

Koresin® – The tackifier for the rubber industry

 **BASF**

The Chemical Company

The connecting power of Koresin®

- Koresin is the industry benchmark with regard to
 - superior tack performance
 - processing flexibility
 - reliability
 - high quality and uniformity
- Production capacity expansion to ensure all future demands
- Koresin is the only formaldehyde-free phenolic tackifier in the market
- Over 70 years of product expertise



Your solution – Koresin®

The tackifier for high quality applications

Koresin is successfully applied in the manufacturing of

- quality and premium tires of all kind
 - for cars, trucks and special vehicles
 - for OEM, replacement and re-treading
 - in light, medium, heavy and speed use operations
 - in earth and air transport rubber compounds
- other industrial and technical rubber goods, such as
 - conveyor belts
 - power transmission belts
 - hoses
 - cable / roll coverings
 - lining materials



Your solution – Koresin®

When overall performance is key

Outstanding advantages

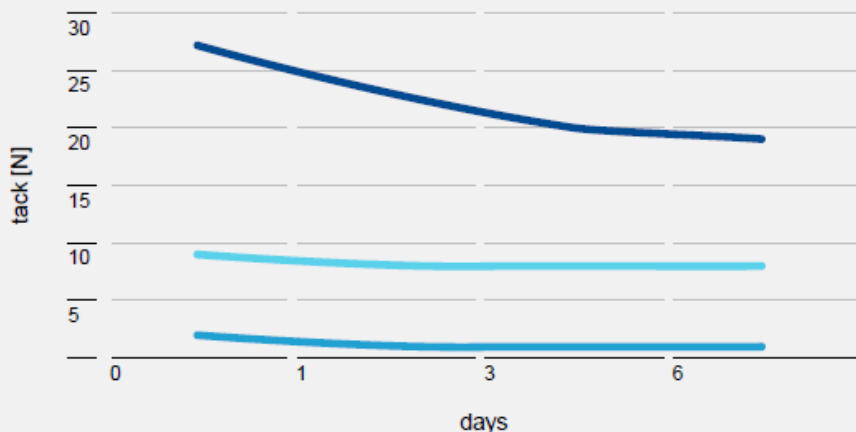
- High initial and long-term tackiness of rubber compounds
- Compatible with all current rubber formulations
- Processing flexibility
 - degree of tackiness can be adjusted
 - tackiness can be maintained for up to several weeks when needed
- Koresin has no negative influence on the
 - vulcanization kinetics
 - properties of the vulcanized rubber
- Proven effectiveness also in formulations with high loading of silica filler

Your solution – Koresin®

Reliable tack at desired level

Koresin allows fine-tuning of tackiness to achieve specific requirements

Adjustment of tackiness with Koresin



— Koresin 4 phr — Koresin 2 phr — Koresin 0 phr

Passenger tire sidewall:

(base formulation in phr)

Natural rubber 50

Butadiene-rubber 50

Carbon black 40

Silica 10

Plasticizing oil 10

Koresin 0 / 2 / 4



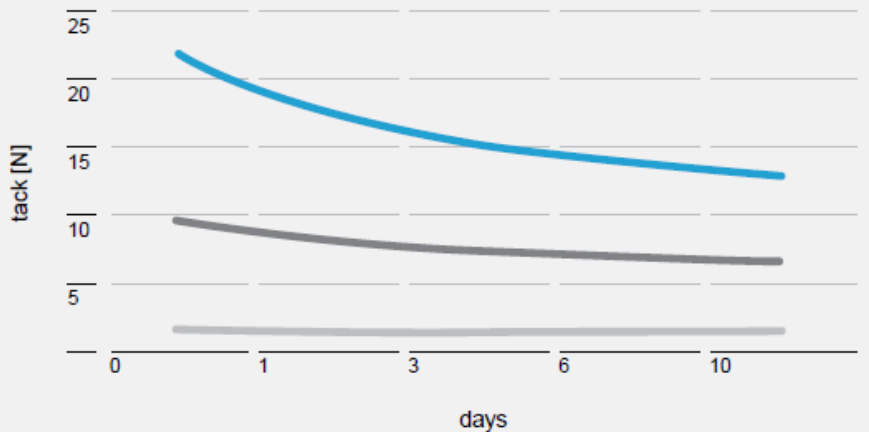
- A low loading of Koresin increased tack by 300%
- Higher loadings offer further significant improvement
- Tack is maintained over extended time periods

Your solution – Koresin[®]

Tack stability provides safer processing

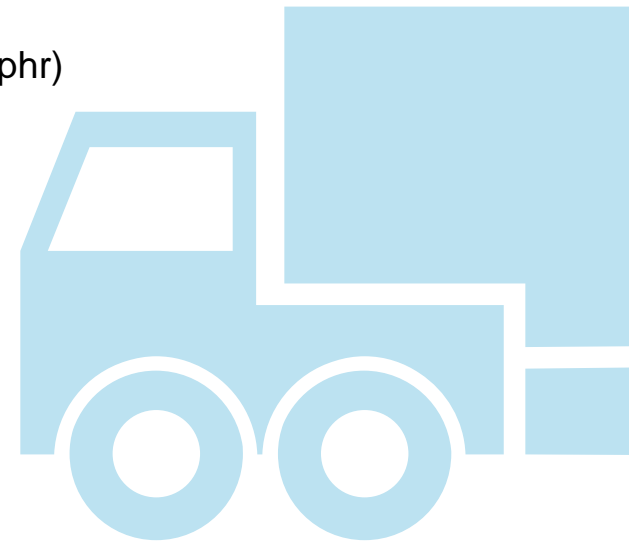
Koresin has excellent efficiency together with long-term performance compared to standard phenol-formaldehyde based tackifiers (PF resins)

Koresin: High performance tackifier



— Koresin 5 phr — PF resin 5 phr — w/o tackifier

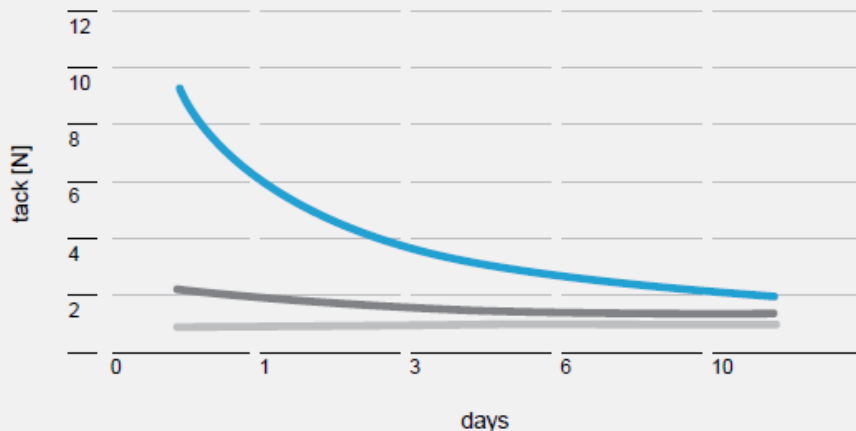
Truck tire tread:
(base formulation in phr)
Natural rubber 80
Butadiene-rubber 20
Carbon black 50
Plasticizing oil 4
Tackifier 0 / 5



Your solution – Koresin® For low rolling resistance tires

Koresin allows adjustment of tackiness according to the processing needs

Performance of Koresin in High-Silica /
Low rolling resistance tread formulation



Passenger tire tread:
(base formulation in phr)
Vinyl-SBR 70
Butadiene-rubber 30
Carbon black 40
Silica 80
Silan 8
Carbon black 10
Plasticizing oil 20
Tackifier 0 / 5



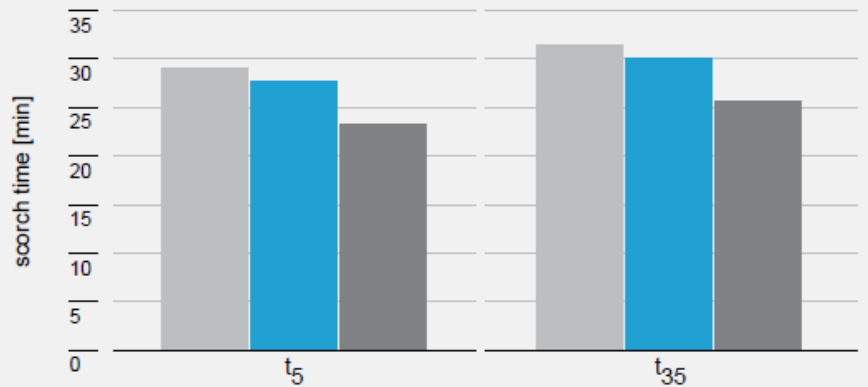
— Koresin 5 phr — PF resin 5 phr — w/o tackifier

Your solution – Koresin®

Minor effect on vulcanization kinetics

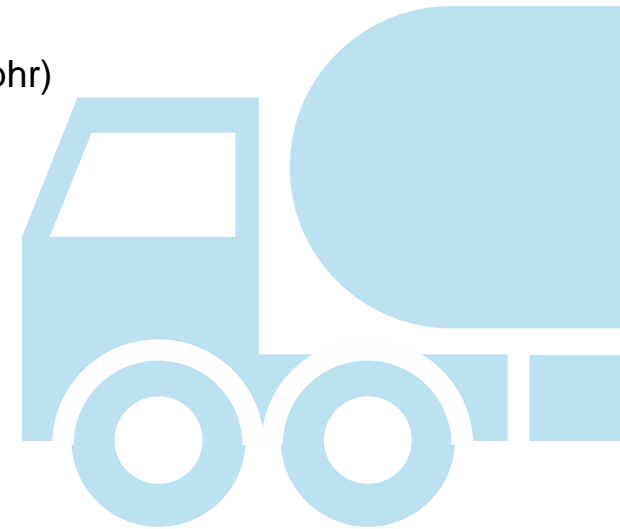
Koresin has a lower scorch influence compared to standard phenol-formaldehyde resins

Koresin minimizes impact on scorch time



— Koresin 5 phr — PF resin 5 phr — w/o tackifier

Truck tire tread:
(base formulation in phr)
Natural rubber 80
Butadiene-rubber 20
Carbon black 50
Plasticizing oil 4
Tackifier 0 / 5

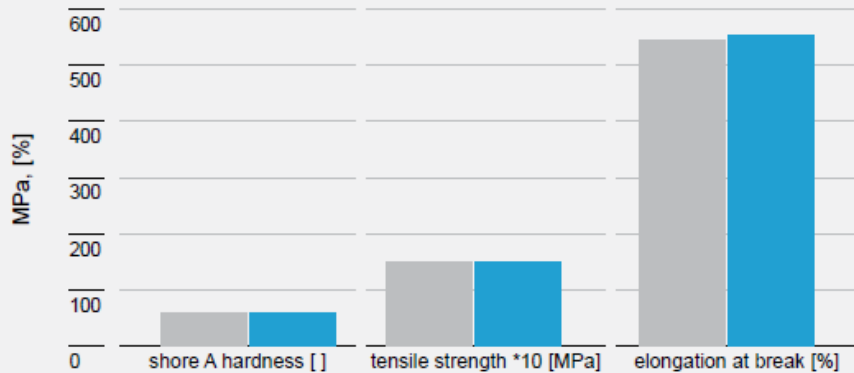


Your solution – Koresin®

No effect on mechanical properties

Koresin does not reduce hardness. Tensile strength and elongation are maintained and maybe improved by use of Koresin

Koresin does not affect the physical properties of rubber



 Koresin 4 phr  w/o tackifier

Passenger tire sidewall:

(base formulation in phr)

Natural rubber 50

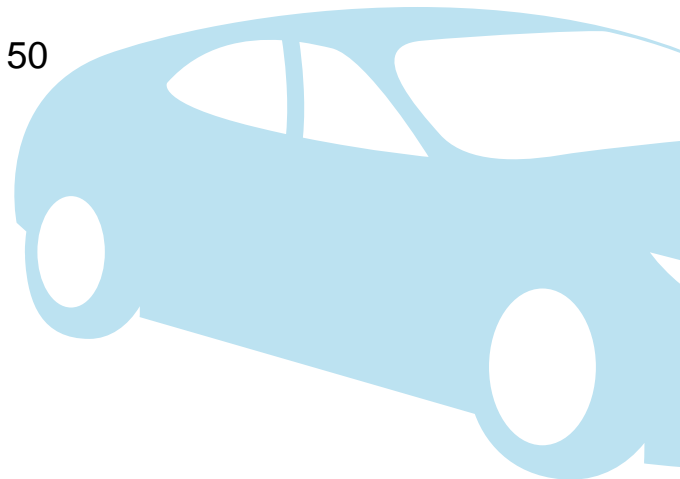
Butadiene-rubber 50

Carbon black 40

Silica 10

Plasticizing oil 10

Koresin 0 / 4



Your solution – Koresin®

Sustainability and reliability included

Global supply security is vital

BASF constantly challenges all related processes to best meet customers' expectations in terms of

- sophisticated raw materials sourcing
- compliance with the highest safety standards in each step of manufacturing
- professional logistics and warehousing facilities around the globe
- installed Quality and Risk Management Systems along the complete Supply Chain including a scenario-based inventory plan



Your solution – Koresin®

Worldwide availability

- Produced at BASF's Ludwigshafen plant
- Production facility also comprising a pelletizing and packaging line
- Pellets in 25-kilogram bags and super-sacks/big bags
- Delivered on plastic pallets
- Available worldwide



Your solution – Koresin®

Modern production facility

BASF currently invests into a new production line for Koresin at its integrated production site in Ludwigshafen

- Koresin capacity will increase by 50 %
- Dual-train production to better meet Koresin customers' needs
 - satisfaction of demand in rising high-end rubber applications
 - optimization of supply security
- Expansion scheduled to be completed by 2015



Your solution – Koresin[®]

Specifications and properties

Specifications

Test criteria	Specification	Test method
Ubbelohde dropping point	140 – 160 °C	DIN 51801
Ring and ball softening point	135 – 150 °C	DIN 52011
Solubility in hydrocarbons	soluble	BASF method

Properties

Physical form	yellow to brown pellets
Odor	almost odorless
Softening point (ball and ring/DIN 52011)	135 – 150 °C
Dropping point (Ubbelohde/DIN 51801)	140 – 160 °C
Density (20 °C)	1.02 – 1.04 g/cm ³
Solubility	soluble in hydrocarbons



Your solution – Koresin®

The tackifier to meet YOUR expectations

YOUR Tackifier

in high performance rubber applications.

YOUR Solution

when overall performance is key.

YOUR Satisfaction

sustainability and reliability included.





The Chemical Company