HIGH PERFORMANCE POLYMERS

Engineering a sustainable future for mobility

Transportation

RADICI GROUP

High-performance materials for every mobility need

The transportation sector is a dynamic and essential pillar of modern society, encompassing a wide range of **mobility solutions** that connect people, goods and communities.

With decades of experience in the transport industry, RadiciGroup stands out for its development of advanced thermoplastic materials engineered to meet the highest standards of **safety, reliability and technical performance**. We deliver cutting-edge, safety-focused product solutions for **the railway sector**, alongside high-performance materials with exceptional chemical and mechanical resistance tailored to the demanding needs of the **nautical industry**. We also bring our expertise to urban mobility by offering lightweight, high-performance products for **motorcycles, bicycles and micromobility vehicles** that contribute to overall vehicle weight reduction and enhanced energy efficiency.

Sustainability is a key component of our transportation offering, where the focus is not only on performance but also on environmental responsibility. We develop low-impact materials that meet the specific needs of the sector – including **Renycle®**, made from pre- and post-consumer recycled polyamide waste, and **Bionside®**, a range of bio-based polyamides such as Radilon® D PA610.

Typical application segments

Railways

Nautical

Motorcycles

Bicycles and Micromobility

Why choose RadiciGroup solutions?

We combine cutting-edge engineering with strict safety standards to deliver optimal performance across all applications. From improving efficiency and user experience to reducing environmental impact, our high-performance materials and custom solutions are designed to drive the future of mobility.

Product name	Product description
radilon®	Polyamide engineering polymers (PA6, PA66, copolymers, PA612, PPA and other specialty PAs for high temperature resistant applications) for injection moulding, extrusion and blow moulding.
radiflam®	Polyamide, polyphthalamide and PBT flame-retardant halogen-and-red-phosphorous-free products.
radistrong®	Specialty PA66 engineering polymers for injection moulding. The main distinguishing features are high mechanical properties, better property retention with moisture absorption and excellent surface appearance. Ideal for metal replacement.
BIONSIDE®	Bio-based offering of the Radilon family, including Radilon® D (PA610) and other experimental grades.
RENYCLE®	Low environmental impact polyamide compounds mainly based on selected and regenerated secondary raw materials (PA6 and PA66) obtained from the recovery of selected pre-and post-consumer waste.

Find the ideal product for your needs
and download the technical data sheet.

Empowering innovation through advanced technical support

RadiciGroup High Performance Polymers aims to be more than just a supplier of advanced materials — it strives to be an innovation partner, delivering end-to-end **technical support** that blends proven material expertise with cutting-edge **Engineering Service**.

Our **Global Technical Service Team** partners with you to pinpoint the ideal polymer for each application, whether you are designing next-generation e-mobility components, replacing metal parts or tackling other demanding projects. Our **Engineering Service Team** uses advanced material modelling and integrated simulation to accurately predict the behaviour of our engineering polymers, as well as their process-induced properties.

This data-driven approach lets you **optimize performance**, **cut weight** and hit ambitious **sustainability targets**, while accelerating time to market. By combining comprehensive technical know-how with virtual prototyping, we help lower development costs and reduce risk —so you can bring innovative products to life faster and with greater confidence.

engineering service

Railways

For decades, RadiciGroup has been a **trusted partner for the European and global railway industry**, supplying flame-retardant polyamides tailored to the sector's highest **safety and performance requirements**.

Building on our extensive expertise, we have developed a **broad portfolio of specialized compounds** for railway applications, many of which meet the stringent **EN 45545-2 standard**.

Let's focus on the EN 45545 standard

The European standard **EN 45545**, *"Railway applications — Fire protection on railway vehicles"*, classifies applications to assess fire risk and defines material requirements based on the associated hazard level. **EN 45545** consists of a series of seven parts. According to Clause 4.1 of EN 45545-2:2020+A1:2023, the design of rolling stock and the products used shall incorporate the aim of **limiting fire development** should an ignition event occur so that an acceptable level of safety is achieved.
If the objectives defined in Clause 4 of EN 45545-1:2013 are met, then there should be a high probability that, in the event of a fire, passengers and staff will be able to escape from the fire unaided and be able to reach a place of safety.

EN 45545-1:2013 divides railway vehicles into **four Operation Categories and four Design Categories**, as detailed in **Tables 1 and 2**.

Operation Categories	Table 1
1: Overground operation with minimum delay in stopping and fast evacuation	
2: Operation in tunnels or elevated structures with fast side evacuation available	
3: Operation in tunnels or elevated structures with slower side evacuation available	
4: Operation in tunnels or elevated structures with no side evacuation available	

Design Categories	Table 2
N: Standard vehicles	
A: Automatic train vehicles with no emergency staff	
D: Double decked vehicles	
S: Sleeping vehicles	

- The Operation Categories reflect the conditions under which trains operate (e.g., underground, tunnels and open line).
- The Design Categories take into account the type of rolling stock and passenger accessibility (e.g., sleeping vehicles, double decked vehicles and automatic trains).

Hazard Levels (HL1 to HL3) are set out in **EN 45545-2:2020+A1:2023**, based on the combination of the Operation and Design Categories, as defined in **EN 45545-1:2013**. **Table 3** illustrates the hazard levels for the various combinations.

Table 3

Operation Categories	Design Categories			
	N: Standard vehicles	**A**: Automatic train vehicles with no emergency staff	**D**: Double decked vehicles	**S**: Sleeping vehicles
1	HL1	HL1	HL1	HL2
2	HL2	HL2	HL2	HL2
3	HL2	HL2	HL2	HL3
4	HL3	HL3	HL3	HL3

The highest risk applications typically involve **sleeping vehicles**, where passengers need to be awakened before evacuation, or trains operating in conditions that hinder side evacuation. For these high-risk **HL3** scenarios, stricter material requirements apply, particularly regarding **flammability, smoke emission and toxicity**.

Our grades according to the EN 45545-2 standard

Material	Thickness (mm)	R21	R22	R23	R24	R26
radiflam® A FRX PA66 unfilled halogen-free V-0	0.8		HL3	HL3	HL3	HL3
	1.6		HL3	HL3	HL3	HL3
radiflam® S FR PA6 unfilled halogen-free V-0	0.75		HL2	HL3	HL3	HL3
	1.5		HL2	HL3	HL3	HL3
radiflam® A RV250 HF PA66 GF25 halogen-free V-0	2	HL3	HL2	HL3	HL3	HL3
	3		HL1	HL2	HL3	HL3
radiflam® A RV300 HF PA66 GF30 halogen-free V-0	2	HL3	HL2	HL3	HL3	HL3
	3		HL1	HL2	HL3	HL3
radiflam® S RV250 HF PA6 GF25 halogen-free V-0	2	HL3	HL2	HL3	HL3	HL3
	3		HL1	HL2	HL3	HL3
radiflam® S RV300 HF PA6 GF30 halogen-free V-0	2	HL3	HL2	HL3	HL3	HL3
	3		HL1	HL2	HL3	HL3
radiflam® S RV250K AE C PA6 GF25 halogenated V-0	1				HL3	HL3
	3				HL3	HL3
radiflam® S RV250 FR PA6 GF25 halogen-free V-0	1	HL3	HL3	HL3	HL3	HL3
	3	HL3	HL3	HL3	HL3	HL3
radilon® S RV200 FR2 PA6 GF20 halogen-free V-2	1	HL1	HL1	HL2	HL3	
	3	HL1	HL1	HL2	HL3	
radilon® A HS 164 PA66 unfilled V-2	1	N/A	N/A	N/A	HL2	N/A
	3				HL2	

Other materials and colours may be available on request.

Cable glands

Flame retardant materials, rated UL 94 V-0 or V-2, can be used inside carriages where compliance with the risk classes set out in the EN 45545-1 standard is required; this also refers to trains with sleeping vehicles or metropolitan train lines (HL3).

Radilon® S RV200 FR2 – PA6 20% glass-fibre-reinforced, flame-retardant injection moulding grade. Halogen-and-phosphorus-free. UL 94 V-2 rated.

Radiflam® S HF – PA6 flame-retardant injection moulding grade, halogen-and-red-phosphorus-free, glass-fibre-reinforced. Good electrical insulating properties. UL 94 V-0 rated and suitable for HL3 operation.

Radiflam® A HF – PA66 flame-retardant injection moulding grade, halogen-and-red-phosphorus-free, glass-fibre-reinforced. Good electrical insulating properties. UL 94 V-0 rated and suitable for HL3 operation.

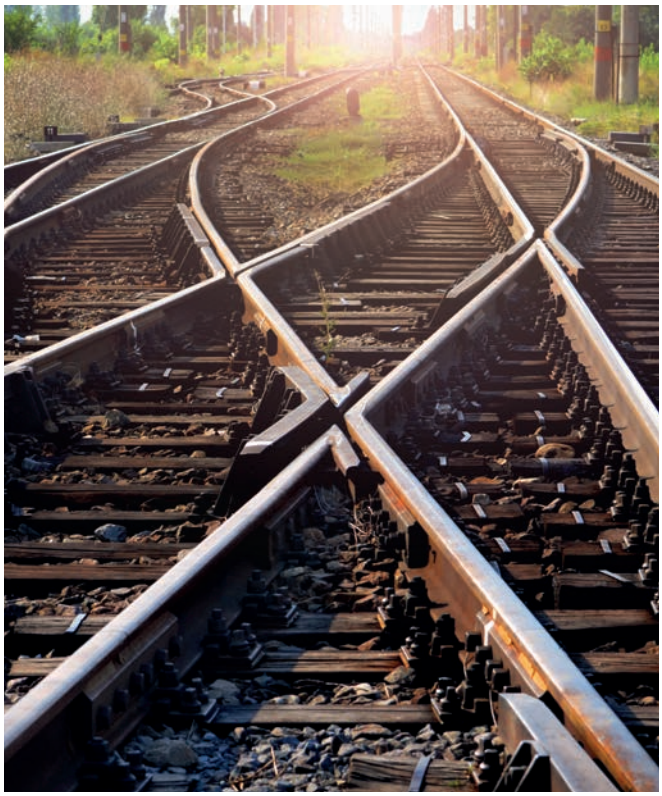
Track fastening systems

RadiciGroup's engineering polymers are designed to **absorb high-frequency vibrations** and **provide electrical insulation**. PA66-based products with high viscosity or filled with glass fibre are also available, in order to meet the requirements of different fastening systems (such as Nabla, SKL and Clip Fastening).

Radilon® A 50E – PA66, very high viscosity injection moulding grade.

Radilon® A LX14080 – PA66, medium-high viscosity injection moulding grade with good impact resistance.

Radilon® A RV350 – PA66, 35% glass-fibre-reinforced with high stiffness and mechanical resistance.



Nautical

RadiciGroup has developed specific polymers for marine applications, helping manufacturers **replace metal parts** with high-performance solutions that reduce weight, lower production costs and improve sustainability.
These materials are **lightweight, durable and corrosion-resistant**, making them ideal for modern manufacturing. They enable companies to maintain high-quality standards while improving efficiency and sustainability.

		radilon® S PA6	radilon® A PA66	radilon® D PA610 (Bionside®)	radilon® DT PA612
Inorganic Substances	**Concentration**	**Ranking**	**Ranking**	**Ranking**	**Ranking**
Sodium chloride	Saturated	+	+	++	++
Calcium chloride	10%	+	+	++	++
Magnesium chloride	10%	++	++	++	+
Sodium carbonate	Diluted (<10%)	++	++	++	++

X Not resistant/Soluble 0 Fair/Limited + Good ++ Excellent

Notably, materials such as Radilon® DT and Radilon® D offer improved chemical, corrosion and hydrolysis resistance, combined with reduced weight and long-lasting mechanical performance.

For more information download
the chemical resistance table for our product range.

Nautical Applications

Replacement of metal housing (left)
with engineering polymer housing (right)

Anchor winch reducer bodies

We have developed an innovative solution for windlass system reducer bodies by replacing traditional die-cast aluminium components with components made of **engineering polymers with high mechanical properties**. Advanced simulations offered by our **Engineering Service** were used to optimize design and **performance**.
The chosen material, **Radilon® DT** (PA612), guarantees high rigidity, resistance and greater durability over time, even in critical conditions such as prolonged exposure to salt water and lubricants.

Radilon® DT – PA612 glass-fibre-reinforced, with high mechanical properties, high chemical resistance and low moisture sensitivity.

Motorcycles

Motorcycles are playing an increasingly important role in **redefining urban mobility** by helping to reduce traffic congestion, streamline travel and lower pollutant emissions. In this evolving landscape, the choice of materials is critical to enhancing vehicle performance, safety and efficiency.
RadiciGroup develops advanced material solutions specifically for the motorcycle industry, enabling the production of **lighter, stronger and more visually appealing components**. Our innovative engineering polymers support the creation of high-performance, sustainable motorcycles that meet the demands of **modern mobility**.

Motorcycle Applications

Motorcycle fairings

For fairings and other aesthetic parts, **Radilon® Mixloy** materials provide **excellent appearance** while guaranteeing **outstanding mechanical properties**, particularly impact resistance.
Improved chemical resistance compared to other ABS/PA- or PC/ABS-based alloys is another key feature of **Radilon® Mixloy.**

Radilon® Mixloy S – PA6/ABS blend for injection moulding, also available with glass-fibre reinforcement and UV stabilization. High impact properties, high chemical resistance and low moisture sensitivity.

Structural motorcycle parts

For structural applications (e.g., rear frame support and for metal parts replacement), **Radilon®** and **Radistrong®** deliver **superior mechanical performance** and help to **reduce component weight.** Moreover, dedicated **UV-resistant formulations** are available.

Radilon® A – PA66 glass-fibre-reinforced with high mechanical properties.

Radistrong® A RV600W – PA66 special blend, high fluidity, 60% glass-fibre-reinforced, UV and heat stabilized with very high mechanical properties.

Brake and fuel lines

RadiciGroup offers high-performance materials specifically engineered for motorcycle brake cable covers. This application demands **excellent flexibility**, **strong chemical resistance** (particularly to gasoline and oils) and **UV stability** for long-term outdoor durability.
Materials like **Bionside®** bio-based polyamides meet these requirements and can also be extended to fuel line applications, thanks to their superior resistance to aggressive fuels such as gasoline. **Bionside®** not only ensures high performance but also results in a **lower environmental impact**.

Radilon® D 40P50K (Bionside®) – PA610 flexible, medium-high viscosity extrusion grade. Plasticized and heat stabilized. Suitable for extrusion of tubes and profiles. This grade is partially renewably-sourced (64% of base polymer by weight).

Bicycles and Micromobility

The rise of bicycles and micromobility is accelerating the shift towards **more sustainable urban transportation** — an evolution where material innovation plays a central role.
RadiciGroup is part of this change, offering **lightweight, high-performance and custom-made materials** designed to meet the specific needs of **next-generation mobility**.

Bicycles and Micromobility Applications

Rear swing-arm for e-bikes

RadiciGroup has developed an exciting **co-design project**, together with a bicycle manufacturer and a component producer, leading to the **creation of an innovative e-bike rear swing arm** made of glass-fibre-reinforced nylon instead of aluminium. This new component, which is 10% lighter and moisture resistant, improves shock absorption and aesthetics. The material is solution dyed, eliminating the need for painting and thus reducing environmental impact.

Radistrong® A RV500UK – PA66 special blend, high fluidity, 50% glass-fibre-reinforced, UV and heat stabilized.

Battery housing for e-bikes and e-motorbikes

As urban mobility moves increasingly towards electrification, **battery-powered vehicles** such as e-bikes and e-motorbikes are gaining ground. RadiciGroup supports this evolution with its Radiflam® **flame-retardant materials**, designed for battery housings of all sizes. These solutions combine **excellent processability** — even for thin-walled components — with **safety, efficiency and design flexibility**.

Radiflam® A FR – PA66 flame-retardant injection moulding grade. Halogen-and-red-phosphorus-free. UL 94 V-0 rated at 0.4 mm.

Radiflam® A RV250 HF – PA66 flame-retardant injection moulding grade. Halogen-and-red-phosphorus-free. 25% glass-fibre-reinforced.

Self-balancing electric vehicle

RadiciGroup developed specific materials for Genny Zero, a **self-balancing electric vehicle** designed for inclusive and sustainable mobility. Thanks to advanced polymers, the vehicle's weight dropped from 110 kg to 60 kg, improving performance and aesthetics without requiring paint.

Radistrong® A RV500UK – PA66 special blend, high fluidity, 50% glass-fibre-reinforced, UV and heat stabilized. Suitable for structural components like seating shells and frames.

Radilon® Mixloy S HSA20TUK – PA6/ABS blend for injection moulding. Also available with glass-fibre reinforcement and UV stabilization. High impact properties and high chemical resistance. Specifically designed for fairings and aesthetic parts.

RadiciGroup.
Inside your world.

RadiciGroup is among the world leaders in the manufacture of chemical intermediates, polyamide polymers and high-performance engineering polymers, including recycled and bio-based solutions. RadiciGroup products are the result of our outstanding chemical expertise and vertically integrated polyamide production chain and have been developed for use in a variety of industries, such as automotive, electrical and electronics, consumer and industrial goods, water management, transportation, household appliances and sport. At the core of the Group's strategy is our strong focus on innovation, quality and customer satisfaction – always in alignment with our ESG principles.

Sustainability

Every day at RadiciGroup, we work to make circularity our business model. We optimize the use of materials while fine-tuning our processes, designing out waste and promoting recyclability from the earliest product design phases. We are always looking for low-impact solutions in terms of natural resources and energy. We rely on certified management systems for Quality, Health and Safety, Environment and Energy to keep our companies in line with the highest sustainability standards. Since 2004, the Group has released its Sustainability Report every year.

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