

Arla Plast MAKROTECH® FR is a 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, flame retardant additives. A yellow card on the base material is also available on the UL website

## MAKROTECH® FR BENEFITS:

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

## APPLICATION AREAS:

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

## DELIVERY PROGRAM:

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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>Mechanical properties</b>			
Tensile elongation at Yield (at break)	6(110)	%	ISO 527
Izod impact, notched +23 °C	70	kJ/m <sup>2</sup>	ISO 180
Elastic modulus	2350	MPa	ISO 527
Rockwell hardness	M70	R-scale	ISO 2039-2
Tensile strength at yield (at break)	63	MPa	ISO 527
Izod impact, unnotched 3 mm +23 °C d)	NB	kJ/m <sup>2</sup>	ISO 180/1U
Izod impact, unnotched 3 mm -30 °C d)	NB	kJ/m <sup>2</sup>	ISO 180/1U
Tensile Stress, break, 50 mm/min	65	MPa	ISO 527
Tensile Strain, yield, 50 mm/min	6	%	ISO 527
Tensile Modulus, 1 mm/min	2300	MPa	ISO 527
Flexural Stress, yield, 2 mm/min	90	MPa	ISO 178
Flexural Modulus, 2 mm/min	2300	MPa	ISO 178
Hardness, H358/30	95	MPa	ISO 2039-1
Charpy Impact notched 3 mm +23 °C	75	kJ/m <sup>2</sup>	ISO 179
Izod impact strength unnotched at +23 °C	NB		ISO 180/1U
<b>Physical properties</b>			
Density	1,20	g/cm <sup>3</sup>	ISO 1183
<b>Thermal properties</b>			
Heat deflection temperature, HDT A (1,8 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	7.E-0,5	W/m.K	DIN 52612
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	PASSES	-	ISO 180/1U
CTE, 23 °C to 80 °C, flow	0,2	W/m-°C	ISO 8302
Ball Pressure Test, 125 °C +/- 2 °C	PASSES	-	ISO 180/1U
<b>Fire properties</b>			
UL 94 V= Flame Class Rating	1,5	mm	UL 94
UL 94 5VA Rating	3	mm	UL 94
Glow Wire Flammability Inex 850 °C	passes at 1	mm	IEC 60695-2-12
Glow Wire Flammability Inex 960 °C	passes at 1,6	mm	IEC 60695-2-12
Oxygen Index (LOI)	35	mm	ISO 4589
<b>Electrical properties</b>			
Volume resistivity, dry	>1.E+15	? x cm	IEC 60093
Oxygen Index (LOI)	>1.E+15	?	IEC 60093
Oxygen Index (LOI)	0,001		IEC 60250
Oxygen Index (LOI)	17	kV/mm	IEC 60243-1
Oxygen Index (LOI)	0,001		IEC 60250
Oxygen Index (LOI)	0,001		IEC 60250
Oxygen Index (LOI)	50/60 Hz 2,7		IEC 60250
Oxygen Index (LOI)	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.