Vulkanol® TOF

Function
Vulkanol® TOF is used in plastic and rubber polymers as non-corrosive flame retardant, due to his extreme low glass transition temperature it is also a wet and ice grip improver in silica filled passenger car tread formulations.

Product description
Composition: tris(2-ethylhexyl)phosphate (TOF)
Appearance: clear, almost colorless liquid

<table>
<thead>
<tr>
<th>Property</th>
<th>Nominal value</th>
<th>Unit</th>
<th>Test method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assay</td>
<td>≥ 98.5%</td>
<td>%</td>
<td>gas chromatography</td>
</tr>
<tr>
<td>Refractive index (at 20 °C)</td>
<td>1.444 ± 0.001</td>
<td>---</td>
<td>DIN 51 423</td>
</tr>
<tr>
<td>Viscosity (at 20 °C)</td>
<td>14 ± 1</td>
<td>mPa.s</td>
<td>DIN 53 015</td>
</tr>
</tbody>
</table>

Use
Mode of action: As phosphorous chemical Vulkanol® TOF itself is a non-flammable substance. By replacing flammable mineral oils the resistance of articles is improved. As non-corrosive flame retardant Vulkanol® TOF can be used alone but mainly in combination with other flame retardants. Vulkanol® TOF has an extreme low glass transition temperature. In highly filled silica tread formulations based on S-SBR the product improves mainly the wet and ice grip of the tire in combination with better the rolling resistance.

Processing: Vulkanol® TOF is readily mixed into the rubber compounds. The compound viscosity and scorch safety is not effected using Vulkanol® TOF as replacement for mineral oils. The vulcanization time of the compound is shorter.

Vulcanizate Properties: By replacing mineral oils Vulkanol® TOF has no effect on mechanical properties like hardness or modulus, the abrasion resistance can be improved, rebound elasticity is higher with positive effect on wet and ice grip as also rolling resistance.

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

- NBR (e.g. Perbunan®, Krynac®) 10 phr
- CR (e.g. Baypren®) 10 phr
- NR 20 phr
- SBR (e.g. Buna® SE, Buna® VSL) 15 phr
- IIR 20 phr
Packaging
195 kg metal drum on 780 kg skid or 950 kg IBC.

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

Handling
For additional handling information on Vulkanol® TOF 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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