



Bayloy[®], Bayblend[®] and Makrolon[®]

Thermoplastic sheets for mass transportation interiors

Bayer Sheet Europe offers a range of opaque colored and transparent sheets based on polycarbonate and polycarbonate blends. Makrolon[®] sheets are basically clear or transparent tinted sheets. Bayloy[®] 10 sheets are opaque sheets made of 100 % PC resin. Bayblend[®] are opaque blends based on PC and ABS. Bayloy[®] and Bayblend[®] sheets can be manufactured in almost every color according to the individual customer wishes.

What benefits do these sheets offer?

They are:

- extremely break-resistant. Due to their high impact resistance, they are excellently suited for technical parts.
- easy to thermoform. Good flowing properties, in combination with short cycle times, provide optimum thermoforming conditions.
- fire resistant. Depending on the type, they are flame retardant and halogen-free, complying with the most stringent fire standards.
- available with a wide range of properties. Whatever your requirements, we will offer a solution.

Applications in rail coaches and mass transportation

Applications are based on high impact resistance, high heat deflection temperature and halogen free fire behaviour of several grades.

Flame retardant Bayloy[®] FR is used to produce seats and Bayblend[®] sheets are used for wall cladding, ceilings, air conducts and seat backs. They can be produced with UV- protection or PVDF top layer. Typical applications for Makrolon sheets are light diffusers, luggage racks, wall- and door partitions. Laminates with glass offer possibilities for windscreens.

What special properties do the different grades offer?

Makrolon[®] is a transparent polycarbonate sheet. It combines good fire behaviour and extreme impact strength in a wide temperature range (-100°C up to +120°C).

The Makrolon[®] AR-version is UV- and abrasion resistant and offers glasslike hardness and chemical resistance and hence easy to clean. Makrolon[®] Hygard is a bullet proof laminate of glass with Makrolon[®] PC.

Bayloy[®] 10 FR is a flame retardant grade of Bayloy[®] 10, made of UL 94 V0 classified PC resin. It's the basic sheet within the range with high impact resistance and can be used in the widest T° range.

Bayblend[®] FR 3030 is a flame retardant thermoplastic polymer blend based on PC and ABS. It is noted, in particular, for its favorable combination of mechanical and thermal properties as well as its excellent thermoforming behaviour. It is classified as "halogen-free" under the terms of DIN/VDE 0472, part 815. Bayblend FR 3030 meets most local European standards for mass transportation.

Bayblend[®] MTR is made of mineral filled flame retardant PC blend. Its combination of high stiffness and thermoform ability makes it an excellent alternative for GRP or HPL. With a Vicat T° close to 110°C and a thermal expansion of only 0,5 mm/m/10°C Bayblend[®] MTR assures a high dimensional stability. Bayblend[®] MTR is hence a perfect product for large surface parts as ceilings and side wall panels.

Test conditions	Makrolon 099	Bayblend FR 3030	Bayblend MTR	Bayloy 10FR	Unit	Test Method
Physical						
Density	1.20	1.18	1.30	1.20	g/m ³	ISO 1183
<i>Moisture absorption:</i>						
Equilibrium at 23°C/50%RF	0.15	0.20	0.10	0.15	%	ISO 62, method 4
Saturation in water at 23°C	0.35	0.50	0.40	0.35	%	ISO 62, method 1
Mechanical						
Tensile modulus	2400	2700	3800	2400	MPa	ISO 527-2/1B/1
Tensile stress at yield	> 60	69	63	> 60	MPa	ISO 527-2/1B/50
Elongation at yield	6	5	4	6	%	ISO 527-2/1B/50
Elongation at break	> 70	> 50	20	> 70	%	ISO 527-2/1B/50
<i>Impact strength:</i>						
Charpy unnotched @ 23° C	no break		no break	no break	kJ/m ²	ISO 179/1 fU
Charpy unnotched @ -30°C	-		no break	-	kJ/m ²	ISO 179/1 fU
Charpy unnotched @ 23°C; 3 mm	ca. 11		9	ca. 11	kJ/m ²	ISO 179/1 eA
Charpy unnotched @ -30°C; 3 mm	-		5	-	kJ/m ²	
Izod notched @ 23°C; 3.2 mm	ca. 10	40	10	ca. 10	kJ/m ²	ISO 180/1A
Izod notched @ -30°C; 3.2 mm	-	10	7	-	kJ/m ²	ISO 180/1A
Izod notched	ca 70	/	/	ca 70	kJ/m ²	ISO 180/4A
Thermal						
Vicat softening temperature, 50N; 120°C/h	148	115	109	148	°C	ISO 306
Thermal conductivity 23°C	0.2			0.2	W/mK	ISO 8302
Coeff. of linear thermal expansion	0.065	0.076	0.06	0.065	mm/m°C	ISO 11359-1,-2
<i>Heat deflection temperature under load:</i>						
method A: 1.81 MPa	127	96	95	127	°C	ISO/R75 ISO 75
method B: 0.45 MPa	139			70	°C	ISO 75-2
Electrical:						
Dielectric strength 1 mm	35	35		35	kV/mm	IEC 60243-1
Volume resistivity	10 ¹⁶	10 ¹⁵		10 ¹⁶	Ohm/cm	IEC 60093
Surface resistivity	10 ¹⁴	10 ¹⁷		10 ¹⁴	Ohm	IEC 60093
Dielectric constant at 10 ³ Hz	3.1	3.2		3.1		IEC 60250
Dielectric constant at 10 ⁶ Hz	3.0	3.1		3.0		IEC 60250
Dissipation factor at 10 ³ Hz	0.0005	0.00037		0.0005		IEC 60250
Dissipation factor at 10 ⁶ Hz	0.009	0.0075		0.009		IEC 60250
Burning Behaviour						
UL 94	Thickness	HB (1.5 mm)	V-0 (1,5 mm)	V-0 (1,5 mm)	V-0 (2 mm)	Class
UL 94-5V			5VB (2.0 mm)	5VB (2.0 mm)		Class
UL 94-5V			5VA (3.0 mm)	-		Class
Glow wire test (GWFI) 1-2 mm			960 (2mm)	960 (1.6mm)		°C
Glow wire test (GWFI) 3 mm						°C
<i>Fire test for materials in railway applications</i>		S2, SR1, ST1	S-4, SR-2	S-4, SR-2		Class
1.5/2.0/2.5 mm			ST-2	ST-2		
<i>Fire test for materials in building & construction</i>		B1		B1 (3.0mm)		Class
2.5 x 190 1000 mm						
European fire classification	EN ISO 11925-2+ EN 13823:2002					Class
French Building & Construction		M2	M1	M1 (3.0 mm)		Class
Docket 90A	Flame spread index	F1	F2	F1 (3.0mm)		
Docket 90 A	burning dripping			<35 (2 & 3 mm)		
	Ds 1,5			no		
	Ds 4,0'(1.5, 2 & 3 mm)			<100		
				no		

Availability

Depending on type and surface patterns, the above mentioned sheets are available with maximum width of 2050 mm in thickness from 1 to 12 mm. The sheets can be manufactured with UV protection for exterior applications and PVDF layer for improved chemical resistance and graffiti cleaning.

The company

Bayer Sheet Europe belongs to Bayer MaterialScience, one of the major global players in the polycarbonate industry. The strategic integration of the company combines decades of experience, competence and know-how in the production of high-quality polycarbonate and polyester sheets.

Bayer Sheet Europe offers transparent Makrolon® polycarbonate-, Axpel® polyester- and Vivak® copolyester sheet. Its position towards the thermoforming market has been strengthened with the introduction of opaque sheets made of PC (Bayloy®) and PC/ABS (Bayblend®). Based on our ISO 9001 certified Production System, we are able to offer sheets which meet the highest requirements and which create added value for our customers.

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Bayer Sheet Europe GmbH
 Otto-Hesse-Straße 19/T9
 64293 Darmstadt
 Germany
 Tel. +4961511303-0
 Fax +4961511303-500
 www.bayersheeteurope.com
 sales@bayersheeteurope.com



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