MICHELIN

RESICARE

Beyond resin, innovation for life.

AEROSPACE & DEFENSE

Resi4 ABLATION

A unique, non-toxic[1] & renewable-carbon-based, araminolic resin engineered for ablative protection offering high charring performance under heat flux.

- Atmospheric re-entry bodies
- Heat shields
- Propulsion nozzles
- Fuselage structure parts

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Resi4 ABLATION

Araminolic resins provide a sustainable alternative to conventional thermosetting phenolics, formulated with unique, bio-based monomers that replace **formaldehyde** with **aromatic aldehydes** and **polyphenols.**

Resi4 ABLATION is a unique, bio-based[2] and formaldehyde-free araminolic resin with high temperature properties. While reducing use of CMR substances in your value chain, Resi4 ABLATION contributes to your sustainable roadmap, achieving CO_2 emission reduction & sovereignty goals with local sourcing.

Benefits and characteristics

High temperature resistance for aerospace and defense applications

Coke rate[3] **50% - 55%**

Solving toxicity issues in phenolic resins for your workers & a lasting peace of mind today and for the years to come

REACH compliant

Monomers **free of formaldehyde** and **phenol** by design

Free of CMR and **endocrine disruptors**

Water-based technology

Supports your company's sustainable development & sovereignty strategy

Approaching >90% bio-based formulation

Bio-based raw materials: **5HMF monomer**

Low CO_2 emissions[2]

European sourcing[2]

Advantages

No acute toxicity & serious health hazard pictograms VS **Formaldehyde, Phenol, Furfuraldehyde.**

Resi4 ABLATION
CO_2 emissions[2] (CO_2kg / kg)

(1)Formulated without chemicals meeting SVHC criteria (Substance of Very High Concern) as defined by European Chemicals Agency in date of 01/01/2026.

(2)Upon availability of our sugar-based monomers industrial demonstrators in 2027. Two of our first main industrial monomers demonstrators are based in France. The bio-based content is based on ISO 16620 guidelines based on internal data. CO2 emission's preliminary figures are based on internal data, compliant with iso 14044 guidelines. The variability of high and low values is depending of sugar sourcing.

(3)Coke rate – residu at 850°C > 50% (TGA – 10°C/min – nitrogen method).

Technical Data Sheet
Resi4 ABLATION

Applications:

- Atmospheric re-entry bodies
- Heat shields
- Propulsion nozzles
- Fuselage structure parts

Product: Resi4 ABLATION.

Description: Aqueous araminolic resin.

Presentation form: Red - brown liquid.

Benefits: Formol-free, phenol-free formulation. High coke rate.

Main application: Molded composites with high thermal stability.

Main method of implementation: Fiber impregnation, drying to evaporate the solvent (water), then thermocompression molding. The drying time and curing conditions during molding will need to be adapted to the product.

Main cross-linking: Thermocompression.

Duration of use and storage: 10 days at room temperature and 30 days at 4°C (Viscosity < 1500cP). Store in the freezer to extend shelf life (until 6 months). The viscosity can be adjusted by dilution in water or ethanol.

Handling precautions: This product must be used in accordance with the instructions in the Safety Data Sheet.

Characteristics of liquid resin

Property	Method	Unit	Measure
Viscosity at 20°C	Brookfield Viscometer	mPa.s	200 - 400
Dry matter	Moisture Analyzer – 100°C	%	50 - 52
pH	pH meter	-	11 - 12
Density	Pycnometer	-	1,25
Onset crosslinking	DSC – 10°C/min	°C	100 - 110
Peak temperature crosslinking	DSC – 10°C/min	°C	130 - 150
Enthalpy	DSC – 10°C/min	J/g	200 - 350
Coke rate – residu at 850°C	TGA – 10°C/min – nitrogen	%	> 50

Cross-linking method: The curing conditions must be adapted according to the size, geometry and composition of the piece.

Destruction and disposal: Cleaning of liquid resin with water. Disposal with basic aqueous waste.

Additional information: For further information, please reach out to us through the contact form on our website (https://resicare.michelin.com/contact/).

Did you know?
REACH regulation focus

I've heard about the REACH regulation...
Should I really worry about it? Does it impact my business?

Yes! Regarding the European directive 2004/37/EC, employers must reduce the use of CMR substances in the workplace. This must be done by replacing the hazardous substance with a safer alternative, if technically feasible!

Got it... Time to improve our chemistry for a safer future!

Sent by Pioneer customer

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CERTIFICATION UTAC ISO 9001 UTAC CERAM