Effect of RAP and fibers addition on asphalt mixtures with self-healing properties gained by microwave radiation heating

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Abstract

Microwave heating of asphalt mixtures containing metal fibers is a promising technology for asphalt pavement rehabilitation. The main characteristic of these types of mixtures is that they have the ability to self-heal their cracks when external microwave heating is applied. Prior to this study, the assessment of crack-healing has only been conducted in mixtures prepared with virgin aggregate materials. This paper, however, presents results of research in which the effect of adding reclaimed asphalt pavement (RAP) and metallic fibers was studied. The volumetric properties of the mixtures indicated that the air voids content increased with the fiber content. The indirect tensile stiffness modulus of the mixtures increased with the addition of RAP. Clusters of fibers were found in the mixtures by means of CT-Scan analysis. The general effect of RAP addition was a decrease in the healing of the mixtures, and the effect of fibers was an increase in the healing. Overall, it is concluded that asphalt mixtures with RAP and metal fibers have the potential for crack-healing via microwave heating.

Keywords: Asphalt mixture; Metallic fibers influence; Crack-healing; RAP addition; Microwave heating; X-ray microtomography