Technical Leaflet

TI/ES 1010 e
November 2000

Supersedes edition dated June 1999

Koresin®

Tackifier for the rubber industry

Chemicals

BASF

Koresin

Chemical composition	Condensation product of butylphenol and acetylene

Properties

Physical form	yellow to brown pellets and powder
Odour	almost odourless
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
Storage stability	10 years

Applications

Koresin is recommended for the production of unvulcanized rubber mixtures that have a high degree of tackiness, e. g. for the manufacture of tyres, materials for retreading, conveyor belts, V-belts, industrial tubing, cable and roll coverings, and lining materials. The product imparts very good short-term or long-term tackiness to mixtures of natural and synthetic rubbers. The adhesive strength lasts for several weeks. Under normal conditions it does not affect vulcanization.

Koresin improves the resistance of rubber goods to ageing, which is caused by exposure to heat and dynamic load. It promotes extrudability and produces optimum dispersion of carbon black, thereby reducing abrasion. The storage stability of mixtures is unaffected.

We recommend additions of 2 to 5 phr for mixtures. The physical characteristics of the vulcanized rubber remain nearly unchanged within these amounts.

Maximum effect is obtained in roll mixing by adding Koresin at the start of processing. In this way, homogeneous dispersion of the softened tackifier is ensured. Otherwise, the product acts as a filler in the mixture and does not unfold its tackifying action. The plasticizers that are found in almost all rubber formulations will reduce the softening point of the resin by means of their dissolving action. Koresin can be added along with plasticizers and fillers to the internal mixer at temperatures exceeding 130 °C. Therefore, processing of rubber mixtures containing it will not present any problem. Koresin plasticizer-melts are suitable for rubber batches of low plasticity, which generate only minimal heat during mixing. The plasticizer-melts can be produced by heating the components.

A 2 – 30 % solution of Koresin in hydrocarbons can be used as an adhesive for two layers of rubber. However, for the formation of a proper adhesive bond, care must be taken to ensure that the uppermost layer of the rubber is dissolved in the Koresin solution. The bond is made homogeneous by vulcanizing the rubber mixture. This type of solution is suitable for improving the adhesion of rubber to fabric and metal, and for rubber lining materials.

Koresin powder is a suitable material for elastomers of very low tack. A typical application is the storage of semi-finished products.

We measure adhesive strength with the *Ketjen-Tackmeter* (Rontgen-Apparatefabriek Delft, the Netherlands). Thin layers of the mixes to be tested are laminated onto woven cotton fabric to prevent their stretching during measurement. Before being measured, the laminated sheets are cut into strips which are then stored for different lengths of time ranging between 0 and 10 days. During the measuring process itself, two strips are pressed together for 30 seconds under a pressure of 20 N. The strips

are separated by a Teflon® sheet in which there is an aperture measuring 3 or 6 mm x 18 cm. This is the contact area on which the measurements are based. The pressure is released and 10 seconds are allowed to elapse before the strips are separated. The force necessary for separation is a measure of the adhesive strength. As a base for comparison, we chose the following low-tack mixture.

50 pts SBR 1707
50 pts SBR 1500
50 pts Carbon Black N 765
20 pts Talcum
15 pts Polybutadiene plasticizer

The results below, which are expressed in N, were obtained with the Ketjen-Tackmeter (Pressure 20 N, aperture 6 mm).

	imme-diately	after 1 day	after 3 days	after 6 days
no addition	34	6.8	6.5	6.0
2 phr Koresin	34	10.0	8.0	6.0
4 phr Koresin	36	34.0	32.0	32.0

Examples

The effect of Koresin in rubber mixtures as described above shall be demonstrated with two examples of tyre formulations.

Passenger tyre tread

	parts
S-SBR (Buna VSL 5025-1 HM)	96
BR (Buna CB 11)	30
Silica (Ultrasil 7000)	80
TESPT (Si 69)	6.4
zinc oxide	3
Stearinsäure	2
Aromatic oil	10
IPPD	1.5
Sulfur	1.4
CBS	1.7
DPG	2

Koresin (parts)	0	2	4
Adhesive strength (N)			
immediately	18	33	38
after 1 day	5	21	33
after 3 days	4	19	27
after 6 days	2	14	21
Shore A hardness	68	69	67
Tensile strength (Mpa)	11.3	11.1	11.0
Elongation at break (%)	419	422	428
DIN Abrasion (mm^3)	112	110	108
tanδ 0 °C	0.157	0.179	0.191
tanδ 60 °C	0.104	0.115	0.118
1/G′ 0 °C	0,090	0,105	0,106

The mechanical properties, which have been measured at the vulcanized samples, remain nearly unchanged by the addition of Koresin. The well known effect of increasing ice traction and wet traction of carbon black filled tyre treads by Koresin has been confirmed by the dynamic values 1/G′ at 0 °C and tanδ at 0 °C also for this example of a silica filled tyre tread.

Passenger tyre sidewall

	phr
NR RSS 1	50
BR (Taktene 1220)	50
Carbon black N 326	40
Silica (Ultrasil 7000)	10
TESPT (Si 69)	0.5
Zinc oxide	3
Stearic acid	1.7
Aromatic oil	10
IPPD	3
TMQ	1
Wax (Ozonschutzwachs 111)	1.5
TBBS	1.2
Sulfur	1.7

Koresin (phr)	0	2	4
Adhesive strength (N)			
immediately	2	9	27
after 1 day	1	8	23
after 3 days	1	8	20
after 6 days	1	8	19
Shore A hardness	57	57	56
Tensile strength (Mpa)	14.6	14.9	
Elongation atbreak(%)	540	574	
Tear resistance (N/mm)	29	33	

Safety

We have not heard of any ill effects that could have resulted from using Koresin for the purpose for which it is intended and from processing it in accordance with current practice.

According to the experience that we have gained over many years and other information at our disposal, Koresin does exert any harmful effects on health, provided that it is used properly, due attention is given to the precautions necessary for handling chemicais, and the information and advice given in our Safety Data Sheet are observed.

Note

The information submitted in this publication is based on our current knowledge and experience. In view of the many factors that may affect processing and application, these data do not relieve processors of the responsibility of carrying out their own tests and experiments; neither do they imply any legally binding assurance of certain properties or of suitability for a specific purpose. It is the responsibility of those to whom we supply our products to ensure that any proprietary rights and existing laws and legislation are observed.

BASF Aktiengesellschaft
Marketing Spezialamine
67056 Ludwigshafen, Germany

BASF

Printed in Germany