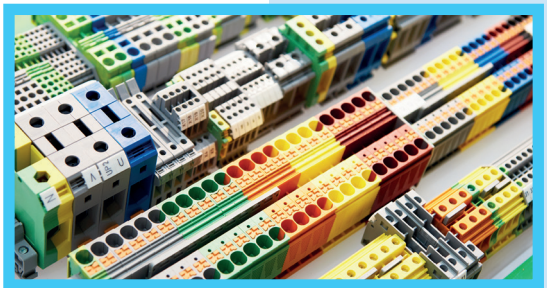
New Halogen and Phosphorus-Free Flame retardant Polyamide 66: Radiflam® A FRX

RADICI GROUP
HIGH PERFORMANCE POLYMERS



Keeping up with the trends in the E&E market towards miniaturization and lower environmental impact is a difficult task to accomplish, especially at a reasonable cost.

RadiciGroup High Performance Polymers has seized the challenge by developing **Radiflam® A FRX**: an unreinforced polyamide 66 combining the best-in-class mechanical, thermal and electrical properties, together with high productivity.

Radiflam® A FRX is particularly suitable for applications, such as terminal blocks, connectors, switches, plugs, sockets, motors and many others, where a combination of toughness and safety is a must.

Radiflam® A FRX is a VDE (www.vde.com) and UL (www.ul.com) certified material.

The introduction of EN45545-2 for railway vehicles has tightened requirements in terms of smoke density and toxicity. **Radiflam® A FRX** has passed the most severe tests and achieved an R22 HL3 rating, making it usable without restriction in all electrical devices used inside trains.

Fig.1 Terminal Blocks
Fig.2 Modern Design for Rolling Stocks

UL Certification

Underwriters Laboratories Inc., or UL as it is universally known, tests and evaluates components and products, allowing a certification mark to be affixed by the manufacturer. The most common marks are “UL Listed”, applicable to finished products or entire systems, and “UL Recognized”, for components and materials. Plastic materials are tested according to global standards and certification is aimed at mitigating the risks of fire, electric shock, personal injury and environmental hazards. The “UL Yellow Card” on a plastic material is a globally accepted safety and quality recognition that can also be used as a marketing tool.

Component - Plastics E116324

Guide Information

RADICINOVACIPS SPA
VIA BEDESCHI 20, CHIGNOLO D'ISOLA BG 24040 IT

Radiflam A FRX (a)(r1)
Polyamide 66 (PA66), furnished as pellets

Color	Min. Thk (mm)	Flame Class	HWI	HAI	RTI Elec	RTI Imp	RTI Str
ALL	0.25	V-0	-	-	65	65	65
	0.40	V-0	3	1	130	110	125
	0.71	V-0	3	1	130	110	125
	1.5	V-0	1	1	130	110	125
	3.0	V-0	1	0	130	110	125

Comparative Tracking Index (CTI): 0
Dielectric Strength (kV/mm): 21
High-Voltage Arc Tracking Rate (HVTR): -
Dimensional Stability (%): 0
Inclined Plane Tracking (IPT) kV: -
Volume Resistivity (10^x ohm-cm): 12
Surface Resistivity (10^x ohms/square): -
High Volt, Low Current Arc Resis (D495): -

(a) - alphanumeric code consisting of 3 to 4 digits or letters indicating color excluding letter c.
(r1) - Virgin and regrind up to 50% by weight inclusive have the same basic characteristics

ANSI/UL 94 small-scale test data does not pertain to building materials, furnishings and related contents. ANSI/UL 94 small-scale test data is intended solely for determining the flammability of plastic materials used in the components and parts of end-product devices and appliances, where the acceptability of the combination is determined by UL.

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Fig.3 UL Certification Card

VDE Certification

VDE Institute tests and certifies products and materials, providing worldwide recognition and ensuring product safety, electromagnetic compatibility and usability. Electrical insulating materials are tested according to the requirements of IEC 60335 for household appliances: Glow Wire Flammability Index (GWFI), Glow Wire Ignition Temperature (GWIT), Comparative Tracking Index (CTI) and Ball Pressure Test (BPT).

VDE Certificate N°40053062

Certificate Holder
Radici Novacips S.p.A., Via Provinciale 1331, 24020 Villa d´Ogna BG, Italy

	Glow Wire Flammability Index (GWFI) EN 60695-2-12	Glow Wire Ignition Temperature (GWIT) EN 60695-2-13	Comparative Tracking Index (CTI) EN 60112	Ball Pressure Test EN 60695-10-2
RADIFLAM® A FRX All Colours	960°C at 0.4 mm 960°C at 0.75 mm 960°C at 1.5 mm	775°C at 0.4 mm 775°C at 0.75 mm 775°C at 1.5 mm	600V	200°C

Fig.4 VDE Certification Document

Railway Performance Levels

The harmonized European fire protection standard for railway vehicles, EN 45545-2, plays an important role in the classification of a material into different hazard levels. Rail vehicles may operate in different environments and several requirement sets have been identified with different acceptance limits for flame spread, ignitability, smoke release and toxicity. Different parts of the same product can require distinct requirement sets.

	Oxygen Index ISO 4589-2	Ds max ISO 5659-2, 25kW/m²		CIT_{NLP} NF X 70 100 -1/-2, 600°C	50W Flame Test EN 60695-11-10	
RADIFLAM® A FRX	**≥ 32%**	Thk 0.8 mm	**45**	**0.60**	Thk 0.4 mm	**V0**
		Thk 1.6 mm	**145**			

Fig.5 EN 45545-2 Typical Material Performance

Radiflam® A FRX Highlights

Main Features of Radiflam® A FRX	Key Benefits of Radiflam® A FRX
UL 94 V0 flammability classification down to 0.25 mm	Highest safety standards
UL RTI (Relative Thermal Index) of 130°C	Reliability under severe thermal conditions
UL recognition to use regrind up to 50%	Cost reduction
VDE certification for GWFI (Glow Wire Flammability Index) of 960°C, GWIT (Glow Wire Ignition Temperature) of 775°C R22/R23 HL3 Classification according to EN 45545-2	Fastest time to market for new products
High Flow and CTI (Comparative Tracking Index) of 600V	Cost reduction thanks to miniaturization
Low outgassing to reduce tool maintenance	Higher productivity

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www.radicigroup.com

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