

Investigating the Resilient Modulus and Fatigue Behavior of Asphalt Concrete Containing Waste Polyethylene Terephthalate (PET) Polymer

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Received: February 2023- Accepted: April 2023

ABSTRACT

In this study the effect of PET content and particle size on resilient modulus and fatigue property of asphalt concrete has been investigated. PET was added to the mixture at different contents of 0, 2, 4 and 6% (by the weight of binder) with two different sizes as fine and coarse particles. The mixtures were subjected to resilient modulus test at 3 different temperatures of 5, 25 and 40°C and strain controlled fatigue test at 20°C. It was found that the samples containing coarse particles have similar trend at different temperatures, in which, the resilient modulus increases with increasing PET content. Similarly, in the mixtures containing fine PET particles, at 5°, the resilient modulus increases with increasing PET content. However, at 25 and 40°C, the mixture containing 2% PET has the highest resilient modulus with values of 3.5 and 0.808MPa, respectively. The mixtures containing fine particles have higher fatigue life and lower flexural stiffness than the control mixtures. In the mixtures containing 4% of coarse particles the highest flexural stiffness and lowest fatigue life, with the values of 3803MPa and 16260, respectively is obtained. The highest fatigue life for both fine and coarse PET particles is obtained with 6% of PET content, which are 100000 and 63250, respectively. It is concluded that the resilient modulus of the mixtures containing coarse particles is higher than the mixtures containing fine PET particles, but, the mixtures containing fine PET particles have higher fatigue life than the mixtures containing coarse particles.

Keywords: Asphalt Concrete, PET, Resilient Modulus, Fatigue Life