



# MAKROCLEAR™ FR

MAKROCLEAR™ FR is flame Retardant Polycarbonate with high clarity and surface quality. The product can be used where fire performance is required. The product is virtually unbreakable with extremely high impact resistance and offers high temperature performance too.

MAKROCLEAR™ provides designers, specifiers and architects with possibilities to use transparent polycarbonate sheets in applications where high clarity and optical performance is required. The consistent high quality demands from the market helps to improve machining, screen printability and thermoformability.

**EXCELLENT FIRE PERFORMANCE** complying requirements to UL 94 V0 from 3 mm. In case of fire, the sheet will melt and allow venting where heat and smoke will be let out and therefore reduce the growth of fire by flame spread.

## MAKROCLEAR™ FR BENEFITS:

- UL 94 V0 FROM 3 mm
- Outstanding high clarity and surface quality
- High Impact strength
- Half the weight of glass
- Easy to thermoform or fabricate

## APPLICATION AREAS:

MAKROCLEAR™ FR is the best choice where there is a demand for improved fire properties.

## DELIVERY PROGRAM:

Standard size: 2050 x 3050 mm

Thickness range: 3 – 6 mm

Colour: Clear

Embossing: ICE™, TEX™, Grain 35, ANTI-REFLEX™

Special sizes and thicknesses on request

## MAKROCLEAR™ FR TECHNICAL SPECIFICATIONS

Property	Value	Unit	Standard
<b>MAKROCLEAR® FR special properties</b>			
Limiting Oxygen index	35	%	ISO 4589
V0 (on resin)	3	Mm	UL94
<b>Physical properties</b>			
Density	1,2	g/cm <sup>3</sup>	ISO 1183
Refractive index (20 °C)	1,586		ISO 489
Moisture absorption 24 hours, 23 °C, 50% RH	0,15	%	ISO 62
<b>Mechanical properties</b>			
Tensile strength at yield (at break)	60 (70)	N/mm <sup>2</sup>	ISO 527
Elongation at yield (at break)	6 (100)	%	ISO 527
Elastic modulus	>2300	N/mm <sup>2</sup>	ISO 527
Flexural modulus	>2300	N/mm <sup>2</sup>	ISO 178
Charpy unnotched impact strength -40 °C	NB	kJ/m <sup>2</sup>	ISO 179/1eU
Charpy notched impact strength -30 °C	14	kJ/m <sup>2</sup>	ISO 179/1eA
Izod notched impact strength +23 °C	70	kJ/m <sup>2</sup>	ISO 180/1A
Izod notched impact strength -30 °C	10	kJ/m <sup>2</sup>	ISO 180/1A
<b>Thermal properties</b>			
Linear coefficient of thermal expansion (20-70 °C)	65x10 <sup>-6</sup>	K <sup>-1</sup>	ISO 11359-2
Heat deflection temperature, HDT A (1,80 N/mm <sup>2</sup> )	127	°C	ISO 75
Heat deflection temperature, HDT B (0,45 N/mm <sup>2</sup> )	139	°C	ISO 75
Vicat temperature VST/B 120	147	°C	ISO 306
Vicat temperature VST/B 50	144	°C	ISO 306
Thermal conductivity	0,20	W/m.K	DIN 8302
<b>Electrical properties</b>			
Volume resistivity, dry	>10 <sup>14</sup>	Ω . m	IEC 60093
Surface resistivity, dry	10 <sup>15</sup>	Ω	IEC 60093
Dielectric strength, dry	17	kV/mm	IEC 60243
Dielectric constant, dry 50 Hz	3		IEC 60250
Dielectric constant, dry 1 MHz	2,9		IEC 60250
Dissipation factor (tan δ), dry 50 Hz	0,001		IEC 60250
Dissipation factor (tan δ), dry 1 MHz	0,01		IEC 60250

Properties reported here are typical values. Arla Plast makes no representation that the material in any particular shipment will conform exactly to the values given. The above information is based upon experience and given in good faith. Due to many factors which are outside our knowledge and control, no warranty is given or is to be implied with respect to such information. Detailed product specification and technical manual/information is available on request.