Across Flow	0.50 to 0.70	%	ISO 2577
Flow	0.50 to 0.70	%	ISO 2577
Across Flow : 536°F, 0.0787 in <sup>3</sup>	0.70	%	ISO 294-4
Flow : 0.0787 in <sup>3</sup>	0.65	%	ISO 294-4
Water Absorption (Saturation, 73°F)	0.30	%	ISO 62
Water Absorption (Equilibrium, 73°F, 50% RH)	0.12	%	ISO 62
Mechanical	Nominal Value	Unit	Test Method
Tensile Modulus (73°F)	348000	psi	ISO 527-1/1
Tensile Stress (Yield, 73°F)	9570	psi	ISO 527-2/50
Tensile Stress			
Break, 73°F	10200	psi	ISO 527-2/5
Break, 73°F	9430	psi	ISO 527-2/50
Tensile Strain (Yield, 73°F)	6.0	%	ISO 527-2/50
Tensile Strain			
Break, 73°F	130	%	ISO 527-2/5
Break, 73°F	120	%	ISO 527-2/50
Nominal Tensile Strain at Break (73°F)	> 50	%	ISO 527-2/50
Tensile Creep Modulus (1 hr)	319000	psi	ISO 899-1
Tensile Creep Modulus (1000 hr)	276000	psi	ISO 899-1
Flexural Modulus <sup>4</sup> (73°F)	341000	psi	ISO 178
Flexural Stress <sup>4</sup>			ISO 178
73°F	14200	psi	
3.5% Strain, 73°F	10700	psi	
Flexural Strain at Flexural Strength <sup>5</sup> (73°F)	7.0	%	ISO 178



<b>Films</b>	<b>Nominal Value</b>	<b>Unit</b>	<b>Test Method</b>
Water Vapor Transmission Rate (73°F, 85% RH, 3.9 mil)	0.97	g/100 in <sup>2</sup> /24 hr	ISO 15106-1
Carbon Dioxide Permeability (73°F, 1.0 mil)	18900	cm <sup>3</sup> /m <sup>2</sup> /bar/24 hr	ISO 2556
Gas Permeation			ISO 2556
Carbon Dioxide : 3.9 mil	4800	cm <sup>3</sup> /m <sup>2</sup> /bar/24 hr	
Nitrogen : 1.0 mil	630	cm <sup>3</sup> /m <sup>2</sup> /bar/24 hr	
Nitrogen : 3.9 mil	160	cm <sup>3</sup> /m <sup>2</sup> /bar/24 hr	
Oxygen : 1.0 mil	3150	cm <sup>3</sup> /m <sup>2</sup> /bar/24 hr	
Oxygen : 3.9 mil	800	cm <sup>3</sup> /m <sup>2</sup> /bar/24 hr	
<b>Impact</b>	<b>Nominal Value</b>	<b>Unit</b>	<b>Test Method</b>
Charpy Notched Impact Strength <sup>6</sup>			ISO 179/1eA
-22°F, Complete Break	6.7	ft·lb/in <sup>2</sup>	
73°F, Partial Break	31	ft·lb/in <sup>2</sup>	
Charpy Unnotched Impact Strength			ISO 179/1eU
-76°F	No Break		
-22°F	No Break		
73°F	No Break		
Notched Izod Impact Strength <sup>6</sup>			ISO 180/A
-22°F, Complete Break	7.1	ft·lb/in <sup>2</sup>	
73°F, Partial Break	31	ft·lb/in <sup>2</sup>	
Multi-Axial Instrumented Impact Energy			ISO 6603-2
-22°F	47.9	ft·lb	
73°F	40.6	ft·lb	
Multi-Axial Instrumented Impact Peak Force			ISO 6603-2
-22°F	1350	lbf	
73°F	1150	lbf	
<b>Hardness</b>	<b>Nominal Value</b>	<b>Unit</b>	<b>Test Method</b>
Ball Indentation Hardness	16700	psi	ISO 2039-1
<b>Thermal</b>	<b>Nominal Value</b>	<b>Unit</b>	<b>Test Method</b>
Deflection Temperature Under Load (66 psi, Unannealed)	280	°F	ISO 75-2/B
Deflection Temperature Under Load (264 psi, Unannealed)	257	°F	ISO 75-2/A
Glass Transition Temperature <sup>7</sup>	293	°F	ISO 11357-2
Vicat Softening Temperature			
--	293	°F	ISO 306/B120
--	291	°F	ISO 306/B50
Ball Pressure Test (275°F)	Pass		IEC 60695-10-2
CLTE - Flow (73 to 131°F)	3.6E-5	in/in/°F	ISO 11359-2
CLTE - Transverse (73 to 131°F)	3.6E-5	in/in/°F	ISO 11359-2
Thermal Conductivity <sup>8</sup> (73°F)	1.4	Btu·in/hr/ft <sup>2</sup> /°F	ISO 8302
RTI Elec (0.06 in)	257	°F	UL 746B
RTI Imp (0.06 in)	239	°F	UL 746B
RTI Str (0.06 in)	257	°F	UL 746B
<b>Electrical</b>	<b>Nominal Value</b>	<b>Unit</b>	<b>Test Method</b>
Surface Resistivity	1.0E+16	ohms	IEC 60093
Volume Resistivity (73°F)	1.0E+16	ohms·cm	IEC 60093
Electric Strength (73°F, 0.0394 in)	860	V/mil	IEC 60243-1
Relative Permittivity			IEC 60250
73°F, 100 Hz	3.10		
73°F, 1 MHz	3.00		
Dissipation Factor			IEC 60250
73°F, 100 Hz	5.0E-4		
73°F, 1 MHz	9.0E-3		
Comparative Tracking Index			IEC 60112
Solution A	250	V	
Solution B	125	V	
Electrolytic Corrosion (73°F)	A1		IEC 60426
	<b>Nominal Value</b>	<b>Unit</b>	<b>Test Method</b>
	HB		UL 94
	V-2		UL 94

Oxygen Index <sup>9</sup>	28 %	ISO 4589-2
Flash Ignition Temperature	896 °F	ASTM D1929
Self Ignition Temperature	1022 °F	ASTM D1929
<b>Optical</b>	<b>Nominal Value Unit</b>	<b>Test Method</b>
Refractive Index <sup>10</sup>	1.586	ISO 489
Light Transmittance		ISO 13468-2
39.37 mil	89.0 %	
78.74 mil	89.0 %	
118.1 mil	88.0 %	
157.5 mil	> 87.0 %	
Haze (118.1 mil)	< 0.500 %	ISO 14782

### Processing Information

Injection	Nominal Value Unit
Drying Temperature - Dry Air Dryer	248 °F
Drying Time - Dry Air Dryer	2.0 to 3.0 hr
Suggested Max Moisture	< 0.020 %
Suggested Shot Size	30 to 70 %
Rear Temperature	482 to 500 °F
Middle Temperature	518 to 536 °F
Front Temperature	536 to 554 °F
Nozzle Temperature	554 to 572 °F
Processing (Melt) Temp	536 to 608 °F
Mold Temperature	176 to 248 °F
Back Pressure	725 to 2180 psi
Vent Depth	9.8E-4 to 3.0E-3 in

### Injection Notes

Standard Melt Temperature: 300°C  
Hold Pressure (% of Injection Pressure): 50 - 75%  
Peripheral Screw Speed: 0.05 - 0.2 m/s

### Notes

<sup>1</sup> Typical properties: these are not to be construed as specifications.

<sup>2</sup> Pellets

<sup>3</sup> 60x60x2mm, 500 bar

<sup>4</sup> 0.079 in/min

<sup>5</sup> 2.0 mm/min

<sup>6</sup> 3.0 mm

<sup>7</sup> 10°C/min

<sup>8</sup> Across Flow

<sup>9</sup> Procedure A

<sup>10</sup> Method A

