

Makrolon® ET3113

 Covestro - Polycarbonates - *Polycarbonate*
General Information
Product Description

 MVR (300°C/1.2 kg) 6.0 cm³/10 min; Extrusion; high viscosity; UV stabilized; available in transparent colors only; solid sheet; corrugated sheet

General

Material Status	• Commercial: Active		
Availability	• Africa & Middle East	• Europe	• North America
	• Asia Pacific	• Latin America	
Additive	• UV Stabilizer		
Features	• High Viscosity	• UV Stabilized	
Uses	• Corrugated Sheet	• Sheet	
RoHS Compliance	• RoHS Compliant		
Appearance	• Clear/Transparent	• Colors Available	
Processing Method	• Extrusion		
ISO Designation	• ISO 7391-PC,EL,(,)-09-9		

Properties ¹

Physical	Nominal Value	Unit	Test Method
Density (73°F)	1.20	g/cm ³	ISO 1183
Apparent (Bulk) Density ²	0.66	g/cm ³	ISO 60
Melt Mass-Flow Rate (MFR) (300°C/1.2 kg)	6.5	g/10 min	ISO 1133
Melt Volume-Flow Rate (MVR) (300°C/1.2 kg)	6.0	cm ³ /10min	ISO 1133
Molding Shrinkage			
Across Flow	0.60 to 0.80	%	ISO 2577
Flow	0.60 to 0.80	%	ISO 2577
Across Flow : 536°F, 0.0787 in ³	0.75	%	ISO 294-4
Flow : 0.0787 in ³	0.70	%	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)	341000	psi	ISO 527-1/1
Tensile Stress (Yield, 73°F)	9430	psi	ISO 527-2/50
Tensile Stress (Break, 73°F)	10200	psi	ISO 527-2/50
Tensile Strain (Yield, 73°F)	6.3	%	ISO 527-2/50
Tensile Strain (Break, 73°F)	130	%	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 ⁴ (73°F)	341000	psi	ISO 178
Flexural Stress ⁴			ISO 178
73°F	13900	psi	
3.5% Strain, 73°F	10400	psi	
Flexural Strain at Flexural Strength ⁵ (73°F)	7.2	%	ISO 178
Films	Nominal Value	Unit	Test Method
Water Vapor Transmission Rate (73°F, 85% RH, 3.9 mil)	0.97	g/100 in ² /24 hr	ISO 15106-1
Carbon Dioxide Permeability (73°F, 1.0 mil)	16900	cm ³ /m ² /bar/24 hr	ISO 2556
Gas Permeation			ISO 2556



Carbon Dioxide : 3.9 mil	3800	cm ³ /m ² /bar/24 hr
Nitrogen : 1.0 mil	510	cm ³ /m ² /bar/24 hr
Nitrogen : 3.9 mil	120	cm ³ /m ² /bar/24 hr
Oxygen : 1.0 mil	2760	cm ³ /m ² /bar/24 hr
Oxygen : 3.9 mil	650	cm ³ /m ² /bar/24 hr

Impact	Nominal Value	Unit	Test Method
Charpy Notched Impact Strength ⁶			ISO 179/1eA
-22°F, Complete Break	8.6	ft·lb/in ²	
73°F, Partial Break	38	ft·lb/in ²	
Charpy Unnotched Impact Strength			ISO 179/1eU
-76°F	No Break		
-22°F	No Break		
73°F	No Break		
Notched Izod Impact Strength ⁶			ISO 180/A
-22°F, Complete Break	9.5	ft·lb/in ²	
73°F, Partial Break	33	ft·lb/in ²	
Multi-Axial Instrumented Impact Energy			ISO 6603-2
-22°F	51.6	ft·lb	
73°F	44.3	ft·lb	
Multi-Axial Instrumented Impact Peak Force			ISO 6603-2
-22°F	1460	lbf	
73°F	1260	lbf	

Hardness	Nominal Value	Unit	Test Method
Ball Indentation Hardness	16400	psi	ISO 2039-1

Thermal	Nominal Value	Unit	Test Method
Deflection Temperature Under Load (66 psi, Unannealed)	286	°F	ISO 75-2/B
Deflection Temperature Under Load (264 psi, Unannealed)	262	°F	ISO 75-2/A
Glass Transition Temperature ⁷	298	°F	ISO 11357-2
Vicat Softening Temperature			
--	300	°F	ISO 306/B120
--	298	°F	ISO 306/B50
Ball Pressure Test (284°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 ⁸ (73°F)	1.4	Btu·in/hr/ft ² /°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

Electrical	Nominal Value	Unit	Test Method
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	8.0E-4		
73°F, 1 MHz	0.010		
Comparative Tracking Index			IEC 60112
Solution A	250	V	
Solution B	125	V	
Electrolytic Corrosion (73°F)	A1		IEC 60426

Flammability	Nominal Value	Unit	Test Method
Flame Rating			UL 94
0.06 in	HB		
0.030 in	V-2		

Flammability Index			IEC
	1610	°F	
	1610	°F	
	1760	°F	

Glow Wire Ignition Temperature		IEC 60695-2-13
0.030 in	1610 °F	
0.06 in	1610 °F	
0.12 in	1650 °F	
Oxygen Index ⁹	28 %	ISO 4589-2
Application of Flame from Small Burner ¹⁰ (78.7 mil)	K1, F1	DIN 53438-1, -3
Burning Rate ¹¹ (> 39.4 mil)	passed	ISO 3795
Flash Ignition Temperature	896 °F	ASTM D1929
Needle Flame Test		IEC 60695-11-5
59.1 mil ¹²	60 sec	
78.7 mil ¹²	120 sec	
78.7 mil ¹³	5 sec	
0.12 in ¹²	120 sec	
0.12 in ¹³	10 sec	
Self Ignition Temperature	1022 °F	ASTM D1929
Optical	Nominal Value Unit	Test Method
Refractive Index ¹⁴	1.587	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)	< 0.800 %	ISO 14782

Notes

¹ Typical properties: these are not to be construed as specifications.

² Pellets

³ 60x60x2mm, 500 bar

⁴ 0.079 in/min

⁵ 2.0 mm/min

⁶ 3 mm

⁷ 10°C/min

⁸ Across Flow

⁹ Procedure A

¹⁰ Method K and F

¹¹ US-FMVSS

¹² Method F

¹³ Method K

¹⁴ Method A

