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RESICARE

Beyond resin, innovation for life.

TRANSPORTATION

Resi4 TIRE

A unique, non-toxic-based araminolic resin[1] for the tire industry, offering high adhesive properties & solving toxicity issues in RFL solutions.

Resin for dipping solution for textile reinforcement

PET **RPET** **Nylon** **Aramid** **Rayon** **Tires**

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Resi4 TIRE

Araminolic resins serve as a sustainable alternative to conventional thermosetting phenolics, formulated with unique, bio-based monomers that replace formaldehyde, resorcinol, and phenol in adhesive applications.

Resi4 TIRE is a next generation, phenolic novolac resin developed for tire textile applications. Fully qualified by **MICHELIN** for adhesive resistance across all fiber types, it delivers the same level of performance with no changes to existing industrial processes. Approaching a formulation that is over **50% biobased**[2] and **100% non-toxic**[1], Resi4 TIRE offers a safe, sustainable alternative to traditional phenolic resins, free from CMR substances and endocrine disruptors, fully REACH-compliant, and designed to protect workers without compromising performance.

Benefits and characteristics

Plug & play technology qualified by MICHELIN

No reformulation needed and keep your know-how on your dipping solution.
1-for-1 replacement of RF resins: same chemical family.
Preserves your latex-compound specificity.

Equivalent **adhesion performance** to RFL-treated fabrics (fatigue, peel, green adhesion, stiffness).
Multi-fiber compatibility: PET, RPET, Nylon 6/66, Rayon, Aramid.

No process changes: same curing conditions (time, temperature, tension).
Progressive integration: can run alongside RFL systems. No need for full switch.
Compatible with **multiple rubber compounds.**

Solving toxicity issues in RFL solutions & offering regulatory peace of mind

Resi4 TIRE enhances operator safety by **avoiding CMR pictograms** and **endocrine disruptors.**

Fully **REACH-compliant formulation.**

Formulated without **formaldehyde**, **resorcinol**, **isocyanates, and epoxy** by design.

Free to operate

Absolute **freedom** to design **your own glue.**

Global sourcing: suppliers in both Asia and Europe.

Business continuity secured: dual sourcing strategy validated by a leading tire manufacturer.

Advantages

- **No acute toxicity & serious health hazard pictograms** vs **Formol.**


Acute toxicity


Serious health hazard

- **Strong Business Continuity Management** (BCM).

Technical Data Sheet
Resi4 TIRE

Applications:

Resin for dipping solution for textile reinforcement

PET | RPET | Nylon | Aramide | Rayon | Tires

Product: Resi4 TIRE

Description: Aqueous araminolic resin, Novolac type intended to replace historically used Resorcinol/Formaldehyde resins for bonding rubbers to textile reinforcements.

Presentation form: Brown liquid

Benefits: Formaldehyde-free, resorcinol-free, isocyanate-free. Identical performance to Resorcinol-Formaldehyde (RF) resins. No modification of formulations and bonding conditions.

Resi4 TIRE is compatible with latexes and additives available on the market to produce the RFL adhesive system (Resorcinol/Formaldehyde/Latex).

Main application: Bonding of textile reinforcements (Polyester, nylon, aramid, rayon) for rubber applications.

Main processing method: Impregnation

Usage and Storage Duration: After activation, Resi4 TIRE's shelf life is more than 12 hours if stored between 5°C and 30°C. As soon as the Resi4 TIRE is mixed with the latexes, the shelf life is like a standard RFL (between 3 days and 30 days).

Skid and pods: To produce the resin in the best conditions, ResiCare recommends using a Skid4 TEX. The Skid4 TEX is an equipment that allows the resin to be manufactured in-situ. This equipment, combined with Pod4 TEX (ready-to-use powder solution), enables the production of liquid resin in an aqueous phase.

Pod4 TEX
Monomer in powder

Skid4 TEX
Resinification

Resi4 TIRE

This liquid resin can then be mixed with different types of latexes (natural rubber latex-NR, Styrene/Butadiene dispersion-SBR, Styrene/Butadiene/Vinyl Pyridine dispersion VP, Acrylonitrile/Butadiene dispersion - NBR, Chloroprene dispersion- CR) to produce the glue with customer formulations.

Handling Precautions: This product must be used in accordance with the instructions from the Pod4 TEX and Resi4 TIRE Safety Data Sheet.

Liquid resin characteristics

Property	Method	Unit	Measure
Viscosity at 20°C	Brookfield Viscometer	mPa.s	1.95 - 4
Solid content	Thermobalance	%	8.30 - 8.80
pH at 20°C	pH meter	-	7.7 - 8.7

Generic adhesive characteristics

Adhesive: It is recommended to add the resin into the latex used by the customer. The insertion temperature of the resin into the latex should be between 10 and 30°C under mixing. Depending on the type of latex used, an adjustment may be necessary (e.g., pH).

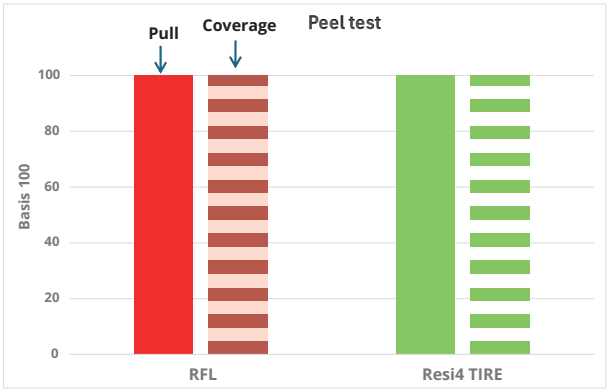
Property	Method	Unit	Measure
Viscosity at 20°C	Brookfield Viscometer	mPa.s	< 10
Solid content	Thermobalance	%	15 - 25
pH at 20°C	pH meter	-	9 - 11
Temperature/ Curing Time	-	-	Similar to RF resins

Adhesive performance

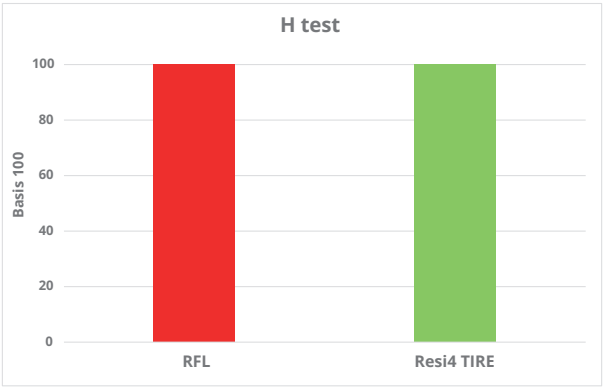
Iso performance RF / Resi4 TIRE on different reinforcement sizes.

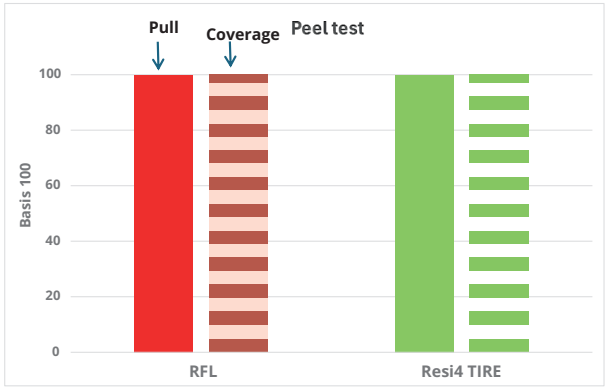
Adhesive performance on PET

H test: tensile test
Force and peeling appearance.

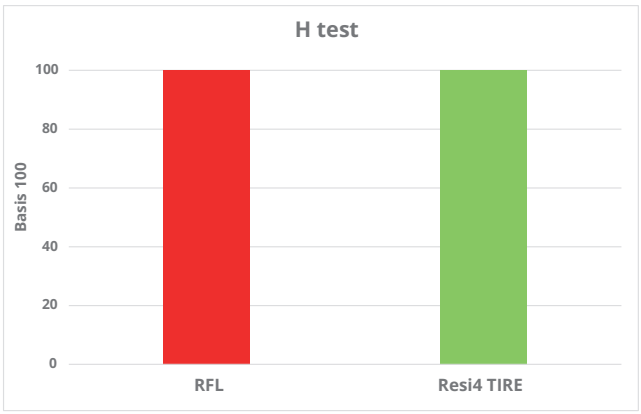


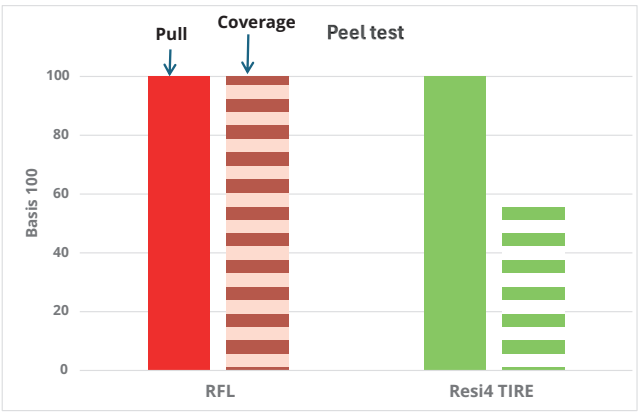
Adhesive performance on Nylon



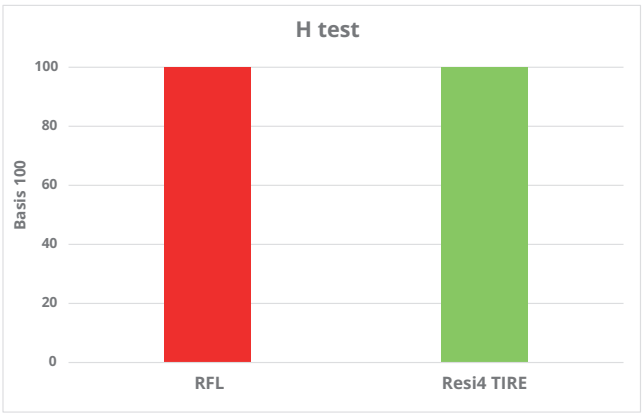


Adhesive performance on Rayon

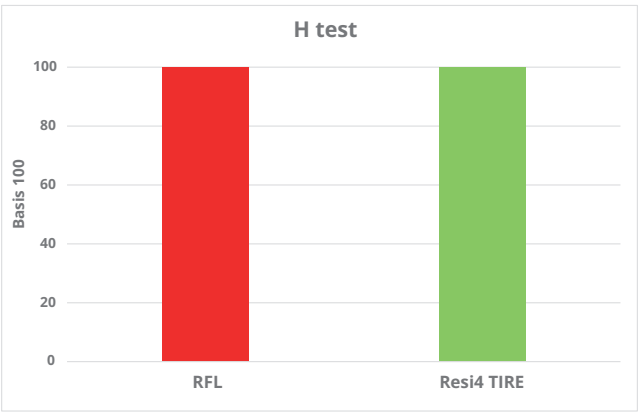


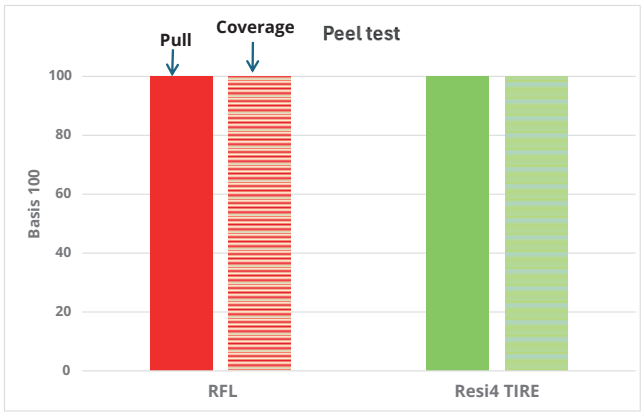


Adhesive performance on Aramid

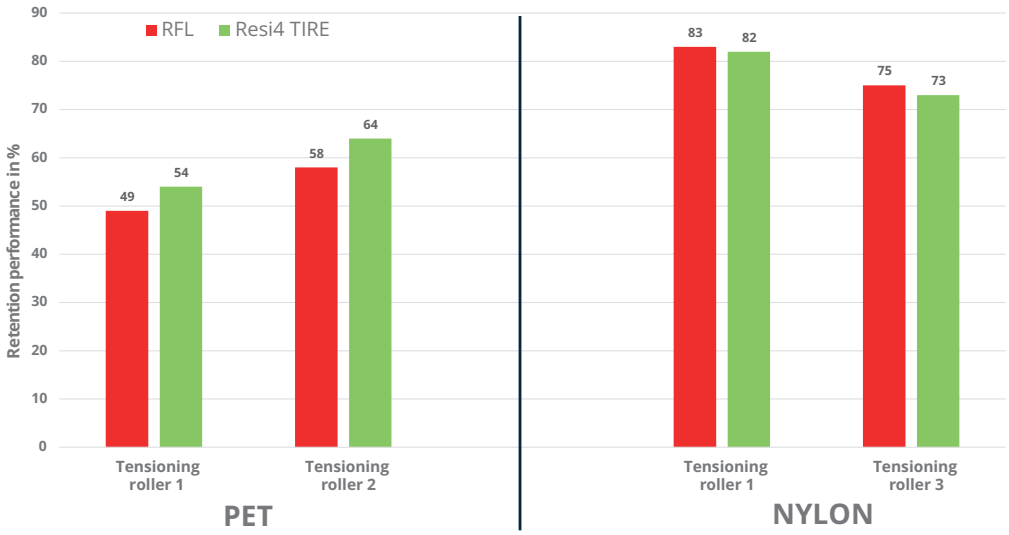


Adhesive performance on RPET



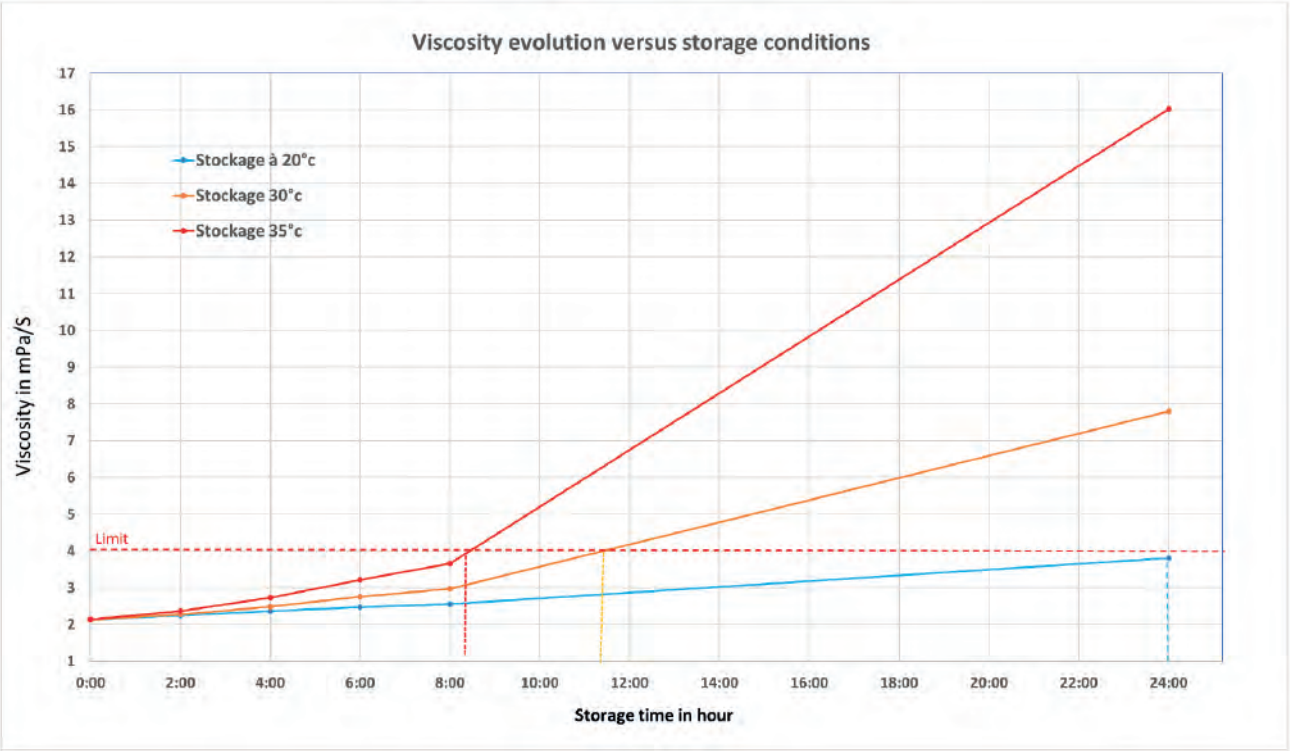


Shoe shine test (Endurance test) on PET and NYLON



Recommendations and Precautions

Resin: The Resi4 TIRE's shelf life is highly dependent on the storage temperature.



Disposal and evacuation: Disposal with basic water-based solutions.

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

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[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 biobased 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.

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Key figures

40kT
fabrics dipped with ResiCare resins

200M+
tires produced with Resi4 TIRE

40+
patents

15 years
of adhesion expertise

3
continents

Already working with us: INDORAMA VENTURES · HALEAD · HS HYOSUNG

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