Sasobit –
the versatile additive
for asphalt mixes

Product information
**Sasobit** – reliable quality for highest standards

Traffic volumes in Europe will continue to increase in the years to come, as will the demands made of asphalt mixes. With **Sasobit** you are well prepared to master future challenges.

**Sasobit** is a synthetic hard wax that is free from sulphur and other impurities. It has been used successfully worldwide since 1997.

**Sasobit** ensures complete process reliability for all asphalt applications at all times – including under adverse conditions.

Even the most demanding asphalt applications, e.g. heavy-duty asphalt mixes for airports or container terminals, will work with an additive as versatile as **Sasobit**.

On top of that, all asphalt mixes can be produced and placed at reduced temperatures when using **Sasobit**, protecting resources and saving costs.

**Sasobit** is the versatile additive, which is perfectly suited for all asphalt applications and ensures highly durable asphalt pavements.

- enhanced workability
- improved process reliability
- temperature reduction (Warm Mix)
- increased stability
- extended service life

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**Sasobit®**
One product – many benefits
Working principle: *Sasobit’s effect on bitumen viscosity*

Mixing and paving temperatures can be reduced by as much as 30 K when using *Sasobit*, because at temperatures above 115 °C *Sasobit* is completely soluble in bitumen and reduces viscosity significantly. Reduced viscosity at standard temperatures enhances the workability of the asphalt mix. *Sasobit* increases process reliability and significantly reduces the risk of improper paving operations.

During the cooling phase *Sasobit* starts to crystallize at 90 °C and forms a lattice structure in the bitumen which has a stiffening effect (the frequently cited congealing point of 100 to 105 °C refers to pure *Sasobit*). Deformation resistance increases significantly when adding the appropriate quantity of *Sasobit*, without impairing low-temperature performance.
Process reliability at all times

Process reliability increases when adding only 1.5% Sasobit by weight of bitumen – from the production to the extended period of use and eventual reuse. So it is no surprise that Sasobit has been successfully used for years, even under difficult conditions.

Sasobit improves workability, and this has the following benefits:

- Reduces the risk of compaction failures especially when using very hard and highly viscous bitumen
- Good workability even during poor weather conditions without any additional compaction/without increasing mixing temperatures
- More effective compaction down to the critical paving temperature range
- Extended construction season because weather conditions matter less
- Easier manual application

Ease of use

In principle we recommend ready-to-use Sasobit-modified bitumen. But it is also possible to add Sasobit directly at the mixing unit:

- Melting system
- Ejector system
- Modification in the bitumen tank
- Modified fibre pellets
- Direct addition to the mix together with the bitumen or afterwards

Sasobit can be stored in a solid state and should be used within 10 years. No additional safety precautions are needed for storage or handling.

Regulations for paving temperatures

According to technical rules there are minimum ambient temperatures for paving asphalt mixes. These requirements often cannot be met in spring and autumn. Our advice for poor weather conditions: benefit from Sasobit’s viscosity-reducing effect and place your asphalt mixes at standard mix temperatures.
Asphalt mix performance – with a 3 % addition

Asphalt mix performance is usually defined as deformation resistance as well as cold-crack and fatigue-crack resistance. Optimal compaction enhances performance.

A 3 % modification with Sasobit increases process reliability and ensures optimal compaction. In combination with the stiffening effect in the service temperature range Sasobit therefore greatly improves pavement performance – road durability increases in line with pavement performance.

Countless construction projects which have been carried out since 1997 demonstrate that Sasobit provides longer pavement service life. This means significantly lower maintenance costs and ensures sustainable and resource-saving road construction projects.

Sasobit has also yielded outstanding results – mostly as co-modification of PmB – when using it for heavy-duty asphalt pavements. Such asphalt mixes are used for areas under high dynamic and static loads.

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**Hamburg Wheel-Tracking-Test SMA 11 S**

<table>
<thead>
<tr>
<th>Rut depth [mm]</th>
<th>Cycles</th>
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<tbody>
<tr>
<td>0</td>
<td>0</td>
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<tr>
<td>1</td>
<td>5,000</td>
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<tr>
<td>2</td>
<td>10,000</td>
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<td>3</td>
<td>15,000</td>
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<tr>
<td>4</td>
<td>20,000</td>
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</tbody>
</table>

- 50/70 + 3 % Sasobit (SmB 35)
- 50/70

Less rutting

After 20,000 cycles, a reduction in rut depth values by 4 mm was measured.

Source: Asphalt-Labor Arno J. Hinrichsen

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**Less government spending**

Sasobit is being used for a growing number of public road construction projects. The extended service life and lower maintenance costs ease strain on budgets.

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**Hamburg Wheel-Tracking-Test AC 16 B S**

<table>
<thead>
<tr>
<th>Rut depth [mm]</th>
<th>Cycles</th>
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<tbody>
<tr>
<td>0</td>
<td>0</td>
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<tr>
<td>1</td>
<td>5,000</td>
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<tr>
<td>3</td>
<td>15,000</td>
</tr>
<tr>
<td>4</td>
<td>20,000</td>
</tr>
</tbody>
</table>

- NV RC 10/40-65 A

“Black concrete”

Even after 20,000 cycles at 60 °C, rut depth was only 1.1 mm.

Source: Asphalt-Labor Arno J. Hinrichsen

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* Steel wheel in water bath at 50 °C

* Steel wheel in water bath at 60 °C
# Recommended Dosage of Sasobit

<table>
<thead>
<tr>
<th>Application</th>
<th>Recommended dosage for Sasobit in M. - % by weight of bitumen</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1,0</td>
</tr>
<tr>
<td>Improved Workability</td>
<td></td>
</tr>
<tr>
<td>Temperature Reduction</td>
<td></td>
</tr>
<tr>
<td>Process Reliability/ Risk Minimization</td>
<td></td>
</tr>
<tr>
<td>Stability</td>
<td></td>
</tr>
<tr>
<td>Heavy Duty Asphalt Mixes</td>
<td></td>
</tr>
</tbody>
</table>

**Sasobit**

*One product – many benefits*
Specifications for asphalt mix design

**Sasobit** influences bitumen parameters as a function of the quantity added and the base bitumen.

The addition of **Sasobit** has no noticeable effect on low-temperature performance and improves deformation resistance. This combination extends the plasticity range and leads to a wider service temperature interval.

The characteristics of bitumen modified with **Sasobit** have to be taken into account when designing asphalt mixes. It makes sense from an engineering and cost-efficiency point of view to use softer base bitumen, especially in harder systems.

Lab tests and practical experience demonstrate that the performance of a softer bitumen grade mixed with **Sasobit** is at least comparable with the performance of the originally specified bitumen grade. On top you will gain all the other benefits of mixes modified with **Sasobit**.

**Comparison of characteristics:**
**Sasobit-modified bitumen (SmB) and non-modified bitumen**

<table>
<thead>
<tr>
<th></th>
<th>70/100</th>
<th>SmB&lt;sup&gt;1&lt;/sup&gt; 45</th>
<th>50/70</th>
<th>SmB&lt;sup&gt;1&lt;/sup&gt; 35</th>
<th>30/45</th>
<th>SmB&lt;sup&gt;1&lt;/sup&gt; 25</th>
</tr>
</thead>
<tbody>
<tr>
<td>Penetration at 25 °C</td>
<td>1/10 mm</td>
<td>70 – 100</td>
<td>35 – 55</td>
<td>50 – 70</td>
<td>30 – 50</td>
<td>30 – 45</td>
</tr>
<tr>
<td>Softening Point R&amp;B</td>
<td>°C</td>
<td>43 – 49</td>
<td>70 – 80</td>
<td>48 – 54</td>
<td>75 – 85</td>
<td>53 – 59</td>
</tr>
<tr>
<td>Frass Breaking Point</td>
<td>°C</td>
<td>≤ -10</td>
<td>≤ -10</td>
<td>≤ -8</td>
<td>≤ -8</td>
<td>≤ -5</td>
</tr>
</tbody>
</table>

<sup>1</sup> 2.5 – 3.0 % **Sasobit** by weight as a function of the technical properties of base bitumen
Warm-Mix Asphalt with **Sasobit** – green and sustainable

Mastic asphalt has been produced and paved at lower temperature for quite a while now. This method, however, is hardly ever used in Europe for all the other types of asphalt mixes, although it also has a lot to offer.

- Less CO₂ emissions
- Less energy consumption
- Less fumes and aerosols
- Less bitumen ageing
- Less wear on machines and resources

European legislators are now focussing on Warm-Mix Asphalt (WMA) technologies, and rightly so.

A 3-percent-addition of **Sasobit** yields the best results when aiming at a maximum temperature reduction of 30 K. To ensure that **Sasobit** can also improve process reliability, the temperature reduction potential should not be fully exploited.

### Savings per tonne of asphalt mix

Temperature reduction = 30 K

→ Fuel and CO₂ savings of 18 – 22 %

**Sources:**
- BG-Bau (German construction workers mutual insurance association)
  “Paving at reduced temperatures”

50 % of bitumen ageing occurs while the asphalt mix is produced and placed. WMA-technologies can reduce short-term ageing significantly while considerably extending the service life of asphalt pavement (Straße und Autobahn, 8.2014).

### Temperature reduction / oxidation rate

**Van’t Hoff equation**

The oxidation rate halves for every 10 K in temperature reduction.
One product – even more benefits

Many aspects have to be considered to successfully complete a project: is the asphalt mix production cost-efficient and environmentally friendly? Does it have good workability? Is it durable and resistant against a variety of impacts? Thanks to its properties Sasobit is the ideal, versatile additive for a multitude of projects and offers many benefits for practical use.

Bitumen adhesion

Adhesion between bitumen and aggregates is crucial for durable asphalt pavements. Sasobit-modified binders provide for good adhesion performance without any additional chemical additives – even for aggregates with poor adhesive strength. This increases resistance to stripping as well as the resistance against de-icing agents.

The Rolling-Bottle-Test (EN 12697-11) has demonstrated repeatedly times that Sasobit-modified bitumen improve adhesion performance.

Earlier traffic release

Every year, traffic hold-ups due to construction sites impact the economy and cost billions of euros (ADAC Staubilanz 2014 – traffic jam statistics from Germany’s motoring association). The goal is to minimize road closures while ensuring high-quality roads.

This is precisely what Sasobit does, because asphalt mixes can be placed at lower temperatures. Even better, the stiffening effect ensures an improvement in initial stability even at comparatively high temperatures.

Enhanced fuel resistance

Pure Sasobit is nearly insoluble in fuels. Sasobit-modified asphalt mixes are therefore much more fuel-resistant. Fuel resistance is enhanced even more because Sasobit allows for an optimal compaction.
Good workability of mastic asphalt mixes – despite reduced temperatures

Since 2008, mastic asphalt mixes in Germany may only be produced, supplied and placed at temperatures ≤ 230 °C. Sasobit has been used successfully for many years to meet this requirement.

Adding Sasobit to mastic asphalt mixes retains their workability despite lowered temperatures. Approximately 3 % of Sasobit should be added to achieve the optimal temperature reduction. Substituting the bitumen with Sasobit is not recommended.

As mastic asphalt is a very delicate material, the mix should be designed in collaboration with a lab. Particularly when using very hard bitumen grades, the use of softer base bitumen should be investigated due to Sasobit's stiffening effect. Sasobit co-modified PmB have worked very well for bridge deck surfaces and in tunnels.

Enhanced rubber modification at standard temperatures

Performance characteristics improve when modifying asphalt mixes with rubber. However, such highly viscous mixes need high production temperatures. Sasobit allows for the production of rubber modified asphalt mixes at standard temperatures. This means temperature increases can be avoided. Thus emissions and binder ageing are prevented – a major contribution to environmental protection and occupational health and safety. On top of that Sasobit enhances the workability and compacting properties of rubber-modified asphalt mixes.
More recycling options

The added quantity of RAP to the asphalt mixing process has increased because reusing RAP saves resources and costs. For the production process this means: the more RAP is added to the mix, the higher the temperature settings for fresh mineral aggregates. This leads not only to higher energy consumption but also releases more emissions – and damages the bitumen especially.

When using Sasobit, more RAP can be added without any temperature increases, no matter whether RAP is added in a cold or warm state.

Highly dense and resistant asphalt mixes

Due to its properties asphalt is ideal for impermeable paved areas. These areas include storage facilities for liquid and solid manure, as well as silage effluents; facilities which store, bottle, or process substances hazardous to water and facilities which produce, treat or use substances hazardous to water. (Asphalt journal 3.2008)

Modifying rolled and mastic asphalt mixes with Sasobit improves:

• Workability
• Density
• Resistance to fuels, effluents and many other chemicals
• Deformation resistance
• Durability
Contact

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You will find references, technical standards, guidelines and useful Internet links about these topics on our website.

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