

SASOL

# Sasobit REDUX

Product information



**We have hatched  
something new for you!**

# Sasobit REDUX

**Sasobit**, the versatile additive for asphalt mixes, has been used successfully worldwide since 1997. Today Sasol is pleased to present another member of the Sasobit family: **Sasobit REDUX**

**Sasobit REDUX** consists of synthetic Fischer-Tropsch (FT) wax and other petroleum-based waxes and has a congealing point between 72 and 83 °C and a penetration of 16 – 30 dmm at 25 °C, making it softer than **Sasobit**.

## Comparison of Sasobit and Sasobit REDUX specifications

Parameter	Sasobit REDUX	Sasobit
Congealing point [°C]	72 – 83	100 – 110
Penetration (25 °C) [dmm]	16 – 30	0 – 2

The average dosage of **Sasobit REDUX** is 1 – 1.5 wt% related to the bitumen content. Ideally, the product is added to the bitumen but can also be added into the pugmill.

**Sasobit REDUX** is available in pastilles and can be added in the same way as **Sasobit**.

## Advantages at a glance

- Reduced viscosity
- Reduced temperatures
- Reduced compaction resistance
- Reduced ageing
- Almost no impact on binder characteristics



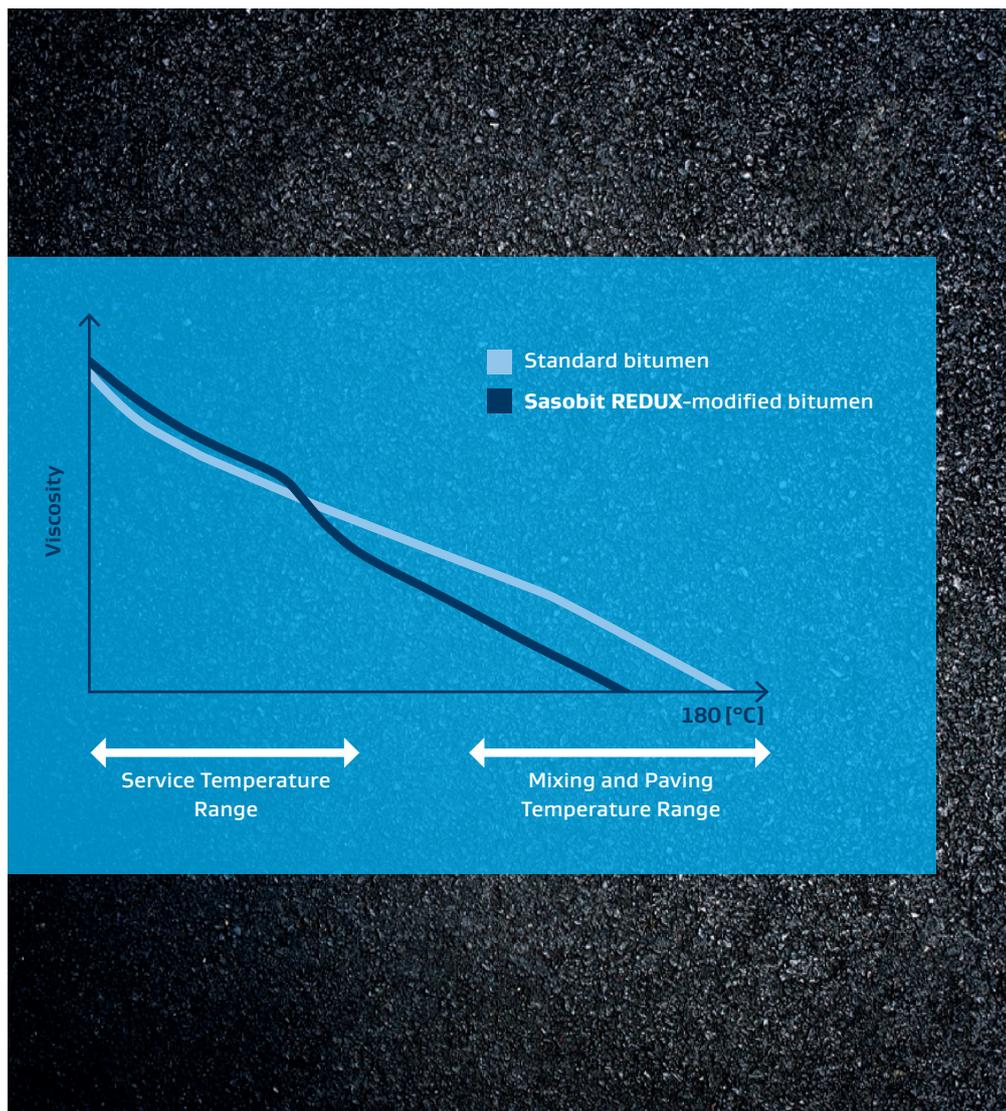
## Working principle: the effect of Sasobit REDUX on bitumen viscosity

Temperatures can be reduced by as much as 30 K when using **Sasobit REDUX**, because at temperatures above 85 °C **Sasobit REDUX** is completely soluble in bitumen and significantly reduces viscosity.

Reduced viscosity at standard temperatures improves the workability of the asphalt mix. **Sasobit REDUX** increases process reliability and significantly reduces the risk of improper paving operations.

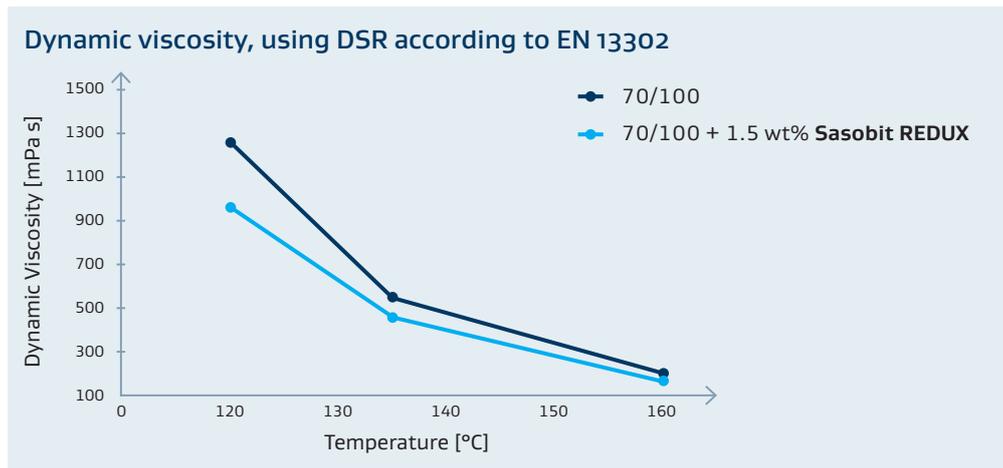
During the cooling phase, **Sasobit REDUX** begins to crystallise at 60 °C, which makes it possible to widen the compaction window. The above-mentioned congealing point of 72–80 °C relates to the pure wax.

**Sasobit REDUX** has a negligible impact on the stiffness of the binder at service temperatures. The actual increase is determined by the base binder.



## Reduced viscosity

When adding only 1.5 wt% of **Sasobit REDUX** to a binder, the viscosity at standard temperatures can be reduced by 15 – 20 % as shown in the following graph.



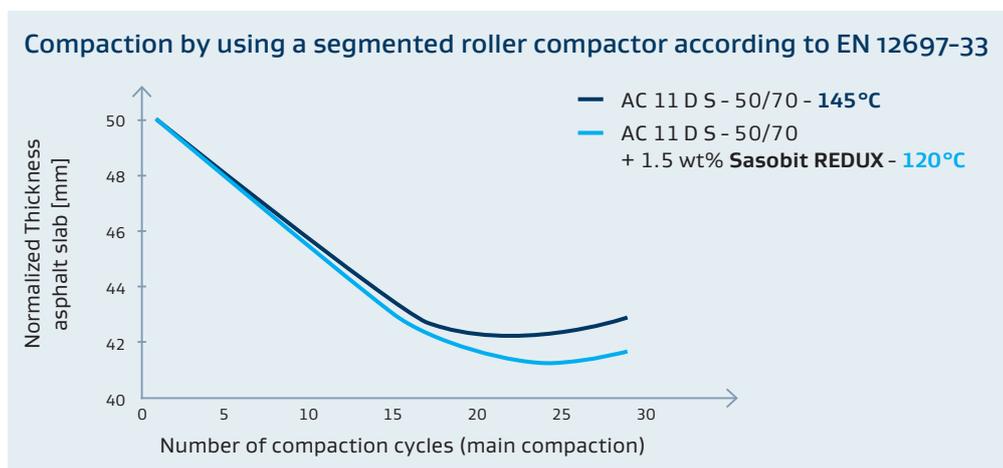
The viscosity-reducing effect of **Sasobit REDUX** offers two key advantages.

### 1. Reduced mixing and paving temperatures

The production of Warm Mix Asphalt has been a topic of discussion for many years. However, this production process has not become the standard for types of rolled asphalt mixes despite its many advantages:

- Lower CO<sub>2</sub> emissions
- Lower energy consumption, fewer fumes and aerosols
- Less bitumen ageing
- Less wear on machines and resources

The results of a test carried out with a segment roller compactor by the ISBS of the Technical University of Brunswick show slightly better workability/compactability for an AC 11 D S with **Sasobit REDUX** at a temperature of 120 °C compared to an unmodified variant at a temperature of 145 °C.

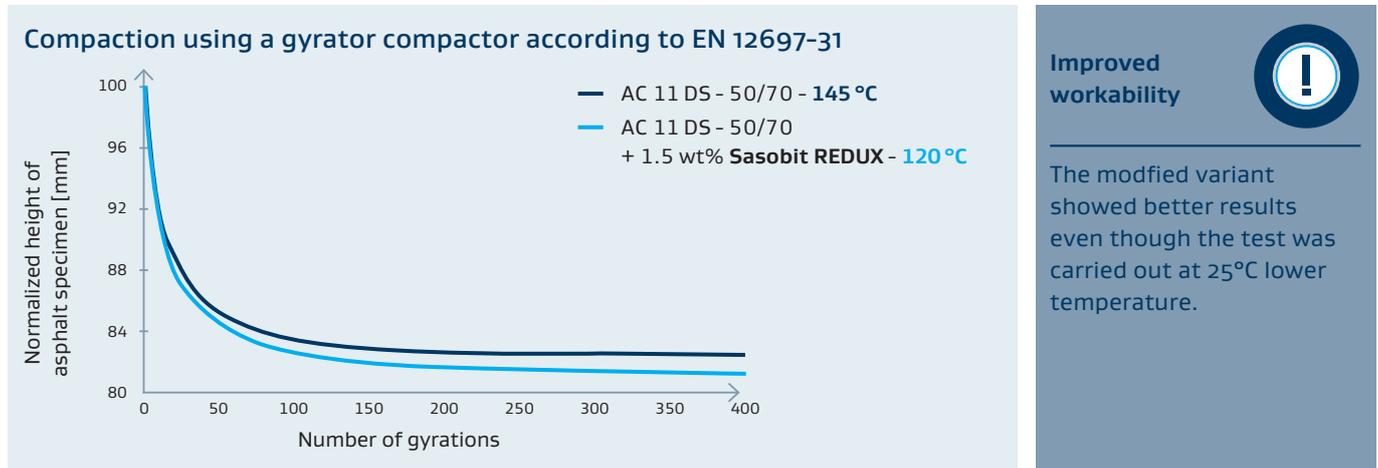


#### Improved workability



The modified variant showed better results even though the test was carried out at 25°C lower temperature.

The same trend was confirmed in a test using a gyrator compactor in the laboratory of HWT Dresden.



**Improved workability**



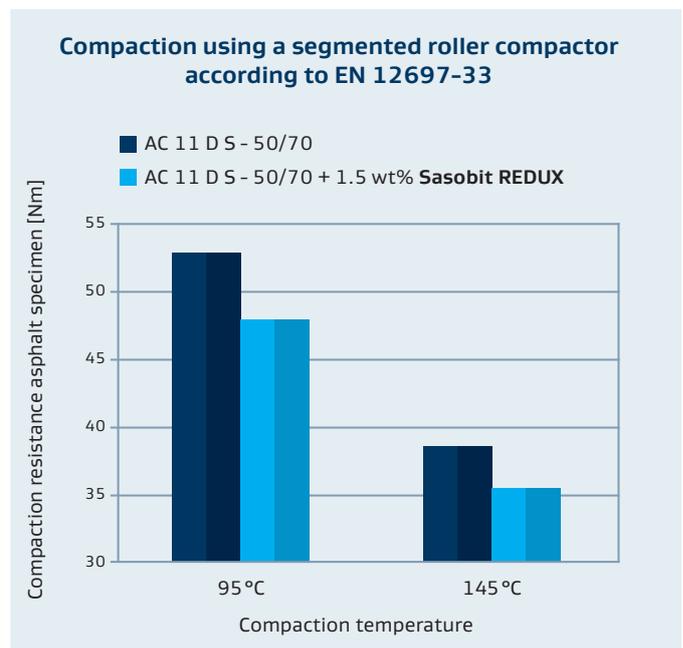
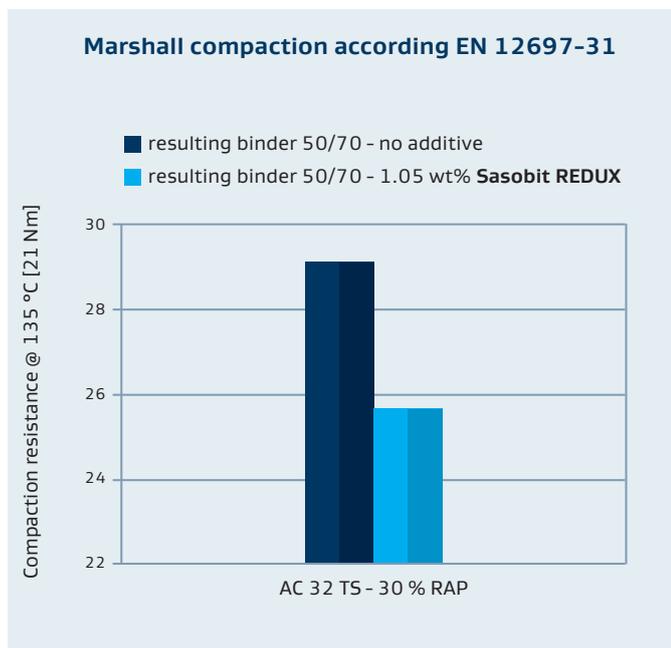
The modified variant showed better results even though the test was carried out at 25°C lower temperature.

This means that **Sasobit REDUX** can be used as an effective Warm Mix additive!

**2. Reduced compaction resistance**

Modification with **Sasobit REDUX** leads to a reduction in the compaction resistance of the asphalt mix, which enhances the workability and increases the ease of compaction. Consequently, the required compaction can be achieved with fewer roller passes.

Different asphalt types (base course AC 32 T S and wearing course AC 11 D S) were examined at different independent laboratories (ISBS Technical University of Brunswick, asphalt-labor Wahlstedt).

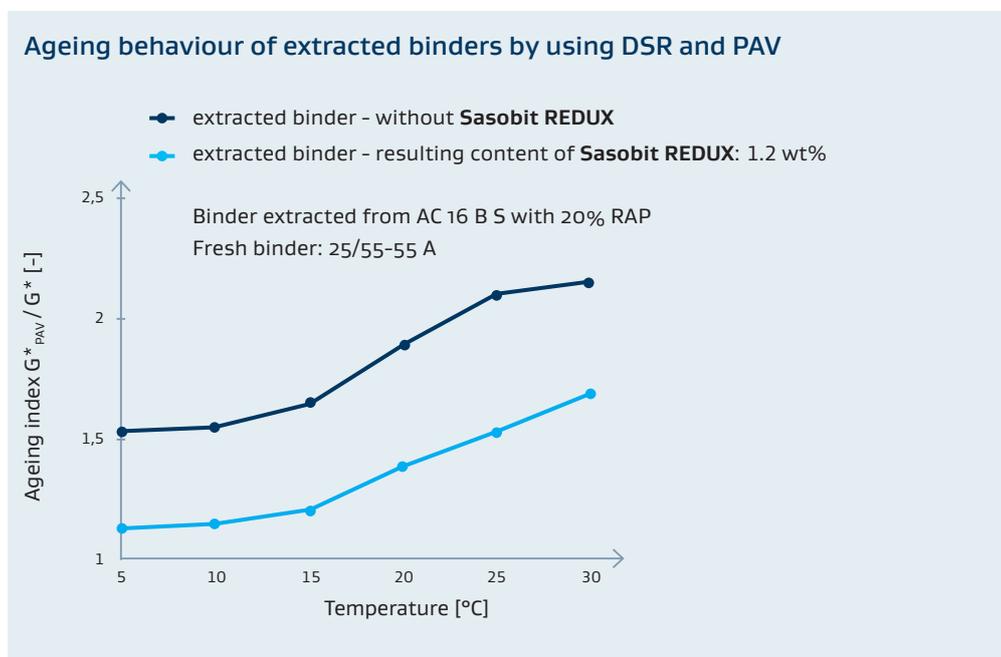


## Reduced ageing

As asphalt ages, the stiffness of the binder increases. This leads to a higher risk of thermal and fatigue cracking.

The addition of **Sasobit REDUX** helps to minimise the risk of cracking as it reduces ageing. This can be traced back to the pure, high quality raw materials which are used for the production of **Sasobit REDUX**.

In order to describe the ageing behaviour of a binder,  $G^*$  (complex shear modulus, characteristic value for stiffness) first has to be determined for different ageing stages. The ageing indices can then be calculated, i.e.  $G^*$  after ageing is divided by  $G^*$  before ageing. The smaller the ageing index, the higher the anti-ageing effect.



This approach was used by asphaltlabor Wahlstedt. Binders from a AC 16 B S binder course with 20% RAP were extracted and PAV-aged (simulation of long-term ageing in lab).  $G^*$  was measured after extraction and after PAV ageing of the extracted binders, and the ageing indices were calculated. This was done for two variants – with and without modification with **Sasobit REDUX**. The following figure shows the results of the ageing indices at different test temperatures. The ageing indices for the variant with **Sasobit REDUX** are much lower than those for the variant without the additive.

**This demonstrates the anti-ageing effect of Sasobit REDUX!**

## Almost no impact on softening point and penetration

Due to their inherent properties, FT waxes will always produce a stiffening effect in the modified binder. **Sasobit REDUX** consists of several components and therefore has a negligible stiffening effect.

There is almost no impact on softening point and penetration in most of the commonly used binder grades

The following table give an overview – based on the current data set – of the impacts on softening point and penetration for different bitumen types.

### Examples (average values; based on current data set)

Type of binder	Softening point R&B [°C]	Δ in softening point R&B [°C]	Penetration (25 °C) [0.1 mm]	Δ in penetration (25 °C) [0.1 mm]
<b>50/70</b>	50.4	–	57	–
50/70 + 1.5 wt% Sasobit REDUX	50.6	+0.2	57	0
50/70 + 1.5 wt% Sasobit	55.2	+5.2	40	-17
<b>70/100</b>	47	–	78	–
70/100 + 1.5 wt% Sasobit REDUX	50.6	+3.6	63	-15
70/100 + 1.5 wt% Sasobit	55.4	+8.4	47	-31
<b>25/55-55 A</b>	61.8	–	40	–
25/55-55 A + 1.5 wt% Sasobit REDUX	62.8	+1	34	-6
25/55-55 A + 1.5 wt% Sasobit	70.6	+8.8	28	-12

The results show that **Sasobit REDUX** has a much smaller impact on the softening point as well as on the penetration compared to **Sasobit**.

Since **Sasobit REDUX** has no hardening but an anti-ageing effect, the amount of RAP can be increased.

It is thus much easier to meet the requirements when **Sasobit REDUX** is part of the asphalt design – for example regarding values after binder extraction, especially when using RAP. The following example shall demonstrate this context.

### Example – Investigations on extracted binders

Asphalt mix: base course AC 32 T S  
 Neat binder: 70/100  
 RAP content: 30%  
 Softening point RAP: 68.6 °C  
 Penetration (25 °C) RAP: 21 dmm  
 Contents of additives: 0 wt% and 1.5 wt% (in relation to neat binder)  
 Resulting binder: 50/70

Parameter	AC 32 T S without Sasobit REDUX	AC 32 T S with 1.05 wt% Sasobit REDUX	Requirement in Germany for resulting 50/70
Softening point Ring & Ball* [°C]	55	57	< 62
Penetration(25 °C)* [0.1 mm]	43	42	–



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