



## Product Data Sheet

# Valox<sup>®</sup> FR-1 Film

### Description

Valox FR-1 is a flame retardant thermoplastic polyester film, offering UL94 VTM-0 performance down to 125 microns, with good temperature performance.

VALOX FR-1 film's outstanding dielectric strength and ease of fabrication (ie: thermoforming, embossing, clean-edge die-cutting, folding and bending) make it very suitable for a wide range of electrical, electronic and medical applications.

Typical applications include:

- power supply insulation
- disc drive insulation
- bus bar insulation
- keyboard insulation
- TV/monitor insulation
- PC board insulation
- business equipment insulation
- insulation combined with EMI/RFI shielding when laminated with metal foil
- medical test strips

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### Configuration

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Texture	Standard gauges (mm)	Colour
matt/polished	0.075	white
	0.125	
	0.175	
	0.250	
	0.375	
	0.500	
	0.635	
	0.750	

VALOX



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Property	Test	Unit	Value+	
			MD	TD
<b>Physical</b>				
Specific Gravity	ISO 1183	g/cm <sup>3</sup>	1.34	
<b>Mechanical</b>				
Tensile Stress at break	ISO R527	Mpa	45	40
Tensile Strain at break	ISO R527	%	150	80
Tensile Modulus	ISO R527	Mpa	1500	
Tear Strength, Propagation	ASTM D1922	kN/m	8.7	
Burst Strength, Mullen	ASTM D774	N/mm <sup>2</sup>	0.40	
Stress at 3% elongation	ASTM D638	N/mm <sup>2</sup>	35	33
Stress at 5% elongation	ASTM D638	N/mm <sup>2</sup>	42	40
Impact Strength (method A)	ASTM D1709	g	480	
Coefficient of static friction	ASTM D1894	-	0.39	
Coefficient of kinetic friction	ASTM D1894	-	0.35	
<b>Thermal</b>				
Tensile Heat Distortion	ASTM D1637	°C	167	
Melt Point		°C	220	
Coefficient of Thermal Expansion	DIN 53752	1/°C	5.7x10 <sup>-5</sup>	
Thermal Conductivity	DIN 52612	W/m.°C	0.17	
Specific Heat, 40°C	ASTM C351	kJ/kg.°C	1.67	
Strain relief, 30 min. at 150°C	ASTM D1204	%	<1	
<b>Electrical</b>				
Di-electric strength, 23°C in oil, short term, 25 micron	IEC 243-1	kV/mm	195	
Relative permittivity at 25°C, 50%RH	IEC 250	-		
@50 Hz			3.31	
@1 kHz			3.26	
@100 kHz			3.16	
@1 GHz			2.79	
Dissipation factor at 25°C, 50%RH	IEC 250	-		
@50 Hz			0.0015	
@1 KHz			0.004	
@100 KHz			0.03	
@1 GHz			0.01	
Volume resistivity @ 25°C, 50% RH	IEC 93	Ohm.m	10 <sup>14</sup>	
Surface resistivity at 25°C, 50% RH	IEC 93	Ohm	10 <sup>15</sup>	
<b>Flammability</b>				
UL Flammability*	UL 94			
@ 0.635 mm			V0	
@ 0.125 mm			VTM0	
Oxygen Index				
@ 0.250 mm	ISO 4589	%	26	

+ Typical values only

MD = Machine (extrusion) direction

TD = Transverse direction

\* These ratings are not intended to reflect hazards by this or any other material under actual fire conditions.

# Valox® FR-1 Film

## Agency Summary

Valox FR1 has been tested under a number of agency testing protocols including UL 746A and UL 746B, IEC publication 85 and CSA 21.2 class 905230. The tables below summarize our UL and CSA listings for Valox FR-1.

## UL Listing Summary

File #E61257 (R)

Material	Colour	Thickness mm	UL-94 Flame Rating*	Relative Thermal Index			Performance Level Categories (PLCs)				
				Elect.	Mechanical		H W	H A	H V T	D 4 9 5	C T I
					With Elong.	Without Elong. (tensile)					
Valox FR1	nc	0.075-0.100	VTM2	-	-	-	-	-	4	6	2
	nc	0.125-0.225	VTM0	125	120	120	-	-	4	6	2
	nc	0.250-0.350	VTM0	125	120	120	4	0	4	6	2
	all	0.375-0.600	VTM0	125	120	125	4	0	4	6	2
	all	≥0.635	V0	120	120	140	3	0	3	6	2

\* This rating is not intended to reflect hazards presented by this or any other material under actual file conditions.

## CSA Listing Summary

File #LR84942

Material Type	Minimum Thickness mm	Temp. Class	Requirements in standard							
			CSA C22.2 No.						IEC No.	
			1-M1990	6-M1984	66-1988	223-1987	234	950	65	950
Valox FR1	0.125	130°C	A5	A	A	A	A4	A4	A4	A4

- Notes: - 'A' indicates compliance with all of the requirements of the indicated agency standard.
- '5' indicates that for "reinforced construction" two layers are required.
  - '4' indicates that for "reinforced construction" three layers are required.



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