

Makrolon® LED2245 HP RE

Partially bio-circular grade / Attributed via mass balance (according to ISCC PLUS Standard). For specific content see sustainability declaration.

MVR (300 °C/1.2 kg) 34 cm³/10 min; light guides; optics and lenses; high color stability under injection molding conditions; PC with highest transmission; low viscosity; easy release; injection molding - melt temperature 250 - 300 °C

ISO Shortname

PC

Property	Test Condition	Unit	Standard	typical Value
Rheological properties				
C Melt volume-flow rate	300 °C/ 1.2 kg	cm³/10 min	ISO 1133	34
C Molding shrinkage, parallel	60x60x2 mm³/ 500 bar	%	ISO 294-4	0.65
C Molding shrinkage, normal	60x60x2 mm³/ 500 bar	%	ISO 294-4	0.7
Mechanical properties (23 °C/50 % r. h.)				
C Tensile modulus	1 mm/min	MPa	ISO 527-1,-2	2350
C Yield stress	50 mm/min	MPa	ISO 527-1,-2	63
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	60
Strain at break	50 mm/min	%	b.o. ISO 527-1,-2	125
Flexural modulus	2 mm/min	MPa	ISO 178	2350
Flexural strength	2 mm/min	MPa	ISO 178	97
Flexural strain at flexural strength	2 mm/min	%	ISO 178	7.1
Flexural stress at 3.5 % strain	2 mm/min	MPa	ISO 178	73
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 21305/based on ISO 179/1eA	60P (C)
Charpy notched impact strength	-30 °C/ 3 mm	kJ/m²	ISO 21305/based on ISO 179/1eA	12C
Izod notched impact strength	23 °C/ 3 mm	kJ/m²	ISO 21305/based on ISO 180/A	55P
Izod notched impact strength	-30 °C/ 3 mm	kJ/m²	ISO 21305/based on ISO 180/A	12C
C Puncture impact properties - maximum force	23 °C	N	ISO 6603-2	4900
C Puncture impact properties - maximum force	-30 °C	N	ISO 6603-2	5900
C Puncture energy	23 °C	J	ISO 6603-2	55
C Puncture energy	-30 °C	J	ISO 6603-2	60
Ball indentation hardness		N/mm²	ISO 2039-1	115
Thermal properties				
C Glass transition temperature	10 °C/min	°C	ISO 11357-1,-2	145
C Temperature of deflection under load	1.80 MPa	°C	ISO 75-1,-2	125
C Temperature of deflection under load	0.45 MPa	°C	ISO 75-1,-2	138
C Vicat softening temperature	50 N; 50 °C/h	°C	ISO 306	145
Vicat softening temperature	50 N; 120 °C/h	°C	ISO 306	146
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, normal	23 to 55 °C	10⁻⁴/K	ISO 11359-1,-2	0.65
C Oxygen index	Method A	%	ISO 4589-2	28
Thermal conductivity, through-plane	23 °C; 50 % r. h.	W/(m·K)	ISO 8302	0.20
Resistance to heat (ball pressure test)		°C	IEC 60695-10-2	136
Burning rate (US-FMVSS)	>=1.0 mm	mm/min	ISO 3795	passed
Flash ignition temperature		°C	ASTM D1929	480
Self ignition temperature		°C	ASTM D1929	550
Smoke toxicity (with flame)		ppm	AITM 3.0005; BSS 7239	..

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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	95
C Volume resistivity		Ohm·m	IEC 62631-3-1	1E14
C Surface resistivity		Ohm	IEC 62631-3-2	1E16
C Electrical strength	1 mm	kV/mm	IEC 60243-1	34
C Comparative tracking index CTI	Solution A	Rating	IEC 60112	250
C Comparative tracking index CTI M	Solution B	Rating	IEC 60112	125M
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/m³	ISO 1183-1	1190
C Bulk density	Pellets	kg/m³	ISO 60	660
Material specific properties				
C Refractive index	Procedure A	-	ISO 489	1.584
C Haze for transparent materials	3 mm	%	ISO 14782	< 0.5
C Luminous transmittance (clear transparent materials)	1 mm	%	ISO 13468-2	>90
C Luminous transmittance (clear transparent materials)	2 mm	%	ISO 13468-2	>90
C Luminous transmittance (clear transparent materials)	3 mm	%	ISO 13468-2	>89.5
C Luminous transmittance (clear transparent materials)	4 mm	%	ISO 13468-2	>89.5
C Yellowness index (clear transparent materials)	4 mm	-	ASTM E313	< 1.0
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
Recommended processing and drying conditions				
C Melt temperatures		°C	-	250-300
C Standard Melt temperature		°C	-	270
C Barrel Temperatures - Rear		°C	-	230-240
C Barrel Temperatures - Middle		°C	-	250-260
C Barrel Temperatures - Front		°C	-	260-270
C Barrel Temperatures - Nozzle		°C	-	260-270
C Mold Temperatures		°C	-	80 - 120
C Hold Pressure (% of injection pressure)		%	-	50 - 75
C Plastic Back Pressure (specific)		bar	-	50 - 150
C Peripheral Screw Speed		m/s	-	0.05 - 0.2
C Shot-to-Cylinder Size		%	-	30 - 70
C Dry Air Drying Temperature		°C	-	120
C Dry Air Drying Time		h	-	2-3
C Moisture Content max. (%)		%	-	<= 0.02
C Vent Depth		mm	-	0.025 - 0.075

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

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Disclaimer

Typical value

These values are typical values only. Unless explicitly agreed in written form, they do not constitute a binding material specification or warranted values. Values may be affected by the design of the mold/die, the processing conditions and coloring/pigmentation of the product. Unless specified to the contrary, the property values given have been established on standardized test specimens at room temperature.

General

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Non Medical and non Food Contact Grade

This product is not designated for the manufacture of a pharmaceutical/medicinal product, medical device or of intermediate products for medical devices¹). This product is also not registered for Covestro for the use in other specifically regulated applications, in particular applications requiring regulatory registration, approval or notification (e.g. including cosmetics, plant protection, food processing, food contact and others). If the intended use of the product is for the manufacture of a pharmaceutical, medical device or of intermediate products for medical devices or for other specifically regulated applications which may lead to a regulatory obligation of Covestro, Covestro must be contacted in advance to provide its agreement to sell such product for such purpose. Nonetheless, any determination as to whether a product is appropriate for use in a pharmaceutical, medical device or intermediate products for medical devices or for the use in other specifically regulated applications, must be made solely by the purchaser of the product without relying upon any representations by Covestro, irrespective of the existence of any regulatory obligation for the registration, approval or notification. 1) Please see the "Guidance on Use of Covestro Products in a Medical Application" document.

Recommended Processing and Drying Conditions

Barrel temperatures are valid for a standard 3-zone barrel. Temperature set-up for different barrel types may change according to configuration. Values for hold pressure as percentage of injection pressure may vary depending on, amongst others, part geometry, injection molding machine and injection mold. Drying conditions are for dry air dryers only. Drying times and drying temperatures may differ depending on valid dryer type. Further information is provided by your local Covestro support as well as in the following brochures: Injection Molding of High Quality Molded Parts - Drying; Determining the Dryness of Makrolon by TVI Test; The fundamentals of shrinkage in thermoplastics; Shrinkage and deformation of glass fiber reinforced thermoplastics [...]. <https://www.plastics.covestro.com/Library/Overview.aspx>

Disclaimer shrinkage data

Shrinkage data is provided as a reference only, and is based on sample plaques molded under specific, controlled processing conditions. Shrinkage rates in production parts can vary and are influenced by several variables such as, but not limited to: part design (e.g. part size, thickness and geometry), mold design (e.g. gate type and location, runner design, mold materials, cooling system), molding conditions (e.g. processing temperature, mold temperature, packing time and pressure, injection speed). We suggest materials be evaluated in existing applicable molds to achieve the most accurate shrinkage estimation for your specific application and processing practices. The final choice of shrinkage is the responsibility of the user of the material, and should be made based on your experience and testing results. We shall not be liable for any damage caused by the use of the shrinkage data as provided by us. If you have any questions, pls consult technical representatives from Covestro.

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