

# NORYL™ EFR735 FILM

## PRODUCT DATASHEET

### DESCRIPTION

NORYL™ EFR 735 is halogen-free flame retardant Polyphenylene Oxide film offering UL94 VTM-0 performance down to 0.006" (152 microns) and excellent temperature performance to meet the requirements in a wide range of electrical, electronic and transportation applications. NORYL EFR 735 film has outstanding dielectric strength, ease of fabrication such as thermoforming, embossing, clean-edge die-cutting, score and bend. Gauges available are 6 mil, 10 mil in Matte/Velvet texture finish.

### TYPICAL PROPERTY VALUES

PROPERTY	ASTM TEST METHOD	UNITS (USCS)	VALUE	ISO TEST METHOD	UNITS (SI)	VALUE
<b>MECHANICAL</b>						
Tensile Strength @ Yield	ASTM D882	psi	9000	ISO 527	MPa	62
Ultimate	ASTM D882	psi	7600	ISO 527	MPa	54.6
Tensile Modulus	ASTM D882	psi	294000	ISO 527	MPa	2030
Tensile Elongation at Break	ASTM D882	%	12	ISO 527	%	12
<b>Tear Strength</b>						
Initiation 0.006"	ASTM D1004	lbf/mil	1.32	-	N/mm	232
Initiation 0.010"	ASTM D1004	lbf/mil	1.35	-	N/mm	236
Initiation 0.017"	ASTM D1004	lbf/mil	1.49	-	N/mm	262
Initiation 0.025"	ASTM D1004	lbf/mil	1.52	-	N/mm	265
Propagation 0.006"	ASTM D1922	g/mil	22	-	N/mm	8.5
Propagation 0.010"	ASTM D1922	g/mil	29	-	N/mm	11.1
Propagation 0.017"	ASTM D1922	g/mil	35	-	N/mm	13.7
Propagation 0.025"	ASTM D1922	g/mil	36	-	N/mm	13.9
<b>Puncture Resistance (Dynatup)</b>						
Total Energy	ASTM D3763	ft-lb/inch	186	-	J/mm	9.9
<b>Fold Endurance (MIT)</b>						
0.006" (0.152mm)	ASTM D2176	double folds	>1000	ISO 5626	folds	>1000
0.010" (0.250mm)	ASTM D2176	double folds	>80	ISO 5626	folds	>80
0.017" (0.432mm)	ASTM D2176	double folds	10	ISO 5626	folds	10
0.025" (0.635mm)	ASTM D2176	double folds	7	ISO 5626	folds	7
<b>THERMAL</b>						
CTE 0-80 deg C, in flow	ASTM E831	1/°F	4.4x10 <sup>-5</sup>	ISO 11359	1/°C	8x10 <sup>-5</sup>
CTE 0-80 deg C, cross flow	ASTM E831	1/°F	4.4x10 <sup>-5</sup>	ISO 11359	1/°C	8x10 <sup>-5</sup>
Vicat Softening Temp, Rate B/50		°F	282/309	ISO 306	°C	162
Glass Transition Temperature	ASTM D3417	°F	342	ISO 11357	°C	172
Shrinkage 130°C 30 min TD	ASTM D1204	%	0.08		%	0.08
Shrinkage 130°C 30 min MD	ASTM D1204	%	0.15		%	0.15

PROPERTY	ASTM TEST METHOD	UNITS (USCS)	VALUE	ISO TEST METHOD	UNITS (SI)	VALUE
<b>PHYSICAL</b>						
Density	ASTM D792	slug/ft <sup>3</sup>	2.1	ISO 1183	kg/m <sup>3</sup>	1088
Water Absorption						
23°C, 50% Relative Humidity, 24hrs	ASTM D570	% change	0.07	ISO 62	% change	0.07
24hrs water immersion	ASTM D570	% change	0.4	ISO 62	% change	0.4
<b>ELECTRICAL</b>						
Dielectric Strength in oil, short time	ASTM D149-97a					
@23°C, 0.006" (0.152mm)	Method A	kV/mil	2.3	IEC 60243	kV/mm	90
@23°C, 0.010" (0.250mm)		kV/mil	1.8	IEC 60243	kV/mm	70
@23°C, 0.017" (0.432mm)		kV/mil	1.2	IEC 60243	kV/mm	47
@23°C, 0.025" (0.635mm)		kV/mil	1	IEC 60243	kV/mm	38
Break Down Voltage in oil	ASTM D149-97a					
@23°C, 0.006" (0.152mm)	Method A	V	13500	IEC 60243	V	13500
@23°C, 0.010" (0.250mm)		V	18200	IEC 60243	V	18200
@23°C, 0.017" (0.432mm)		V	2100	IEC 60243	V	21000
@23°C, 0.025" (0.635mm)		V	24600	IEC 60243	V	24600
Dielectric Constant @ 1,000,000Hz	ASTM D150	-	2.75	IEC 60250	-	2.75
Dissipation Factor @ 1MHz	ASTM D150	-	0.0028	IEC 60250	-	0.0028

- ◆ These are typical properties and are not intended for specification purposes. If minimum certifiable properties are required, please contact your local SABIC representative or the SABIC Quality Services Department.  
Reported Values are based on 0.250 mm (0.010") thickness unless otherwise noted.
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## MANUFACTURING SPECIFICATIONS

NOMINAL GAUGE RANGES	MIN./MAX LIMIT OF NOMINAL
0.006" (0.152 mm)	+/- 15%
0.010" (0.254mm)	+/-10%

## COLOUR AND UL FLAMMABILITY RATING

COLOUR	COLOUR CODE	UL LISTING
Black colour	BK (BK1005)	File number: E121562, E207780

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