



Makrolon AL2447

Grades for / Automotive lighting

Global grade; MVR (300 °C/1.2 kg) 19 cm³/10 min; Automotive lighting; Low viscosity; UV stabilized; Easy release; Injection molding - Melt temperature 280 - 320 °C; Available in transparent colors only; Headlamp lenses for automotive forward lighting

ISO Shortname

ISO 7391-PC,MLR,(,)-18-9

Property	Test Condition	Unit	Standard	Value
Rheological properties				
C Melt volume-flow rate	300 °C; 1.2 kg	cm³/10 min	ISO 1133	19
C Molding shrinkage, parallel	60x60x2; 500 bar	%	ISO 294-4	0.65
C Molding shrinkage, normal	60x60x2; 500 bar	%	ISO 294-4	0.65
Molding shrinkage, parallel/normal	Value range based on general practical experience	%	b.o. ISO 2577	0.5 - 0.7
Melt mass-flow rate	300 °C; 1.2 kg	g/10 min	ISO 1133	20
Mechanical properties (23 °C/50 % r. h.)				
C Tensile modulus	1 mm/min	MPa	ISO 527-1,-2	2400
C Yield stress	50 mm/min	MPa	ISO 527-1,-2	66
C Yield strain	50 mm/min	%	ISO 527-1,-2	6.0
C Nominal strain at break	50 mm/min	%	ISO 527-1,-2	> 50
Stress at break	50 mm/min	MPa	ISO 527-1,-2	65
Strain at break	50 mm/min	%	b.o. ISO 527-1,-2	120
C Tensile creep modulus	1 h	MPa	ISO 899-1	2200
C Tensile creep modulus	1000 h	MPa	ISO 899-1	1900
Flexural modulus	2 mm/min	MPa	ISO 178	2350
Flexural strength	2 mm/min	MPa	ISO 178	98
Flexural strain at flexural strength	2 mm/min	%	ISO 178	7.0
Flexural stress at 3.5 % strain	2 mm/min	MPa	ISO 178	74
C Charpy impact strength	23 °C	kJ/m²	ISO 179-1eU	N
C Charpy impact strength	-30 °C	kJ/m²	ISO 179-1eU	N
Charpy impact strength	-60 °C	kJ/m²	ISO 179-1eU	N
Charpy notched impact strength	23 °C; 3 mm	kJ/m²	ISO 7391/b.o. ISO 179-1eA	65P(C)
Charpy notched impact strength	-30 °C; 3 mm	kJ/m²	ISO 7391/b.o. ISO 179-1eA	14C
Izod notched impact strength	23 °C; 3.2 mm	kJ/m²	b.o. ISO 180-A	75P(C)
Izod notched impact strength	-30 °C; 3.2 mm	kJ/m²	b.o. ISO 180-A	12C
C Puncture maximum force	23 °C	N	ISO 6603-2	5100
C Puncture maximum force	-30 °C	N	ISO 6603-2	6000
C Puncture energy	23 °C	J	ISO 6603-2	55
C Puncture energy	-30 °C	J	ISO 6603-2	65
Ball indentation hardness		N/mm²	ISO 2039-1	116

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Property	Test Condition	Unit	Standard	Value
Thermal properties				
C Glass transition temperature	10 °C/min	°C	ISO 11357-1,-2	144
C Temperature of deflection under load	1.80 MPa	°C	ISO 75-1,-2	124
C Temperature of deflection under load	0.45 MPa	°C	ISO 75-1,-2	136
C Vicat softening temperature	50 N; 50 °C/h	°C	ISO 306	144
Vicat softening temperature	50 N; 120 °C/h	°C	ISO 306	145
C Coefficient of linear thermal expansion, parallel	23 to 55 °C	10 ⁻⁴ /K	ISO 11359-1,-2	0.65
C Coefficient of linear thermal expansion, transverse	23 to 55 °C	10 ⁻⁴ /K	ISO 11359-1,-2	0.65
C Burning behavior UL 94 (1.5 mm) [UL recognition]	1.5 mm	Class	UL 94	V-2
C Burning behavior UL 94 [UL recognition]	2.6 mm	Class	UL 94	V-2
Burning behavior UL 94 [UL recognition]	0.75 mm	Class	UL 94	V-2
Burning behavior UL 94 [UL recognition]	2.7 mm	Class	UL 94	HB
Burning behavior UL 94 [UL recognition]	3.0 mm	Class	UL 94	HB
Burning behavior UL 94 [UL recognition]	6.0 mm	Class	UL 94	HB
C Oxygen index	Method A	%	ISO 4589-2	27
Thermal conductivity	23 °C	W/(m·K)	ISO 8302	0.20
Resistance to heat (ball pressure test)		°C	IEC 60695-10-2	135
Relative temperature index (Tensile strength) [UL recognition]	1.5 mm	°C	UL 746B	125
Relative temperature index (Tensile impact strength) [UL recognition]	1.5 mm	°C	UL 746B	115
Relative temperature index (Electric strength) [UL recognition]	1.5 mm	°C	UL 746B	125
Flash ignition temperature		°C	ASTM D1929	480
Self ignition temperature		°C	ASTM D1929	550
Electrical properties (23 °C/50 % r. h.)				
C Relative permittivity	100 Hz	-	IEC 60250	3.1
C Relative permittivity	1 MHz	-	IEC 60250	3.0
C Dissipation factor	100 Hz	10 ⁻⁴	IEC 60250	5
C Dissipation factor	1 MHz	10 ⁻⁴	IEC 60250	90
C Volume resistivity		Ohm·m	IEC 60093	1E14
C Surface resistivity		Ohm	IEC 60093	1E16
C Electrical strength	1 mm	kV/mm	IEC 60243-1	34
C Comparative tracking index CTI	Solution A	Rating	IEC 60112	250
Comparative tracking index CTI M	Solution B	Rating	IEC 60112	125
Electrolytic corrosion		Rating	IEC 60426	A1
Other properties (23 °C)				
C Water absorption (saturation value)	Water at 23 °C	%	ISO 62	0.30
C Water absorption (equilibrium value)	23 °C; 50 % r. h.	%	ISO 62	0.12
C Density		kg/m ³	ISO 1183-1	1200
Water vapor permeability	23 °C; 85 % RH; 100 µm film	g/(m ² ·24 h)	ISO 15106-1	15
Gas permeation	Oxygen; 100 µm film	cm ³ /(m ² ·24 h·bar)	b.o. ISO 2556	800
Gas permeation	Oxygen; 25.4 µm (1 mil) film	cm ³ /(m ² ·24 h·bar)	b.o. ISO 2556	3150
Gas permeation	Nitrogen; 100 µm film	cm ³ /(m ² ·24 h·bar)	b.o. ISO 2556	160
Gas permeation	Nitrogen; 25.4 µm (1 mil) film	cm ³ /(m ² ·24 h·bar)	b.o. ISO 2556	630
Gas permeation	Carbon dioxide; 100 µm film	cm ³ /(m ² ·24 h·bar)	b.o. ISO 2556	4800
Gas permeation	Carbon dioxide; 25.4 µm (1 mil) film	cm ³ /(m ² ·24 h·bar)	b.o. ISO 2556	18900
Bulk density	Pellets	kg/m ³	ISO 60	660



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Material specific properties				
Refractive index	Procedure A	-	ISO 489	1.586
Haze for transparent materials	3 mm	%	ISO 14782	< 0.5
Luminous transmittance (clear transparent materials)	1 mm	%	ISO 13468-2	89
C Luminous transmittance (clear transparent materials)	2 mm	%	ISO 13468-2	89
Luminous transmittance (clear transparent materials)	3 mm	%	ISO 13468-2	88
Luminous transmittance (clear transparent materials)	4 mm	%	ISO 13468-2	> 87
Processing conditions for test specimens				
C Injection molding-Melt temperature		°C	ISO 294	280
C Injection molding-Mold temperature		°C	ISO 294	80
C Injection molding-Injection velocity		mm/s	ISO 294	200

C These property characteristics are taken from the CAMPUS plastics data bank and are based on the international catalogue of basic data for plastics according to ISO 10350.

Impact properties: N = non-break, P = partial break, C = complete break

