

Evaluation of the Use of Polymer Modified Bitumen in the Production of High Modulus Asphalt for Heavily-trafficked Roads

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Abstract. Enrobé à Module Élevé (EME) technology, a High Modulus Asphalt (HiMA), has been introduced to South Africa to provide an optimum solution for the design and construction of heavily trafficked roads. Implementation of EME technology in South Africa started in 2011, when a trial section consisting of an EME base layer was constructed on the heavily trafficked South Coast Road in Durban. However, difficulties in obtaining 10/20 or 15/25 penetration-grades of bitumen suitable for production of EME have impeded a more regular use of the technology. This motivated the South African asphalt industry to explore alternatives, such as the use of modified bitumen, to produce asphalt mixes with comparable properties to those of EME. National Asphalt, a major South African asphalt producer, introduced the use of Ethylene Vinyl Acetate (EVA) polymer-modified bitumen for the production of HiMA. The modified bitumen was used to produce two types of HiMA mixes; one for a base course and one for the wearing course. The mixes were designed in accordance with the South African interim procedures for the design of EME. In November 2012, a trial section consisting of the EVA-modified HiMA base and wearing course layers was constructed on road M7 in eThekweni (Durban). The objective of this paper is to evaluate the performance of the EVA-modified HiMA against that of the South Coast Road EME (unmodified bitumen) based on the results of a laboratory testing programme and a field performance monitoring programme conducted over a period of two years. Although the HiMA trial section has been monitored for a period of two years only, the field assessments results are promising, indicating that the current shortage of 10/20 penetration-grade bitumen required for production of EME could be addressed through innovative techniques such as EVA modification of 35/50 penetration-grade bitumen, which is available locally. It is recommended that innovative technologies such as EME and EVA-modified HiMA should be encouraged in Southern Africa and elsewhere.

Keywords: Enrobé à Module Élevé (EME), High Modulus Asphalt (HiMA), Workability, Durability, Stiffness, Rutting and Fatigue cracking.