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 asphalts can be produced and placed at reduced temperatures when using Sasobit, protecting resources and saving costs.

Sasobit – perfect for every application

Many bitumen manufacturers sell Sasobit-modified bitumen (SmB) and Sasobit co-modified PmB. Sasobit can also be added directly in the mixing unit. Thanks to this versatility, Sasobit is suited for a large number of asphalt mix designs.
Working principle: Sasobit’s effect on bitumen viscosity

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 at high service temperatures increases significantly when adding the appropriate quantity of Sasobit, without impairing low-temperature performance.

Benefits

- Process reliability
- Stability
- Durability
- Temperature reduction
- Cost savings
- Energy savings
- Reduction in CO₂-emissions
- Reduced wear and tear on machinery
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
- Low-risk mix production and placement at outstanding quality
- Allows for the use of both very hard and highly viscous bitumen
- Longer retention times on the lorry without having to increase the mix temperature
- Good workability even during poor weather conditions without any additional compaction
- Extended construction season because weather conditions matter less
- Easier manual application

Paving operations are possible even during poor weather conditions

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.

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.
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.

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

Source: Asphalt-Labor Arno J. Hinrichsen

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.

"Black concrete"
Even after 20,000 cycles, rut depth was only 1.1 mm.

Source: Asphalt-Labor Arno J. Hinrichsen
Specification 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 at high service temperatures. 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 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: Non-modified bitumen and Sasobit-modified paving grade bitumen

<table>
<thead>
<tr>
<th></th>
<th>70/100</th>
<th>SmB² 45 70/100 + Sasobit</th>
<th>50/70</th>
<th>SmB² 35 50/70 + Sasobit</th>
<th>30/45</th>
<th>SmB² 25 30/45 + Sasobit</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 °C</td>
<td>43 – 49</td>
<td>70 – 80</td>
<td>48 – 54</td>
<td>75 – 85</td>
<td>53 – 59</td>
<td>80 – 90</td>
</tr>
<tr>
<td>Frass Breaking Point °C</td>
<td>≤ -10</td>
<td>≤ -10</td>
<td>≤ -8</td>
<td>≤ -8</td>
<td>≤ -5</td>
<td>≤ -5</td>
</tr>
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### Comparison of characteristics: Polymer-modified bitumen and co-modified polymer-modified bitumen

<table>
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</thead>
<tbody>
<tr>
<td>Penetration at 25 °C</td>
<td>1/10 mm</td>
<td>45 – 80</td>
<td>≥ 30</td>
<td>25 – 55</td>
<td>≥ 20</td>
<td>10 – 40</td>
</tr>
<tr>
<td>Softening Point R&amp;B °C</td>
<td>≥ 50</td>
<td>≥ 65</td>
<td>≥ 55</td>
<td>≥ 70</td>
<td>≥ 65</td>
<td>≥ 75</td>
</tr>
<tr>
<td>Frass Breaking Point °C</td>
<td>≤ -15</td>
<td>≤ -15</td>
<td>≤ -10</td>
<td>≤ -10</td>
<td>≤ -5</td>
<td>≤ -5</td>
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¹ According to technical bitumen standards in Germany  
² 2.5 – 3.0 % Sasobit by weight as a function of the technical properties of base bitumen  
³ Characteristics of standard PmB
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.

### Energy saving per tonne of asphalt mix

<table>
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<tr>
<th>Temperature reduction = 30 K</th>
<th>= energy saved</th>
<th>= 9 kWh</th>
<th>= 0.8 l fuel oil</th>
<th>= 1.5 kg lignite powder</th>
</tr>
</thead>
</table>

**Source:** Asphalt Guidelines “Warm mix asphalts”

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.

For instance a temperature reduction of 20 K reduces the oxidation rate by 75 %. Lowering the temperature by 30 K gives a calculated reduction of nearly 88 %.
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.

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.

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 improves adhesion performance.

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 and penetration depth. 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 are lowered significantly – 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.

Asphalt mixes meeting special requirements

Due to its properties asphalt is ideally suited 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 3.2008)

Modifying rolled and mastic asphalt mixes with Sasobit improves impermeable paved areas with regards to the following properties:

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