

Cohedur® RDL

Specialty and Standard Chemicals

Function

Cohedur® RDL is a direct bonding agent for rubber to fabric and rubber to steel cord bonding.

Product description

Composition: 1/3 resorcinol, 1/3 hexamethoxymethylmelamine ether (HMMM), 1/3 silica
Appearance: white to red brown powder, may contain soft lumps (may change during storage)
Density: approximately 1.5 g/cm³

Property	Nominal value	Unit	Test method
Nitrogen content	7.7 ± 0.7	%	37 E
Ash content	30.7 ± 3.0	%	ASTM D 4574

Use

Mode of action: Cohedur® RDL is a direct bonding agent for rubber to reinforcing materials, e.g. fabrics, steel cord and glass fibers. It is employed as an additive to the rubber compound. Typical applications include tires, conveyor belting, V-belts, reinforcing hose, air springs, flexible containers and fabric proofing's.

Cohedur® RDL can be used with most types of rubber. Best adhesion is obtained either with polar and unpolar elastomers, such as NBR, HNBR, CR, NR, IR, SBR and BR. Oil-extended elastomers can yield inferior results as also highly saturated polymers, e.g. IIR and EPDM, develop a considerably lower adhesion level.

Fibers, such as cotton, rayon, polyamide, polyester (with special spin finish) and glass can be firmly adhered to rubber by using Cohedur® RDL in the rubber mix. For steel cord the bond strength increase in the order raw, zinc plated and brass-plated steel.

Processing: The recommended level of addition is 6 - 8 phr Cohedur® RDL for optimum adhesion results. Where rubber-textile bonding is concerned, it is necessary to use 10 - 30 phr silica (e.g. Vulkasil® S). In the case of rubber-steel cord bonding, the amount of silica should be 5 - 10 phr.

Addition of carbon blacks generally does not interfere directly with the bonding system, but may have some affect as a result of the influence on the mechanical properties of the rubber. Large amounts of light-colored fillers in addition to the silica should be avoided. If their use is necessary, whiting, quartz flour and diatomaceous earth should be employed rather than hard or soft clays and alumina.

In light-colored compounds, Cohedur® RDL will cause a brown-orange discoloration, which can be toned down by incorporation titanium dioxide. Levels of up to 30 phr do not impair adhesion seriously.

A very important aspect is the selection of the curing system. Accelerators must be chosen to permit sufficient flow time for adhesion development before the scorch has proceeded too far. Ultra and semi-ultra accelerators must therefore be avoided, while sulfenamides, with their delayed curing action, are particularly useful. Vulkacit® DZ (DCBS), for example, is especially suitable for bonding rubber to steel cord. The level of sulfur can also effect adhesion properties. It is recommended to employ 1.5 - 2.5 phr for fabrics and at least 4 - 5 phr to develop optimum results on steel cord. The addition of 5 phr zinc oxide and 1.5 - 3.0 phr stearic acid is favorable for full effectiveness of the Cohedur® system and the additional use of 1 - 3 phr lead oxide (PbO) improves the adhesion to zinc plated and raw steel cord still further. Plasticizers do generally not impair adhesion at levels of up to 20 phr. Aromatic and naphthenic oils should be given preference over paraffinic oils.

It is recommended to add Cohedur® RDL at the end of the mixing cycle at the lowest possible temperature. Excessively high temperature will result in premature resin formation detracting from the final adhesion. The disadvantage of pure resorcinol, such as dust formation and poor dispersion or the risk of blooming and sublimation, are eliminated by using Cohedur® RDL. As Cohedur® RDL is a dry liquid made from liquid active ingredients, it is easy to disperse, even at low temperatures. No special precautions must be taken with polychloroprene, since Cohedur® RDL is a resorcinole derivative it will not show the strong crosslinking effect resorcinole can have.

For best adhesion results compounds should be calendered or extruded to the reinforcing material, assuring sufficient pressure for deep penetration. Vulcanization may be carried out by hot-air, steam or press-curing. The latter method is the most desirable, since the pressure forces the compound into the fabric structure during the curing process, assuring optimum adhesion. Curing temperature between 135 - 170 °C are suitable for vulcanizing Cohedur® containing compounds. Overcuring has little effect on the bond strength and in some special cases, e.g. for natural rubber/polyamide fibre structures, overcuring is required to produce the best results.

Vulcanizate Properties: The addition of Cohedur® RDL improves physical properties, such as tensile strength, modulus and hardness, while elongation at break and tear resistance are slightly reduced.

The brown-orange discoloration of light-colored compounds does not produce a staining effect or migrate into adjacent rubber layers not containing Cohedur® RDL.

Dosage: Typical levels of addition based on 100 parts by weight of elastomer are:

Cohedur® RDL	6 - 8 phr
Vulkasil® S with textile	10 - 30 phr
Vulkasil® S with steel cord	5 - 10 phr

Solubility

Cohedur® RDL (active ingredients only) is soluble in alcohols, ethyl acetate, acetone, methyl ethyl ketone and tetrahydrofuran. It is practically insoluble in water, aliphatic hydrocarbon, toluene and chlorinated solvents.

Packaging

20 kg package on 480 kg skid.

Storage stability

In original closed containers under cool (below 20 °C) and dry conditions 91 days after delivery.

Handling

For additional handling information on Cohedur® RDL please consult current safety data sheet.

These raw material properties are typical and, unless specifically indicated otherwise, are not to be considered as delivery specification.

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