

## Makrolon® 3206

Covestro - Polycarbonates - *Polycarbonate*

### General Information

#### Product Description

MVR (300°C/1.2 kg) 5.0 cm<sup>3</sup>/10 min; food contact quality; high viscosity; 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	• High Viscosity	
RoHS Compliance	• RoHS Compliant		
Appearance	• Clear/Transparent	• Opaque	
	• Colors Available	• Translucent	
Processing Method	• Extrusion	• Injection Molding	
ISO Designation	• ISO 7391-PC,M,(,)-05-9		

### 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)	5.5	g/10 min	ISO 1133
Melt Volume-Flow Rate (MVR) (300°C/1.2 kg)	5.0	cm <sup>3</sup> /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 <sup>3</sup>	0.75	%	ISO 294-4
Flow : 0.0787 in <sup>3</sup>	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)	10900	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 <sup>4</sup> (73°F)	341000	psi	ISO 178
Flexural Stress <sup>4</sup>			ISO 178
73°F	13800	psi	
3.5% Strain, 73°F	10400	psi	
Flexural Strain at Flexural Strength <sup>5</sup> (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 <sup>2</sup> /24 hr	ISO 15106-1
Carbon Dioxide Permeability (73°F, 1.0 mil)	16900	cm <sup>3</sup> /m <sup>2</sup> /bar/24 hr	ISO 2556
Gas Permeation			ISO 2556
Carbon Dioxide : 3.9 mil	3800	cm <sup>3</sup> /m <sup>2</sup> /bar/24 hr	
Nitrogen : 1.0 mil	510	cm <sup>3</sup> /m <sup>2</sup> /bar/24 hr	



Nitrogen : 3.9 mil		120 cm <sup>3</sup> /m <sup>2</sup> /bar/24 hr	
Oxygen : 1.0 mil		2760 cm <sup>3</sup> /m <sup>2</sup> /bar/24 hr	
Oxygen : 3.9 mil		650 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		8.6 ft·lb/in <sup>2</sup>	
73°F, Partial Break		38 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		9.5 ft·lb/in <sup>2</sup>	
73°F, Partial Break		36 ft·lb/in <sup>2</sup>	
Multi-Axial Instrumented Impact Energy			ISO 6603-2
-22°F		55.3 ft·lb	
73°F		47.9 ft·lb	
Multi-Axial Instrumented Impact Peak Force			ISO 6603-2
-22°F		1510 lbf	
73°F		1300 lbf	
<b>Hardness</b>	<b>Nominal Value</b>	<b>Unit</b>	<b>Test Method</b>
Ball Indentation Hardness		16100 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)		288 °F	ISO 75-2/B
Deflection Temperature Under Load (264 psi, Unannealed)		266 °F	ISO 75-2/A
Glass Transition Temperature <sup>7</sup>		302 °F	ISO 11357-2
Vicat Softening Temperature			
--		304 °F	ISO 306/B120
--		302 °F	ISO 306/B50
Ball Pressure Test (286°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		9.5E-3	
Comparative Tracking Index			IEC 60112
Solution A		250 V	
Solution B		125 V	
Electrolytic Corrosion (73°F)		A1	IEC 60426
<b>Flammability</b>	<b>Nominal Value</b>	<b>Unit</b>	<b>Test Method</b>
Flame Rating			UL 94
0.06 in		HB	
0.014 in		V-2	
Glow Wire Flammability Index			IEC 60695-2-12
0.030 in		1610 °F	
		1610 °F	
		1710 °F	
Ignition Temperature			IEC
		1610 °F	



0.06 in	1610 °F	
0.12 in	1650 °F	
Oxygen Index <sup>9</sup>	27 %	ISO 4589-2
Application of Flame from Small Burner <sup>10</sup> (78.7 mil)	K1, F1	DIN 53438-1, -3
Burning Rate <sup>11</sup> (> 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 <sup>12</sup>	60 sec	
78.7 mil <sup>13</sup>	5 sec	
78.7 mil <sup>12</sup>	120 sec	
0.12 in <sup>13</sup>	10 sec	
0.12 in <sup>12</sup>	120 sec	
Self Ignition Temperature	1022 °F	ASTM D1929
<b>Optical</b>	<b>Nominal Value Unit</b>	<b>Test Method</b>
Refractive Index <sup>14</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)	< 0.800 %	ISO 14782

### Processing Information

<b>Injection</b>	<b>Nominal Value Unit</b>
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

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

### 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 mm

<sup>7</sup> 10°C/min

<sup>8</sup> Across Flow

<sup>9</sup> Procedure A

<sup>10</sup> Method K and F

<sup>11</sup> ISO 3795

