# EXOLON FR Solid flame retardant polycarbonate sheet

# exolon

July 2021



## Your benefits:

- excellent fire rating
- resistance to a wide range of temperatures

mäkrolon

• extreme impact strength

Solid **Exolon® FR** sheets are flame retardant polycarbonate sheets. They offer extreme impact strength that exceeds the physical properties of other products of their class. Exolon® sheets resist temperatures of -100 to +120 °C and exhibit high optical clarity.

**Exolon® FR** sheets have excellent fire ratings. They are UL94-V0 rated as of 2 mm thickness, comply with EN 45545-2 (European fire standard for rail applications) requirement R4, R22, R23 and R24 and meet FAR 25.853 (a)(1)(i).

 $\ensuremath{\mathsf{Exolon}}^{\ensuremath{\mathsf{0}}}$   $\ensuremath{\mathsf{FR}}$  clear 099 is a clear transparent sheet with good light transmission.

**Exolon® FR UV clear 2099** is a clear transparent sheet with good light transmission, suitable for outdoor applications.

**Exolon® FR DX 139** is a diffuser sheet with a cool and fresh color appearance, even when the LEDs are in off mode.

**Exolon® FR** sheets are the perfect choice for a long service life because of their good material performance.

### Applications:

Typical applications for **Exolon® FR** sheets include:

- lighting fixtures on railway vehicles
- electro technical components and guards which have to comply with UL94, EN 45545-2 or FAR 25.853 requirements
- any application where improved fire behaviour is needed for fire safe solutions

The sheets offer protection against involuntary breakage and willful destruction. **Exolon® FR DX** sheets can be thermoformed, cold-curved and machined with ease.

	Test Conditions	Typical Values <sup>(1)</sup>	Unit	Test Method
PHYSICAL Density Water absorption saturation Water absorption equilibrium Refractive Index	water at 23°C 23°C, 50 % RH Procedure A	1200 0.3 0.12 1,587	kg/m <sup>3</sup> % ~	ISO 1183-1 ISO 62 ISO 62 ISO 489
MECHANICAL Tensile modulus Yield stress Yield strein Nominal strain at break Flexural modulus Flexural strength Charpy impact strength Izod impact strength	1 mm/min 50 mm/min 50 mm/min 2 mm/min 2 mm/min 23°C, unnotched 23°C, 3.2 mm, notched	2400 >60 6 >50 2400 >90 non-break 70P 60P	MPa MPa % MPa KJ/m² kJ/m² kJ/m²	ISO 527-1,-2 ISO 527-1,-2 ISO 527-1,-2 ISO 527-1,-2 ISO 178 ISO 178 ISO 179-1eU ISO 179-1eU ISO 180-A
THERMAL Vicat softening temperature Thermal conductivity Coefficient of thermal expension Temperature of deflection under load	50 N; 50°C/h 23°C 23 to 55°C 1.8 Mpa 0.45 Mpa	146 0.2 0.70 127 139	°C W/(mK) 10⁻⁴ K °C °C	ISO 306 ISO 8302 ISO 11359-1,-2 ISO 75-1,-2 ISO 75-1,-2
ELECTRICAL Electrical strength Volume resistivity Surface resistivity Relative permittivity Relative permittivity Dissipation factor Dissipation factor	1 mm 100 Hz 1 MHz 100 Hz 1 MHz	34 1E14 1E16 3.1 3 10 10 <sup>-4</sup> 90 10 <sup>-4</sup>	kV/mm Ohm.m Ohm - - -	IEC 60243-1 IEC 60093 IEC 60093 IEC 60250 IEC 60250 IEC 60250 IEC 60250 IEC 60250

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





# EXOLON FR Solid flame retardant polycarbonate sheet





Ideas, innovative, intelligent, interesting... Exolon Group i-line represents the next generation of quality products. This seal guarantees innovative and intelligent first-class solutions at all times for a multitude of requirements.

exolon

### Available dimensions:

Exolon® FR/UV clear 099: available as 2, 3 and 5 mm sheet thickness in the format 2.050 x 3.050 mm Exolon® FR DX white 139\*: in 3 mm sheet thickness in the format 2.050 x 3.050 mm \*Other sizes, colours or sheet thicknesses on request.

Permanent Service Temperature: without load approx. 120 °C.

#### Fire Rating\*:

Country	Standard	Rating	Thickness	Colour
Europe	EN 45545-2	R1/ HL1, R2/HL1, R3/HL1, R4/ HL3 R22/ HL3, R23/ HL3, R24/HL3	1,5 – 5 mm 1.5 – 5 mm	all colours
USA	UL 94 UL 94 FAR 25.853	V0 V0 Part 1, (a)(1)(i) – 60 sec Part 1, (a)(1)(ii) – 12 sec	≥ 2,0 mm ≥ 2,6 mm 1.5 – 5 mm	all colours FR UV clear 2099 clear 099

\*Fire certificates are 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.

#### Light transmission in %, test method according to DIN 5036

The stated thicknesses are not all available as standard. The stated values are typical values only.

	Exolon <sup>©</sup> FR/ UV clear 099				Exolon <sup>®</sup> FR DX white 139	
Sheet thickness (mm)	3	4	5	6	3	
Light transmission (%)	88	86	85	84	53	

#### Light diffusion Exolon® FR DX:

Spatial distribution of the luminance coefficient q



Results were derived from BTDF measurements:

	Exolon° FR DX white 139	
Sample thickness (mm)	3	
Half-power angle [ $\gamma$ ]	2 x 50°	
Light diffusion factor [ $\sigma$ ]	63%	

T<sub>a</sub> and R<sub>a</sub> for the combination of illuminant A and **Exolon<sup>®</sup> FR DX** cool 139, as a function of the transmission angle.

Illuminant A	Transmission angle (°)	R	Т <sub>с</sub> (К)
R <sub>a</sub>	0	97.62	2708
99.58	1	97.67	2710
Т <sub>с</sub> (К)	2	97.66	2714
2856	5	97.62	2726





#### VINK Plastics Spain S.L.U. C/. Bosquerons 3, Nave 1. 08170 Montornès del Vallès. Barcelona - Spain T. +34 935 683 961 | info@vinkplastics.es www.vinkplastics.es