

Makrolon® 3156

 Covestro - Polycarbonates - *Polycarbonate*
General Information
Product Description

 MVR (300°C/1.2 kg) 6.0 cm³/10 min; food contact quality; high viscosity; easy release; extrusion; injection molding - melt temperature 290 - 330°C; available in transparent, translucent and opaque colors

General

Material Status	• Commercial: Active		
Availability	• Africa & Middle East	• Europe	• North America
	• Asia Pacific	• Latin America	
Features	• Food Contact Acceptable	• Good Mold Release	• High Viscosity
RoHS Compliance	• RoHS Compliant		
Appearance	• Clear/Transparent	• Opaque	
	• Colors Available	• Translucent	
Processing Method	• Extrusion	• Injection Molding	
ISO Designation	• ISO 7391-PC,MR,(,)-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)	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 527-2/50
Tensile Strain (Yield, 73°F)	6.2	%	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)	348000	psi	ISO 178
Flexural Stress ⁴			ISO 178
73°F	14100	psi	
3.5% Strain, 73°F	10600	psi	
Flexural Strain at Flexural Strength ⁵ (73°F)	7.1	%	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		7.6 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		7.1 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)		280 °F	ISO 75-2/B
Deflection Temperature Under Load (264 psi, Unannealed)		259 °F	ISO 75-2/A
Glass Transition Temperature ⁷		295 °F	ISO 11357-2
Vicat Softening Temperature			
--		298 °F	ISO 306/B120
--		297 °F	ISO 306/B50
Ball Pressure Test (280°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
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		5.0E-4	
73°F, 1 MHz		9.5E-3	
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	
Glow Wire Flammability Index			IEC 60695-2-12
0.030 in		1610 °F	
0.06 in		1610 °F	
0.12 in		1710 °F	
Glow Wire Ignition Temperature			IEC 60695-2-13
		1610 °F	
		1610 °F	
		1650 °F	
		27 %	ISO



x⁹



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
Glow Wire Test		EDF HN60 E.02
59.1 mil	1562 °F	
0.12 in	1562 °F	
Needle Flame Test		IEC 60695-11-5
59.1 mil ¹²	60 sec	
78.7 mil ¹³	5 sec	
78.7 mil ¹²	120 sec	
0.12 in ¹³	10 sec	
0.12 in ¹²	120 sec	
Self Ignition Temperature	1022 °F	ASTM D1929
Optical	Nominal Value Unit	Test Method
Refractive Index ¹⁴	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)	< 0.800 %	ISO 14782

Processing Information

	Nominal Value	Unit
Injection		
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	500 to 518	°F
Middle Temperature	536 to 554	°F
Front Temperature	554 to 572	°F
Nozzle Temperature	572 to 590	°F
Processing (Melt) Temp	554 to 626	°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

Peripheral Screw Speed: 0.05 - 0.2 m/s
Standard Melt Temperature: 310°C
Hold Pressure (% of Injection Pressure): 50 - 75%

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

