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Stone Mastic Asphalt (SMA)

ASPHALT PRODUCTS 2018 EDITION

Specially designed gap graded Stone Mastic Asphalt delivers high performance wearing surfaces.

Background

Stone Mastic Asphalt was developed in Germany during the mid 1960's. The original purpose was to provide a surfacing that offered maximum resistance to damage by studded tyres. Over the years it has proved to have a high resistance to plastic deformation from heavy vehicle loads at high temperatures, while at the same time exhibiting good low temperature properties.

Recognised Value

Stone Mastic Asphalt is a thin asphalt surfacing mix, which has very good rut resistance properties and excellent durability compared to standard asphalt. It can also be used as a base course mix. While it is primarily used for heavily trafficked roads and is the preferred surfacing in some countries, SMA can be used for all types of pavements.

It is basically a gap-graded asphalt mix, (primarily for surface courses), with a high proportion of coarse aggregate which interlocks to form a stone skeleton to resist permanent deformation.
The mix is filled with a mastic of bitumen and fillers, to which fibres are added in order to provide adequate stability to the binder and prevent drainage of binder during transport and placing.

In addition to its structural capabilities, the SMA surface has a rough texture which offers a good skid resistance over time, and can reduce road surface noise.

Advantages of SMA

- Industry acknowledged deformation resistance
- Good skid resistance
- Good durability (slow ageing) due to higher binder content
- Good low temperature performance
- Wide range of applications
- Longer service life than dense graded asphalt
- Reduced road surface noise
- Good surface texture
- Good flexibility and resistance to fatigue
- Suitable for all traffic volumes, particularly for high traffic volumes and heavy traffic
- Can reduce rehabilitation and therefore the disruption to traffic.

Stone Mastic Asphalt (SMA)

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Although SMA is more expensive than Dense Graded Asphalt [due to a higher binder content, use of a modified binder and fibres and reduced production rate] it can be more economical in the long term by reducing rehabilitation and extending service life.

The design philosophy revolves around developing a strong stone skeleton with a high stone content, high bitumen and mortar content and a binder carrier. Layer thicknesses are usually four times the nominal stone size of the mix (eg. Size 10mix gives a 40mm layer thickness).

Modified binders are often used in heavy duty situations to increase the resistance to permanent deformation and to increase service life.

SMA is produced in an asphalt plant in the same manner as dense graded asphalt. However, SMA requires tighter quality control in both production and laying. Conventional asphalt paving equipment is used and a light tack coat is normally applied. Compaction is usually carried out by 4 to 6 passes of a steel drum roller.

Pneumatic tyred rollers are not used.

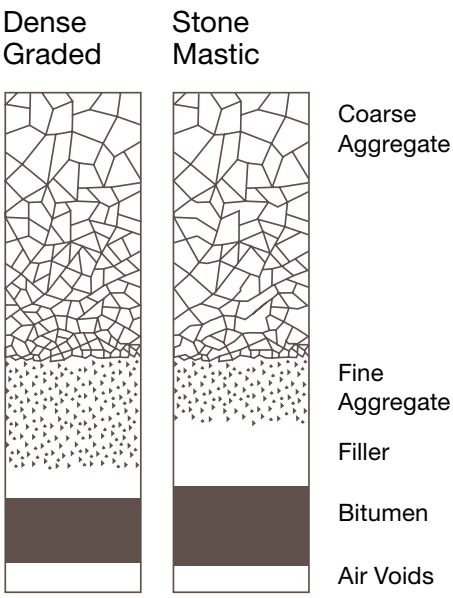
The SMA mix should not be opened to traffic until it has cooled.

SMA surface course mixes show excellent results in terms of being particularly stable and durable in traffic areas with high loads and under a wide variety of weather conditions.

SMA has good deformation resistance properties with reports of 30 to 40%[1][2] improvement over dense graded asphalt. There are also reports of an increased life of 20% (sometimes 30 to 40%)[1][2] over conventional mixes on very heavily trafficked roads.

Tests have shown that noise levels from SMA are 1 to 3dB(A) less than dense graded asphalt.[2] With such good, long term performance and acceptance overseas, there appears no doubt its popularity will continue as the demands of modern day traffic increase.

Typical mix components by volume



(1) Performance of Stone Matrix Asphalt Pavements in Maryland, Michael, Burke, Schwartz, 2002.
(2) European experiences in the design, manufacture and placement of StoneMatrix Asphalt, Marissa Nicolls, DMR-QLD 2002.

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