



# MAKROTECH™ FR

Arla Plast MAKROTECH™ is our range of opaque coloured polycarbonate sheets. The product is virtually unbreakable with extremely high impact resistance. The product offers high temperature performance too.

MAKROTECH™ FR is flame retardant sheet produced with halogen free according to DIN VDE 472 part 815. A yellow card on the base material is also available on the UL website.

## MAKROTECH™ FR BENEFITS:

- Flame retardant (halogen free)
- High impact resistance and virtually unbreakable
- Wide temperature range

## APPLICATION AREAS:

Flame retardant requirements (UL 94, oxygen index, glow wire) for indoor flat, curved and formed applications like electrical appliances, machine covers and containers.

## DELIVERY PROGRAM:

Standard size: 1250 x 2050 mm

Max width: 1450 mm

Thickness range: 1,5 – 8 mm

Colours: 5 standard colours and customer specific colours upon request

Embossing: 00/00, 00/35, 00/40

# MAKROTECH™ FR TECHNICAL SPECIFICATIONS

Property	Value	Unit	Standard
<b>Physical properties</b>			
Density	1,20	g/cm <sup>3</sup>	ISO 1183
Humidity absorbtion 24 h, 23°C, 50% RH	0,15	%	ISO 62
<b>Mechanical properties</b>			
Tensile strength at yield (at break)	63 (70)	MPa	ISO 527
Tensile elongation at yield (at break)	6 (110)	%	ISO 527
Tensile modulus 1 mm/min	>2300	MPa	ISO 527
Flexural Modulus, 2 mm/min	>2300	MPa	ISO 178
Charpy Impact unnotched -40°C	NB		ISO 179/1eU
Charpy Impact notched -30 °C	11	kJ/m <sup>2</sup>	ISO 179/1eA
Charpy Impact notched +23 °C	75	kJ/m <sup>2</sup>	ISO 179
Izod impact, notched +23 °C	>65	kJ/m <sup>2</sup>	ISO 180/1A
Izod impact, notched -30 °C	10	kJ/m <sup>2</sup>	ISO 180/1A
Izod impact, unnotched -30 °C	NB	kJ/m <sup>2</sup>	ISO 180/1U
Rockwell hardness	M70	R-scale	ISO 2039-2
Hardness, H358/30	95	MPa	ISO 2039-1
<b>Thermal properties</b>			
CLTE (20-70°C), flow	7*E-0,5	1/K	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> )	138	°C	ISO 75
Thermal conductivity	0,20	W/m.K	ISO 8302
Vicat temperature VST/B 120	145	°C	ISO 306
Vicat temperature VST/B 50	141	°C	ISO 306
Ball Pressure Test, 125 °C +/- 2 °C	Pass	-	IEC 60695-10-2
<b>Fire properties</b>			
UL 94 V0 Rating	1,5	mm	UL 94
UL 94 5VA Rating	3	mm	UL 94
Glow Wire Flammability Index 850 °C	passes at 1	mm	IEC 60695-2-12
Glow Wire Flammability Index 960 °C	passes at 1,6	mm	IEC 60695-2-12
Oxygen Index (LOI)	35	%	ISO 4589
<b>Electrical properties</b>			
Volume resistivity, dry	>1.E+15	Ohm x cm	IEC 60093
Surface resistivity, dry	>1.E+15	Ohm	IEC 60093
Dissipation factor (tg δ), dry, 50 Hz	0,001	-	IEC 60250
Dielectric strength	17	kV/mm	IEC 60243-1
Relative permittivity 50 Hz	2,7	-	IEC 60250
Relative permittivity 1 MHz	2,7	-	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.