PROJECT

Volumetrical and Mechanical Optimising of Stone Mastic Asphalt (VSS1996/034)

Volumetrische und mechanische Optimierung von Splittmastixasphalt, SMA

**Funding:** National (Switzerland)

**Duration:** Nov 1996 - Dec 2002

**Status:** Complete with results

Background & policy context:

The Swiss standard SN 640 432 Stone Mastic Asphalt surface layers which was published in 1996 is based especially on volumetric data with regard to testing of compliance. SMA subjected to testing of compliance according to SN 640 432 was never based on mechanical properties as it is required for asphalt concrete.

The European standard pre EN 227 104 which is still in preparation plans the Marshall test as well as the compaction with Gyratory apparatus for trial of the mix. Because Stone Mastic Asphalt surface layers, like all other surface layers on the road, are exposed to enormous mechanical stress the mechanical properties have to be checked in advance.

In this research project focus was put on whether the results of volumetric optimizing the SMA compacted either by Marshall or by Gyratory provide the same conclusions independent on the equipment used for compaction, i.e. finally is the Marshall test for trial suitable at all.

Objectives:

The project should find the answer for these questions:

- Performs the volumetric mix optimization of SMA under SN 640 432 actually to mechanically optimal values?
- Perform at SMA different compression modes to same mechanical properties?

Parent Programmes:

ARAMIS - ARAMIS information system

Institute type: Public institution

Institute name: Swiss Government: State Secretariat for Education and Research

Funding type: Public (national/regional/local)

Partners:

Switzerland

Swiss Federal Roads Office

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Key Results:
The present research project is based on wide-ranging preliminary work, extensive exchange of experience with colleagues from other laboratories and companies and our own comparative testing at EMPA Dobendorf.

Different types of compaction give rise to different volumetric indices. The behaviour of stone mastic asphalts SMA 11 and SMA 16 with different filler/binder combinations was investigated. The investigations were complemented by permanent deformation measurements at relatively high temperatures of 60°C using the French rutting tester (LCPC Orniereur) and of indirect tensile strength at low temperatures of 0°C and -10°C by the indirect tensile test.

On the basis of the results, the answer to the question as to whether both the Marshall method and the Gyratory compaction method provide the same optimum soluble binder content values in stone mastic asphalt, SMA, must be an unequivocal “no”. It was found that none of the optimum soluble binder content values determined by the Marshall method and the Gyratory compactor method were identical for any of the filler/binder combinations used for either stone mastic asphalt SMA 11 or stone mastic asphalt SMA 16. The optimum soluble binder contents determined using the Marshall indices were distinctly higher than those determined using the Gyratory compactor indices. The optimum soluble binder contents determined with the Gyratory compactor are lower than when Marshall compact is used.

With regard to the determination of indirect tensile strength at various temperatures, it was found that mixes containing Bitumen 50/70 exhibit lower rigidity in comparison with Olexobit SMA.

Documents:
21018_1018_Inhalt.PDF (Final report)

STRIA Roadmaps: Vehicle design and manufacturing, Infrastructure
Transport mode: Road transport