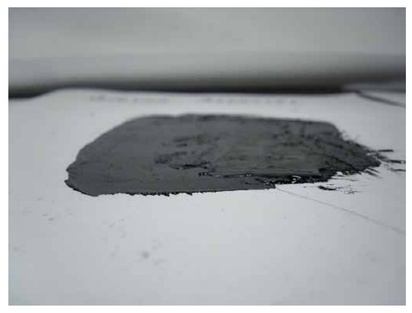
8th International Conference
Bituminous Mixtures and Pavements

Introduction

Past and Future
In 1999, asphalt rubber (wet process) was used for the first time in Europe (Portugal). 25 years later, a new technology — a hybrid bitumen consisting of 20% recycled tire rubber and polymers (storage-stable, such as PMB) — was used for the first time in Europe in the laboratory and in field (A6 in Portugal, a motorway of the Brisa network).

Rapid Digestion Process™
This new hybrid bitumen is produced in the refinary using a homogeneous bitumen that contains up to 40% recycled tire rubber (SigmaBond) and is produced using the Rapid Digestion Process, which completely digests recycled tire rubber into a liquefied state. This new technology enables the sustainable upcycling of end-life-tires, as they do not have to end up in landfills or be incinerated as fuel.

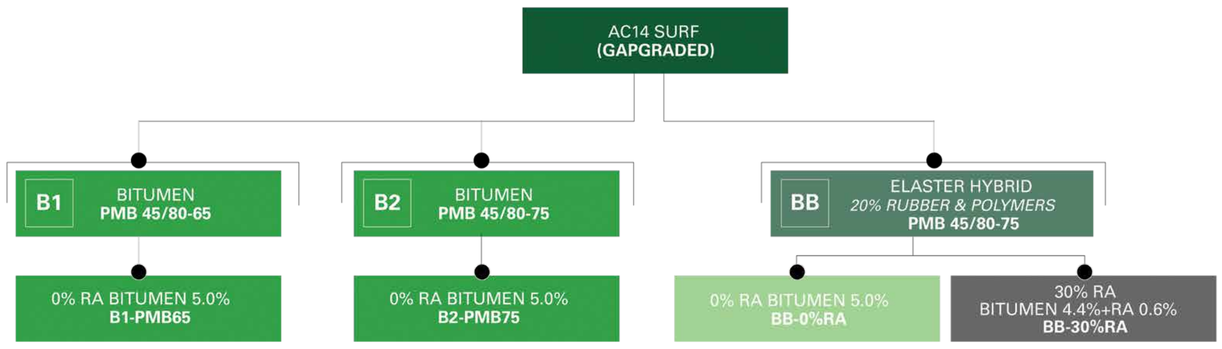
Conventional asphalt rubber



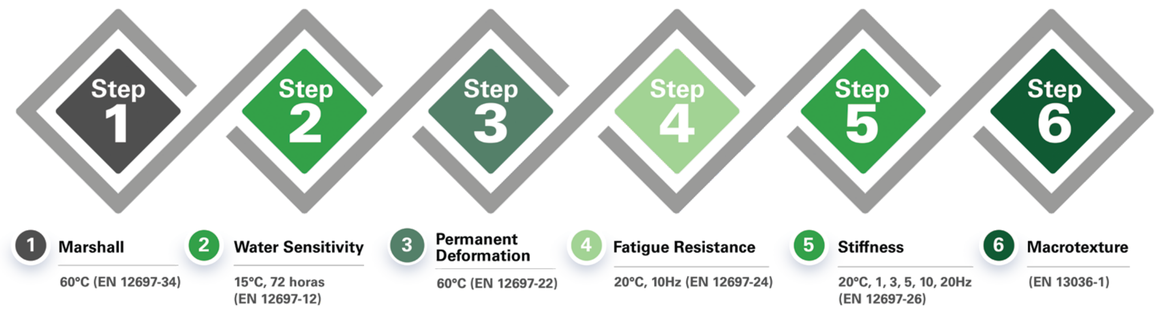
Rapid Digestion Process (SigmaBond)

Results

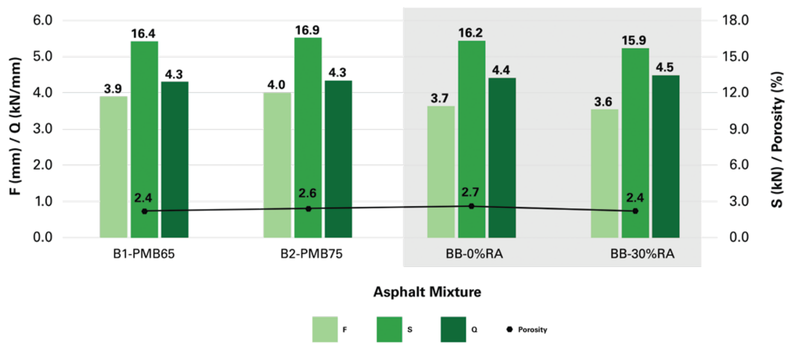
Materials Tested



Experimental Program

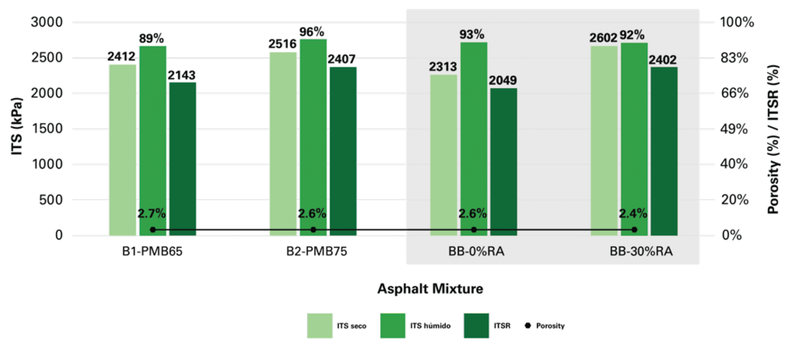


Marshall



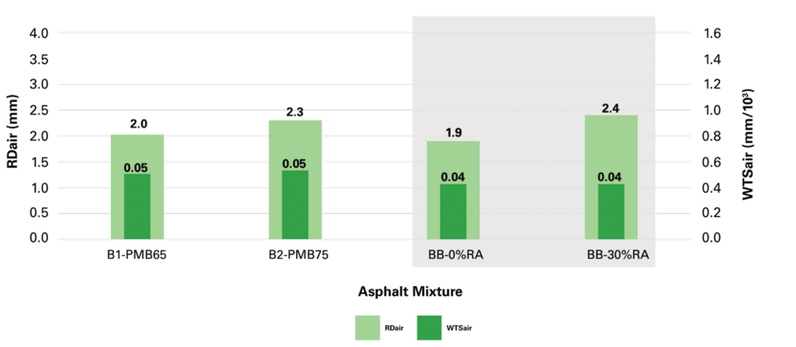
Similar properties compared to virgin mixtures with polymer modified bitumen (PMB). Insensitivity to the use of reclaimed asphalt.

Water Sensitivity



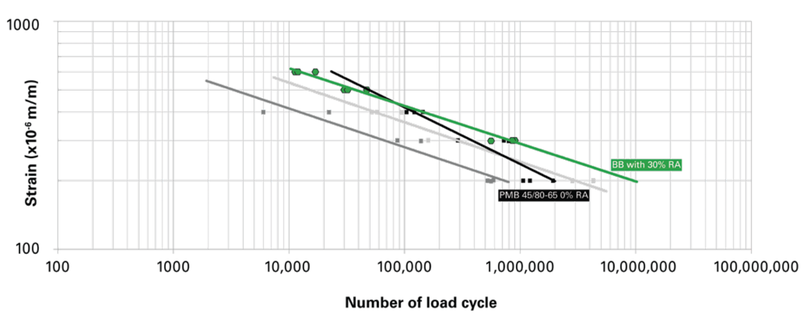
Similar properties compared to virgin mixtures with PMB, despite the use of reclaimed asphalt without the use of adhesion promoters or rejuvenators.

Resistance to Permanent Deformation



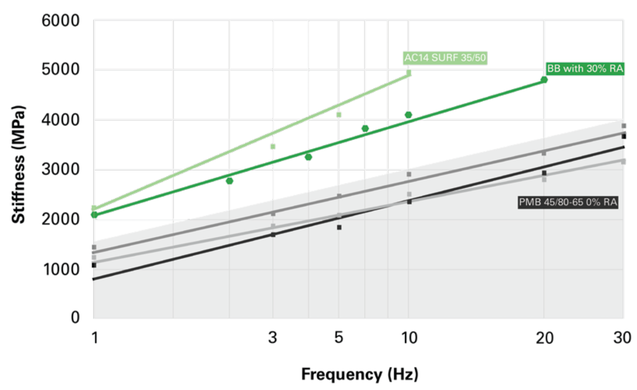
Similar properties compared to virgin mixtures with PMB, despite the use of reclaimed asphalt.

Fatigue Resistance



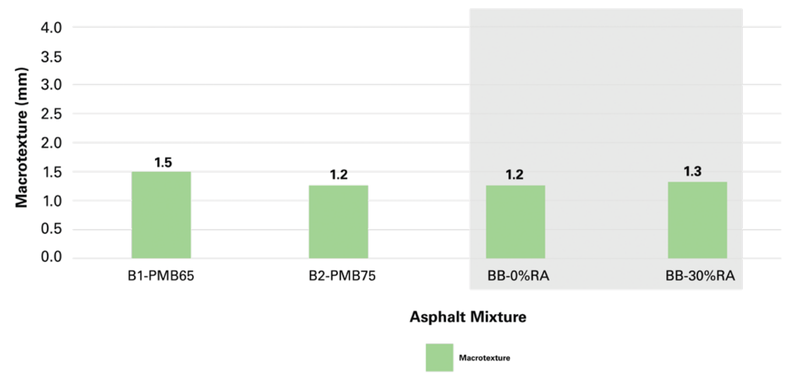
Improvement on fatigue resistance up to 14 times higher despite the use of 30% reclaimed asphalt.

Stiffness



Contribution to an increase in resistance to permanent deformation.

Macrotexture



Similar macrotexture.

Conclusions and Future

- Homogeneous bitumen and long-term stable storage with no physical changes
- Lower production and compaction temperature (165°C) promotes sustainability with decreased carbon footprint
- Can be used with higher percentages of reclaimed asphalt (RA) and rubber tire waste without impacting performance
- No additional or specialized equipment required during asphalt mixture production in asphalt plant
- Similar (marshall, water sensitivity, permanent deformation, macrotexture) to improved (fatigue resistance) performance and durability
- Hybrid bitumen showed to be a stronger and more sustainable alternative for PMB

Future Steps
Use with any mix design, including dense-graded and warm mix, due to bitumen homogeneity

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