

# Makrolon® 9415

Polycarbonate  
Covestro - Polycarbonates

# PROSPECTOR®

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## Technical Data

### Product Description

MVR (300°C/1.2 kg) 6.0 cm<sup>3</sup>/10 min; 10 % glass fiber reinforced; flame retardant; UL 94V-0/1.5 mm and 5VA/3.0 mm; high viscosity; easy release; injection molding - melt temperature 310 - 330°C; available in opaque colors only

### General

Material Status	• Commercial: Active
Literature <sup>1</sup>	• <a href="#">Technical Datasheet (English)</a>
UL Yellow Card <sup>2</sup>	• <a href="#">E41613-233164</a> • <a href="#">E41613-233165</a>
Search for UL Yellow Card	• <a href="#">Covestro - Polycarbonates</a> • <a href="#">Makrolon®</a>
Availability	• Africa & Middle East • Asia Pacific • Europe • Latin America • North America
Filler / Reinforcement	• Glass Fiber, 10% Filler by Weight
Additive	• Flame Retardant
Features	• Flame Retardant • Good Mold Release • High Viscosity
RoHS Compliance	• RoHS Compliant
Appearance	• Colors Available • Opaque
Processing Method	• Injection Molding
Multi-Point Data	• Specific Volume vs Temperature (ISO 11403) • Viscosity vs. Shear Rate (ISO 11403)
ISO Shortname	• ISO 7391-PC,MFR,(,)-09-9,GF10

Physical	Nominal Value Unit	Test Method
Density (23°C)	1.27 g/cm <sup>3</sup>	ISO 1183
Apparent (Bulk) Density <sup>4</sup>	0.64 g/cm <sup>3</sup>	ISO 60
Melt Mass-Flow Rate (MFR) (300°C/1.2 kg)	7.0 g/10 min	ISO 1133
Melt Volume-Flow Rate (MVR) (300°C/1.2 kg)	6.0 cm <sup>3</sup> /10min	ISO 1133
Molding Shrinkage		
Across Flow	0.40 to 0.60 %	ISO 2577
Flow	0.40 to 0.60 %	ISO 2577
Across Flow : 280°C, 2.00 mm <sup>5</sup>	0.45 %	ISO 294-4
Flow : 2.00 mm <sup>5</sup>	0.60 %	ISO 294-4
Water Absorption		ISO 62
Saturation, 23°C	0.26 %	
Equilibrium, 23°C, 50% RH	0.10 %	

Mechanical	Nominal Value Unit	Test Method
Tensile Modulus (23°C)	3800 MPa	ISO 527-1/1
Tensile Stress		ISO 527-2/5
Yield, 23°C	64.0 MPa	
Break, 23°C	45.0 MPa	
Tensile Strain		ISO 527-2/5
Yield, 23°C	4.4 %	
Break, 23°C	15 %	



Mechanical	Nominal Value Unit	Test Method
Tensile Creep Modulus		ISO 899-1
1 hr	3600 MPa	
1000 hr	2900 MPa	
Flexural Modulus <sup>6</sup> (23°C)	3600 MPa	ISO 178
Flexural Stress <sup>6</sup>		ISO 178
23°C	105 MPa	
3.5% Strain, 23°C	95.0 MPa	
Flexural Strain at Flexural Strength <sup>6</sup> (23°C)	5.8 %	ISO 178
Impact	Nominal Value Unit	Test Method
Charpy Notched Impact Strength <sup>7</sup>		ISO 179/1eA
23°C, Complete Break	10 kJ/m <sup>2</sup>	
Charpy Unnotched Impact Strength		ISO 179/1eU
-60°C, Complete Break	100 kJ/m <sup>2</sup>	
-30°C, Complete Break	120 kJ/m <sup>2</sup>	
23°C, Complete Break	150 kJ/m <sup>2</sup>	
Notched Izod Impact Strength <sup>7</sup>		ISO 180/A
23°C, Complete Break	10 kJ/m <sup>2</sup>	
Multi-Axial Instrumented Impact Energy		ISO 6603-2
-30°C	15.0 J	
23°C	25.0 J	
Multi-Axial Instrumented Impact Peak Force		ISO 6603-2
-30°C	3700 N	
23°C	4000 N	
Hardness	Nominal Value Unit	Test Method
Ball Indentation Hardness	128 MPa	ISO 2039-1
Thermal	Nominal Value Unit	Test Method
Deflection Temperature Under Load		
0.45 MPa, Unannealed	142 °C	ISO 75-2/B
1.8 MPa, Unannealed	136 °C	ISO 75-2/A
Vicat Softening Temperature		
--	146 °C	ISO 306/B120
--	145 °C	ISO 306/B50
Ball Pressure Test (137°C)	Pass	IEC 60695-10-2
CLTE		ISO 11359-2
Flow : 23 to 55°C	4.0E-5 cm/cm/°C	
Transverse : 23 to 55°C	6.5E-5 cm/cm/°C	
Thermal Conductivity <sup>8</sup> (23°C)	0.22 W/m/K	ISO 8302
RTI Elec (1.5 mm)	125 °C	UL 746B
RTI Imp (1.5 mm)	115 °C	UL 746B
RTI Str (1.5 mm)	125 °C	UL 746B



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)	36 kV/mm	IEC 60243-1
Relative Permittivity		IEC 60250
23°C, 100 Hz	3.20	
23°C, 1 MHz	3.20	
Dissipation Factor		IEC 60250
23°C, 100 Hz	1.0E-3	
23°C, 1 MHz	9.0E-3	
Comparative Tracking Index		IEC 60112
Solution A	175 V	
Solution B	125 V	
Flammability	Nominal Value Unit	Test Method
Flame Rating		UL 94
0.75 mm	V-2	
1.5 mm	V-0	
3.0 mm	5VA	
Glow Wire Flammability Index		IEC 60695-2-12
0.75 mm	960 °C	
1.5 mm	960 °C	
3.0 mm	960 °C	
Glow Wire Ignition Temperature		IEC 60695-2-13
0.75 mm	900 °C	
1.5 mm	900 °C	
3.0 mm	900 °C	
Oxygen Index <sup>9</sup>	35 %	ISO 4589-2
Application of Flame from Small Burner		
2.00 mm <sup>10</sup>	K1, F1	DIN 53438-1, -3
2.00 mm	B2	DIN 4102
Burning Rate <sup>11</sup> (> 1.00 mm)	passed	ISO 3795
Flash Ignition Temperature	470 °C	ASTM D1929
Needle Flame Test		IEC 60695-11-5
1.50 mm <sup>12</sup>	1.0 min	
1.50 mm <sup>13</sup>	2.0 min	
2.00 mm <sup>12</sup>	2.0 min	
2.00 mm <sup>13</sup>	2.0 min	
3.00 mm <sup>12</sup>	2.0 min	
3.00 mm <sup>13</sup>	2.0 min	
Self Ignition Temperature	550 °C	ASTM D1929
Additional Information	Nominal Value Unit	Test Method
Electrolytical Corrosion (23°C)	A1	IEC 60426
Injection	Nominal Value Unit	
Drying Temperature - Dry Air Dryer	120 °C	
Drying Time - Dry Air Dryer	2.0 to 3.0 hr	



Injection	Nominal Value Unit
Suggested Max Moisture	< 0.020 %
Suggested Shot Size	30 to 70 %
Rear Temperature	250 to 260 °C
Middle Temperature	270 to 280 °C
Front Temperature	280 to 290 °C
Nozzle Temperature	290 to 300 °C
Processing (Melt) Temp	280 to 320 °C
Mold Temperature	80 to 120 °C
Back Pressure	5.00 to 15.0 MPa
Vent Depth	0.025 to 0.075 mm

**Injection Notes**

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

**Notes**

- <sup>1</sup> These links provide you with access to supplier literature. We work hard to keep them up to date; however you may find the most current literature from the supplier.
- <sup>2</sup> A UL Yellow Card contains UL-verified flammability and electrical characteristics. UL Prospector continually works to link Yellow Cards to individual plastic materials in Prospector, however this list may not include all of the appropriate links. It is important that you verify the association between these Yellow Cards and the plastic material found in Prospector. For a complete listing of Yellow Cards, visit the UL Yellow Card Search.
- <sup>3</sup> Typical properties: these are not to be construed as specifications.
- <sup>4</sup> Pellets
- <sup>5</sup> 60x60x2mm, 500 bar
- <sup>6</sup> 2.0 mm/min
- <sup>7</sup> 3 mm
- <sup>8</sup> Across Flow
- <sup>9</sup> Procedure A
- <sup>10</sup> Method K and F
- <sup>11</sup> US-FMVSS
- <sup>12</sup> Method K
- <sup>13</sup> Method F

