

Product Data Sheet, February 2015

# Makrolon® GP

## Solid polycarbonate sheet



### Your benefits:

- extreme impact strength
- resistance to a wide range of temperatures
- good fire rating

Solid **Makrolon®** sheets are clear, polished, UV-stabilized polycarbonate sheets. They offer extreme impact strength that exceeds the physical properties of other products of their class.

**Makrolon®** sheets resist temperatures of -100 to +120 °C, exhibit high optical clarity and have a good fire rating.

**Makrolon® GP clear 099** is a clear transparent sheet with high light transmission.

**Makrolon® NR clear 099** is a transparent sheet with a matt finish and improved UV resistance on one side.

**Makrolon® GP white 130** and **white 150** are translucent sheets offering good light diffusion combined with a pleasant white color.

**Makrolon® GP umbra 775** sheets are brown-colored and transparent.

**Makrolon® FR clear 099** is a clear transparent sheet with improved fire classification acc. to UL94.

**Makrolon® FG clear 099** is a clear transparent sheet suitable for food-contact and medical applications.

### Applications:

Typical applications for **Makrolon® GP** sheets include machine guards, lighting fixtures, signs, wall and door partitions. The sheets offer protection against involuntary breakage and willful destruction. **Makrolon® GP** sheets can be thermoformed, cold-curved and machined with ease.

	Test Conditions	Typical values <sup>(1)</sup>	Unit	Standard
<b>PHYSICAL</b>				
Density		1200	kg/m <sup>3</sup>	ISO 1183-1
Water absorption saturation	water at 23 °C	0.30	%	ISO 62
Water absorption equilibrium	23 °C, 50% relative humidity	0.12	%	ISO 62
Refractive index	Procedure A	1.587	–	ISO 489
<b>MECHANICAL</b>				
Tensile modulus	1 mm/min	2350	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	2350	MPa	ISO 178
Flexural strength	2 mm/min	90	MPa	ISO 178
Charpy impact strength	23 °C, unnotched	non-break	kJ/m <sup>2</sup>	ISO 179-1eU
Charpy impact strength	23 °C, 3 mm, notched	80P	kJ/m <sup>2</sup>	ISO 179-1eA
Izod impact strength	23 °C, 3.2 mm, notched	90P	kJ/m <sup>2</sup>	ISO 180-A
<b>THERMAL</b>				
Vicat softening temperature	50 N, 50°C/h	148	°C	ISO 306
Thermal conductivity	23°C	0.20	W/mK	ISO 8302
Coefficient of linear thermal expansion	23 to 55°C	0.65	10 <sup>-4</sup> /K	ISO 11359-1, -2
Temperature of deflection under load	1.80 Mpa	128	°C	ISO 75-1, -2
Temperature of deflection under load	0.45 Mpa	140	°C	ISO 75-1, -2
<b>ELECTRICAL</b>				
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	3.0	–	IEC 60250
Dissipation factor	100 Hz	5	10 <sup>-4</sup>	IEC 60250
Dissipation factor	1 MHz	95	10 <sup>-4</sup>	IEC 60250

<sup>(1)</sup> These values are measured on injection molded samples, and are not intended for specification purposes.

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**Makrolon® GP****Solid polycarbonate sheet**

Bayer MaterialScience S-Line, the standard product line, represents a range of certified quality products which offer the reliable solution for most applications.

**Light Transmission:** Test Method according to DIN 5036

The stated thicknesses are not all available as standard. Please ask us for more information. The stated values are typical values only.

Light transmission %	0.75	1	1.5	2	3	4	5	6	8	10	12	15
Makrolon® GP clear 099	90	90	89	89	88	87	87	86	85	83	82	80
Makrolon® NR clear 099		83	83	82	82	80						
Makrolon® GP white 130				40	30	23	18	13				
Makrolon® GP white 150				60	50	40	33	28	20			
Makrolon® GP umbra 775						75	69	65	62	53		
Makrolon® FR clear 099					88	86	85	84				

**Available sizes:** Makrolon® sheets are available in thicknesses of 0.75 – 15 mm and in the following sizes; other sizes, colors and sheet thicknesses on request.

**Colors:**

Makrolon® GP clear 099  
 Makrolon® GP white 130  
 Makrolon® GP white 150  
 Makrolon® GP umbra 775

**Sizes (standard):**

2,050 x 1,250 mm  
 3,050 x 2,050 mm

**Permanent Service Temperature:** The permanent service temperature without load is approx. 120 °C.

**Fire Rating (\*):** Oxygen index (LOI) ISO 4589-2 Method A: 28% for Makrolon® GP, 43% for Makrolon® FR

Country	Standard	Rating	Thickness	Color
Germany	DIN 4102	B1 (indoors) burning droplets	1 – 6 mm 2 – 3 mm	GP clear 099 GP white 150
		B2	≥ 0.75 mm	GP all colors
	DIN 5510-2	S3 SR2 ST1 S4 SR2 ST2	3 – 8 mm 5 mm	GP clear 099 FR clear 099
France	NF P 92-501&505	M2	1 – 15 mm	GP clear 099
	NF F 16-101&102	F1	1 – 15 mm	GP clear 099
Europe	EN 13501-1	B s1 d0 B s2 d0	1 – 3 mm 1 – 6 mm	GP clear 099 GP all colors except 150
USA	UL94	V2 HB V0	0.75 – 1,4 mm ≥ 1,5 mm ≥ 10 mm	GP all colors GP all colors GP clear 099
		V0	≥ 2 mm	FR all colors

**Glow wire flammability index, IEC 60695-2-12, in °C (\*):**

	0.75	1	1.5	2	3	4	5	6	12
Makrolon® GP clear 099	850	850	800	800	850	960		960	960
Makrolon® GP white 130				900	960	960			
Makrolon® GP white 150				960	960				

(\*) Fire certificates could be limited in time and scope, always check if the mentioned certificate is valid for the purchased Polycarbonate sheet type at the date of delivery. Polycarbonate sheets may change their fire behavior due to ageing and weathering. The indicated fire rating was tested on new / unweathered Product in accordance with the indicated fire classification standards.



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