

Vulcuren®

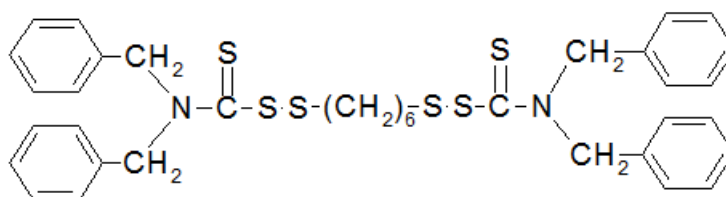
Specialty and Standard Chemicals

Function

Vulcuren® is a hybrid crosslinker for the production of highly reversion-stable vulcanisates of NR, IR, SBR and BR and their blends.

Product description

Composition: 1,6-bis(N,N-dibenzylthiocarbamoyldithio)-hexane

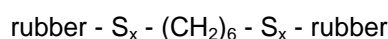


Appearance: light yellow to white powder, oil coated
 Density: approximately 1.3 g/cm³
 Oil content: approximately 7.0 %
 Ash content: approximately 3.4 %

<u>Property</u>	<u>Nominal value</u>	<u>Unit</u>	<u>Test method</u>
Assay	87 ± 3	%	431 A

Use

Mode of action: Vulcuren® is a bifunctional crosslinker for diene rubbers such as NR, IR, SBR and BR and their blends. During sulfur vulcanization in the presence of Vulcuren® thermodynamically stable, flexible hybrid crosslinks are formed, which have the following structure ($x \leq 3$):



Diene rubber vulcanizate crosslinked with a conventional or semi-efficient sulfur crosslinking system exhibit a gradual reduction in the crosslink density at higher vulcanisation temperatures and/or longer vulcanization time which results in a deterioration of their mechanical and dynamic properties. The same effect is observed at high dynamic vulcanizate stress. This process is called reversion. During reversion, polysulfidic crosslinks are broken and more thermally stable mono- and disulfidic crosslinks are generated, which, of course, have inferior dynamic properties compared to the polysulfidic crosslinks. Also the formation of various intramolecular, cyclic and pendant groups containing sulfur and the formation of free zinc sulfide is observed.

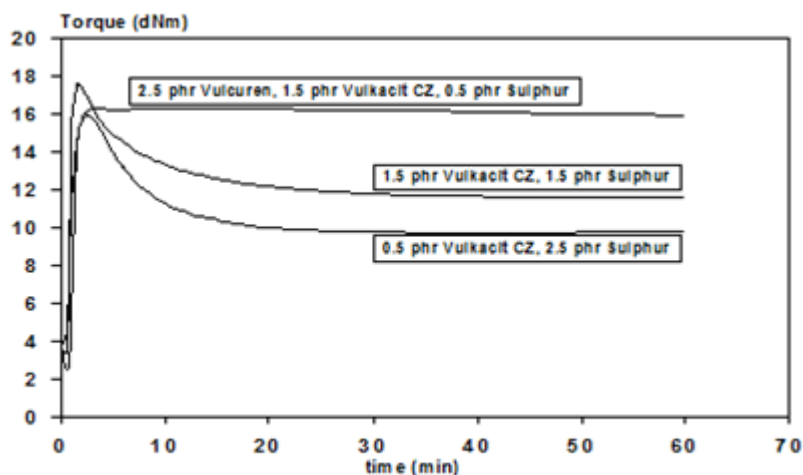
The presence of hybrid crosslinks in vulcanizates crosslinked with Vulcuren® increases the reversion resistance and combines uniquely high thermal stability with high flexibility.

Processing: Vulcuren® can be easily mixed into the rubber in an internal mixer or on a two-roll mill. At mixing temperatures above 92 °C the material melts during processing.

Vulcuren® may be added in the first mixing stage or it may be added with accelerators and sulfur at the final stage of mixing. If the material is added in the first, non-productive mixing step, a slight reduction in scorch safety is observed. This does not affect the mechanical and dynamic properties of the vulcanizate.

Vulcanizate Properties: Vulcuren®, by forming thermodynamically stable, flexible hybrid crosslinks, gives the rubber vulcanizate outstanding properties. The presence of hybrid crosslinks increases the reversion resistance found on overcure, high temperature cure and anaerobic ageing with conventional and semi-efficient vulcanizates. Vulcanizates crosslinked with Vulcuren® show excellent retention of static and dynamic modulus, tensile strength, tear strength, hardness, resilience, compression set, heat build-up and creep in the Goodrich Flexometer test, and of the loss factor tan α .

The Rheometer curve of a carbon black-filled NR compound at 180 °C crosslinked with 2.5 phr Vulcuren® and 0.5 phr sulfur shows the outstanding reversion stability of this vulcanizate in comparison with vulcanizates crosslinked with a conventional or semi-efficient sulfur crosslinking system.



Dosage: When using a conventional or semi-efficient sulfur curing system with mercaptobenzothiazoles and/or sulfenamides for NR, IR, SBR and BR or their blends, the recommended dosage for Vulcuren® is 0.5 - 3.0 phr. To maintain comparable crosslinking density, the usual amount of sulfur should be reduced.

When the product is used alone without sulfur, the dosage should be increased to 7.0 phr to obtain a satisfactory network density. In this case, the use of accelerators is not necessary.

Packaging

17.5 kg paper bag on 595 kg skid.

Storage stability

In original closed packaging under cool (approximately 25 °C) and dry conditions 730 days from date of production.

Handling

For additional handling information on Vulcuren® 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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