3M™ Flame Barrier FRB-NT Series

Data Sheet **November 2012**

Description

3M™ Flame Barrier FRB-NT Series provides the high flammability resistance, arc resistance, and dielectric strength to help safely contain electrical hazards.

These barriers are available in roll or sheet form.

The flame barrier FRB-NT series provides the reliability you need from 3M, a trusted company with over 30 years of experience providing insulating solutions that protect people, equipment, and property around the globe.

Applications

The flame barrier FRB-NT series provides both electric shock and flame protection for electrical and electronic device applications such as:

- General purpose lighting luminaires (including LED type)
- Battery housing barrier (including electric and hybrid vehicles)
- Appliance enclosure (e.g., timers, actuators, switches)

Features

The flame barrier FRB-NT series is:

- An inorganic-based, halogen free material (see regulatory section)
- UL 94-5VA rated - the most flame retardant UL 94 rating, even better than UL 94V-0
- Dimensionally stable – minimal to no shrinkage at elevated temperatures
- Available in thicknesses from 3 to 15 mil (0.08 to 0.38 mm)
- Densified for high dielectric strength and smooth surface
- Low volatile outgassing

Regulatory

The flame barrier FRB-NT series is:

- **REACH compliant**. Product contains no Substances of Very High Concern (SVHC's) on the REACH candidate lists according to article 59 of Regulation (EC) No 1970/2006 up to June 2012. For current status, go to *www.3M.com/REACH*
- **RoHS Meets MCVs 2011/65/EU**. "**RoHS** meets MCVs" means that the product or part does not contain any of the substances in excess of the maximum concentration values ("MCVs") in EU RoHS Directive 2011/65/EU. The MCVs are by weight in homogeneous materials.
- **Halogen Free** defined as both 1) no halogen compounds are intentionally added to the product or used in the manufacturing process for the product and 2) any impurities present are less than 900 ppm bromine, less than 900 ppm chlorine, and/or less than 1500 ppm total bromine and chlorine. The latter are the levels set forth in certain industry standards, such as the International Electrotechnical Commission (IEC) 61249-2-21 standard.
- The above information represents 3M's knowledge and belief which may be based in whole or in part on information provided by 3rd party suppliers to 3M.
- UL component recognized in accordance with UL 746 file # E65069

Flammability

The UL 94 test method is used to classify materials based on results from specified small-scale flame tests. These classifications (5VA, 5VB, V-0, V-1, V-2, HB, listed in decreasing order of flame resistance) are used to distinguish a material's burning characteristics after test specimens have been exposed to a specified test flame under controlled laboratory conditions. These classifications typically apply to materials used in manufacturing enclosures, structural parts, and insulators found in consumer electronic products.

A material classified as 5VA or 5VB is subjected to a flame ignition source that is approximately five times more severe than that used in the V-0, V-1, V-2 and HB tests. Furthermore, specimens in 5VA or 5VB may not drip any flaming particles and 5VA rated specimens may not develop any burn-through holes during the test.

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Typical Properties

Technical information provided consists of typical product data and should not be used for specification purposes. Unless otherwise noted, all tests are performed at room temperature.

Property	Units	Test Method	FRB-NT076	FRB-NT102	FRB-NT127	FRB-NT178	FRB-NT254	FRB-NT381
Nominal Thickness	mm mil	ASTM D-645	0.076 3.0	0.102 4.0	0.127 5.0	0.178 7.0	0.254 10.0	0.381 15.0
Color			Beige & white, marbled	Beige & white, marbled	Beige & white, marbled	Beige & white, marbled	Beige & white, marbled	Beige & white, marbled
Physical Properties								
Basis Weight	g/m^2 lb/yd^2	ASTM D-202	103 0.19	156 0.29	195 0.36	274 0.49	376 0.7	561 1.04
Density	g/cc		1.4	1.5	1.5	1.5	1.5	1.5
Flame Rating (UL File E65069)	Flammability rating	UL94	V-0, 5VA	V-0, 5VA	V-0, 5VA	V-0, 5VA	V-0, 5VA	V-0, 5VA
Relative Thermal Index, Component, Electrical	°C	UL 746B	140	140	140	140	140	140
Relative Thermal Index, Component, Mechanical without impact	°C	UL 746B	130	130	130	130	130	130
Moisture Absorption	%	ASTM D-644	< 1	< 1	< 1	< 1	< 1	< 1
Dimensional Shrinkage, (150 °C), MD	%	ASTM D-2305	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Dimensional Shrinkage, (200 °C), MD	%	ASTM D-2305	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Thermal Conductivity (180 °C)	W/mK	ASTM E-1530	0.15	0.17	0.17	0.18	0.21	0.25
Electrical Properties								
High-Voltage Arc Tracking Rate (HVTR)	PLC assigned	UL 746A	0	0	0	0	0	0
Comparative Tracking Index (CTI)	PLC assigned	UL 746A	0	0	0	0	0	0
Hot Wire Ignition (HWI)	PLC assigned	UL 746A	4*	4*	4*	4*	4*	4*
High Current Arc to Ignition (HAI)	PLC assigned	UL 746A	2	2	2	2	2	2
Glow wire ignition temperature (GWIT)	°C	IEC 60695-2-13	990	990	990	990	990	990
Glow wire flammability index (GWFI)	°C	IEC 60695-2-1	960	960	960	960	960	960
High Volt, Low Current Arc Resistance	PLC assigned	ASTM D-495	4	4	4	4	4	4
Dielectric Breakdown Voltage	kV	ASTM D-149	1.1	2.6	3.1	3.3	5.0	8.0
Dielectric Breakdown Strength	V/mil	ASTM D-149	370	650	620	470	500	530

* - Materials that do not comply with the minimum hot-wire ignition levels may be evaluated by an abnormal overload test or the glow-wire end-product test, per UL 746C

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Mechanical Properties								
Nominal Thickness	mm mil	ASTM D-645	0.076 3.0	0.102 4.0	0.127 5.0	0.178 7.0	0.254 10.0	0.381 15.0
Tensile Strength, MD	lb/inch N/cm	ASTM D-828	17 30	28 49	31 54	41 72	53 93	100 175
Tensile Strength, CD	lb/inch N/cm	ASTM D-828	8 14	14 25	16 28	22 39	34 60	58 102
Elongation to Break, MD	%	ASTM D-828	1.5	1.5	1.5	1.5	1.5	2.0
Elongation to Break, CD	%	ASTM D-828	1.1	1.1	1.1	1.1	1.1	2.0
Elmendorf Tear, MD	g N	ASTM D-689	40 0.4	88 0.9	108 1.1	172 1.7	280 2.7	534 5.2
Elmendorf Tear, CD	g N	ASTM D-689	60 0.6	132 1.3	142 1.4	302 3.0	354 3.5	734 7.2

Typical Outgassing Results for 3M™ Flame Barrier FRB-NT254 (3M Test Report ID# 158824)
Technical information provided consists of typical product data and should not be used for specification purposes.

Gas Chromatography/Mass Spectroscopy (GC/MS) Outgassing
Dynamic headspace analysis of volatile components collected during a 3 hour at 120 °C heat cycle using a Markes micro-CTE cell and Tenax adsorbent tubes. Analysis was by a Markes Ultra desorber coupled to an Agilent 6890 gas chromatograph / 5975 mass spectrometer.

Total volatiles < 22 ppm by mass.

A more detailed test report may be provided on request.

Shelf Life & Storage	This product has a 5-year shelf life from date of manufacture when stored in a humidity controlled storage (from 10°C / 50°F to 27°C / 80°F and <75% relative humidity)
Availability	For availability, please contact your local distributor. Names and addresses are available from 3M.com/electrical [Where to Buy] or call 1-800-676-8381.

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