

Makrolon® ET2613

Polycarbonate

Covestro - Polycarbonates

Message:

MVR (300 °C/1.2 kg) 12 cm³/10 min; Extrusion; medium viscosity; UV stabilized; available in color code 550060 only; solid sheet

General Information			
UL YellowCard	E41613-233138		
Additive	UV Stabilizer		
Features	Medium Viscosity		
Uses	Sheet		
RoHS Compliance	RoHS Compliant		
Processing Method	Extrusion		
Physical	Nominal Value	Unit	Test Method
Density (23°C)	1.20	g/cm ³	ISO 1183
Apparent Density ¹	0.66	g/cm ³	ISO 60
Melt Mass-Flow Rate (MFR) (300°C/1.2 kg)	13	g/10 min	ISO 1133
Melt Volume-Flow Rate (MVR) (300°C/1.2 kg)	12.0	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 : 2.00 mm ²	0.75	%	ISO 294-4
Flow : 2.00 mm ³	0.70	%	ISO 294-4
Water Absorption			
Saturation, 23°C	0.30	%	ISO 62
Equilibrium, 23°C, 50% RH	0.12	%	
Hardness	Nominal Value	Unit	Test Method
Ball Indentation Hardness	115	MPa	ISO 2039-1
Mechanical	Nominal Value	Unit	Test Method
Tensile Modulus (23°C)	2350	MPa	ISO 527-2/1
Tensile Stress			ISO 527-2/50
Yield, 23°C	65.0	MPa	ISO 527-2/50
Break, 23°C	70.0	MPa	
Tensile Strain			
Yield, 23°C	6.3	%	ISO 527-2/50
Break, 23°C	130	%	
Nominal Tensile Strain at Break (23°C)	> 50	%	
Tensile Creep Modulus			ISO 899-1
1 hr	2200	MPa	

1000 hr	1900	MPa	
Flexural Modulus ⁴ (23°C)	2350	MPa	ISO 178
Flexural Stress ⁵			ISO 178
3.5% Strain, 23°C	72.0	MPa	
23°C	96.0	MPa	
Flexural Strain at Flexural Strength (23°C) ⁶	7.0	%	ISO 178
Gas Permeation			ISO 2556
Carbon Dioxide : 23°C, 25.4 µm	16900	cm ³ /m ² /bar/24 hr	
Carbon Dioxide : 23°C, 100.0 µm	3800	cm ³ /m ² /bar/24 hr	
Nitrogen : 23°C, 25.4 µm	510	cm ³ /m ² /bar/24 hr	
Nitrogen : 23°C, 100.0 µm	120	cm ³ /m ² /bar/24 hr	
Oxygen : 23°C, 25.4 µm	2760	cm ³ /m ² /bar/24 hr	
Oxygen : 23°C, 100.0 µm	670	cm ³ /m ² /bar/24 hr	
Application of Flame from Small Burner - Method K and F (2.00 mm)	K1, F1		DIN 53438-1, -3
Burning Rate - US-FMVSS (> 1.00 mm)	passed		ISO 3795
Flash Ignition Temperature	480	°C	ASTM D1929
Needle Flame Test			IEC 60695-11-5
Method F : 1.50 mm	1.0	min	
Method F : 2.00 mm	1.0	min	
Method F : 3.00 mm	2.0	min	
Method K : 1.50 mm	0.1	min	
Method K : 2.00 mm	0.1	min	
Method K : 3.00 mm	0.2	min	
Self Ignition Temperature	550	°C	ASTM D1929
Electrolytical Corrosion (23°C)	A1		IEC 60426
ISO Shortname	ISO 7391-PC,EL,(,,)-18-9		
Films	Nominal Value	Unit	Test Method
Water Vapor Transmission Rate (23°C, 85% RH, 100 µm)	15	g/m ² /24 hr	ISO 15106-1
Impact	Nominal Value	Unit	Test Method
Charpy Notched Impact Strength ⁷			ISO 7391
-30°C, Complete Break	16	kJ/m ²	
23°C, Partial Break	70	kJ/m ²	
Charpy Unnotched Impact Strength			ISO 179/1eU
-60°C	No Break		
-30°C	No Break		
23°C	No Break		
Notched Izod Impact Strength ⁸			ISO 7391
-30°C, Complete Break	15	kJ/m ²	
23°C, Partial Break	65	kJ/m ²	
Multi-Axial Instrumented Impact Energy			ISO 6603-2
-30°C	65.0	J	

23°C	60.0	J	
Multi-Axial Instrumented Impact Peak Force			ISO 6603-2
-30°C	6300	N	
23°C	5400	N	
Thermal	Nominal Value	Unit	Test Method
Heat Deflection Temperature			
0.45 MPa, Unannealed	138	°C	ISO 75-2/B
1.8 MPa, Unannealed	126	°C	ISO 75-2/A
Glass Transition Temperature ⁹	147	°C	ISO 11357-2
Vicat Softening Temperature			
--	145	°C	ISO 306/B50
--	146	°C	ISO 306/B120
Ball Pressure Test (138°C)	Pass		IEC 60695-10-2
CLTE			ISO 11359-2
Flow : 23 to 55°C	6.5E-5	cm/cm/°C	
Transverse : 23 to 55°C	6.5E-5	cm/cm/°C	
Thermal Conductivity ¹⁰ (23°C)	0.20	W/m/K	ISO 8302
RTI Elec (1.50 mm)	125	°C	UL 746
RTI Imp (1.50 mm)	115	°C	UL 746
RTI Str (1.50 mm)	125	°C	UL 746
Electrical	Nominal Value	Unit	Test Method
Surface Resistivity	1.0E+16	ohms	IEC 60093
Volume Resistivity (23°C)	1.0E+16	ohms·cm	IEC 60093
Electric Strength (23°C, 1.00 mm)	34	kV/mm	IEC 60243-1
Relative Permittivity			IEC 60250
23°C, 100 Hz	3.10		
23°C, 1 MHz	3.00		
Dissipation Factor			IEC 60250
23°C, 100 Hz	5.0E-4		
23°C, 1 MHz	9.0E-3		
Comparative Tracking Index			IEC 60112
Solution A	250	V	
Solution B	125	V	
Flammability	Nominal Value	Unit	Test Method
Flame Rating			UL 94
2.50 mm	HB		
0.750 mm	V-2		
Glow Wire Flammability Index			IEC 60695-2-12
0.750 mm	850	°C	
1.50 mm	850	°C	
3.00 mm	960	°C	

Glow Wire Ignition Temperature			IEC 60695-2-13
0.750 mm	875	°C	
1.50 mm	875	°C	
3.00 mm	875	°C	
Oxygen Index ¹¹	29	%	ISO 4589-2
Optical	Nominal Value	Unit	Test Method
Refractive Index ¹²	1.586		ISO 489
Transmittance			ISO 13468-2
1000 μm	89.0	%	
2000 μm	89.0	%	
3000 μm	88.0	%	
4000 μm	87.0	%	
Haze (3000 μm)	< 0.80	%	ISO 14782

NOTE

- | | |
|-----|----------------------------|
| 1. | Pellets |
| 2. | 60x60x2 mm, 500 bar |
| 3. | 60x60x2 mm, 500 bar |
| 4. | 2.0 mm/min |
| 5. | 2.0 mm/min |
| 6. | 2 mm/min |
| 7. | Based on ISO 179-1eA, 3 mm |
| 8. | Based on ISO 180-A, 3 mm |
| 9. | 10°C/min |
| 10. | Cross-flow |
| 11. | Procedure A |
| 12. | Method A |

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