

Makrolon® DX Line – Solid polycarbonate sheet for LED lighting



Your benefits:

- extreme high light transmission and high diffusivity at the same time
- extreme impact strength
- resistance to wide range of temperature

Solid **Makrolon® DX** sheets are polished polycarbonate diffuser sheets. **Makrolon® DX** is developed for applications based on LED light sources, which do not emit UV light. It offers a combination of high light transmission and light diffusion as well as an extreme impact strength which exceeds the physical properties of other thermoplastics. Makrolon® sheets resist temperatures of -100 to +120 °C.

Makrolon® DX warm is a diffuser sheet with a warm and pleasant color appearance, especially when backlit with cold white LEDs. **Makrolon® DX warm** enhances color rendering of light coming from red, green, blue LEDs and/or from the combination thereof.

Makrolon® DX cool is a diffuser sheet with a cool and fresh color appearance, even when the LEDs are in off mode.

Makrolon® DX NR (warm/ cool) is a diffuser sheet with one side matt finish to prevent glare and reflections. The matt side contains also UV protection for improved weatherability.

Makrolon® DX UV (warm/ cool) is a diffuser sheet with one side UV protection for improved weatherability.

Makrolon® DX NR and **Makrolon® DX UV** are the perfect choice for a long service life because of their good weathering performance, backed up by a 10-year warranty. **Attention:** the sheet must be mounted with the UV protection layer facing the sun.

Applications:

Typical applications for **Makrolon® DX** diffuser sheets include all kinds of LED lighting fixtures and luminaires. The sheets offer protection against involuntary breakage and willful destruction therefore can also be applied in LED-based signage applications and street furniture where efficient lighting technologies are in use. **Makrolon® DX** sheets can be thermoformed, cold-curved and fabricated with ease.

	Test Conditions	Typical Values	Unit	Test Method
PHYSICAL				
Density		1200	kg/m ³	ISO 1183-1
Water absorption saturation	water at 23°C	0.3	%	ISO 62
Water absorption equilibrium	23°C, 50 % RH	0.12	%	ISO 62
Refractive Index	Procedure A	1,586	-	ISO 489
MECHANICAL				
Tensile modulus	1 mm/min	2300	MPa	ISO 527-1,-2
Yield stress	50 mm/min	>60	MPa	ISO 527-1,-2
Yield strain	50 mm/min	6	%	ISO 527-1,-2
Nominal strain at break	50 mm/min	>50	%	ISO 527-1,-2
Flexural modulus	2 mm/min	2300	MPa	ISO 178
Flexural strength	2 mm/min	90	MPa	ISO 178
Charpy impact strength	23°C, unnotched	non-break	kJ/m ²	ISO 179-1eU
Charpy impact strength	23°C, 3 mm, notched	70	kJ/m ²	ISO 179-1eU
Izod impact strength	23°C, 3.2 mm, notched	80P	kJ/m ²	ISO 180-A
THERMAL				
Vicat softening temperature	50 N; 50°C/h	144	°C	ISO 306
Thermal conductivity	23°C	0.2	W/(mK)	ISO 8302
Coefficient of thermal expansion	23 to 55°C	0.65	10 ⁻⁴ K	ISO 11359-1,-2
Temperature of deflection under load	1.8 Mpa	126	°C	ISO 75-1,-2
	0.45 Mpa	138	°C	ISO 75-1,-2
ELECTRICAL				
Electrical strength	1 mm	34	kV/mm	IEC 60243-1
Volume resistivity		1E14	Ohm.m	IEC 60093
Surface resistivity		1E16	Ohm	IEC 60093
Relative permittivity	100 Hz	3.1	-	IEC 60250
Relative permittivity	1 MHz	3	-	IEC 60250
Dissipation factor	100 Hz	5	10 ⁻⁴	IEC 60250
Dissipation factor	1 MHz	90	10 ⁻⁴	IEC 60250

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Light Transmission:

Test Method according to CIE 130-1998, on a spherical photometer with a diameter of 1.5 m. Please ask us for more information. The stated values are typical values only.

Sample Thickness (mm)	Makrolon® DX warm		Makrolon® DX cool	
	1.5	3.0	1.5	3.0
τ_{D65}	76%	72%	65%	64%

Light diffusion:

According to DIN 5036-3 with a swivel-arm device using a luminance meter of class L (Fa. LMT) and a illuminance meter of class A (Fa. Czibula & Grundmann GmbH).

Sample Thickness (mm)	Makrolon® DX warm		Makrolon® DX cool	
	1.5	3.0	1.5	3.0
Half-power angle [°]	47°	60°	76°	75°
Light diffusion factor [σ]	58%	65%	79%	77%

Dimensions:

Thicknesses: **Makrolon® DX** line will be available in 1.5 mm and 3.0 mm

Sizes: **Makrolon® DX** line will be available in 2,050 x 1,250 mm

Upon request and quantity requirements, other dimensions can be offered

Permanent Service Temperature:

The permanent service temperature without load is approx. 120 °C.

Fire Rating (*):

Oxygen index (LOI) 27% ISO 4589-2 Method A.

Country	Standard	Rating	Thickness	Colour
Europe	EN 13501-1	B-s2-d0	1.5/ 3.0 mm	warm/ cool
UK	Standard BS476-7	Class 1Y	1.5/ 3.0 mm	warm/ cool

(* Tests in progress)

Glow Wire Flammability Tests:

Glow Wire Flammability Index (GWFI): 1.5/3.0 mm warm and cool: 850°C

Glow Wire Ignition Test (GWIT): 1.5/3.0 mm warm and cool: 875°C



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