Environmental Engineering and Management Journal xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
http://www.eemj.icpm.tuiasi.ro/; http://www.eemj.eu

"Gheorghe Asachi" Technical University of Iasi, Romania

EFFECTS OF TRIPLE MODIFICATION ON THE MECHANICAL PROPERTIES AND THE COST OF ASPHALT MIXTURES

Baha Vural Kök[1]*, Yunus Erkuş[2], Mehmet Yılmaz[1]

[1]*Fırat University, Engineering Faculty Department of Civil Engineering,23169 Elazığ, Turkey*
[2]*Fırat University, Technology Faculty Department of Civil Engineering,23169 Elazığ, Turkey*

Abstract

Nowadays, one of the most used additives in the modification of asphalt pavements is styrene-butadiene-styrene (SBS). Crumb rubber (CR) obtained by waste vehicle tires has also started to be used as an additive due to the high cost of polymer additives. Moreover, Sasobit®, which is a warm mixture additive, has been used recently in order to solve the workability problem caused by the use of CR and SBS. In this study, the effects of combined use of CR+SBS+Sasobit in asphalt mixtures were investigated with the mechanical tests. As a result, the additives used in the study increased the Marshall stability, indirect tensile strength, indirect stiffness modulus, fatigue load repetition numbers, and creep stiffness values of bituminous hot mixtures. There were many triple mix types that could cost less and perform better than 7% SBS modification. The 6%CR+3%SBS+2%Sasobit modified mixture, which could be produced 8% cheaper than 7% SBS modified mixture, could withstand 30% more load repetitions than 7% SBS modification in fatigue test. The 8%CR+3%SBS+4%Sasobit mixture which costs the sane as 7% SBS modification showed superior properties in all tests. Compared to single-additive mixtures, the combined use of CR, SBS, and Sasobit additives provided satisfactory properties in terms of performance and cost. This study determined the most effective use of waste vehicle tires which is a great problem for environment.

Key words: asphalt, cost, crumb rubber, mechanical properties, sasobit®, styrene-butadiene-styrene

Received: May, 2021; Revised final: January, 2022; Accepted: January, 2022

* Author to whom all correspondence should be addressed: e-mail: bvural@firat.edu.tr; Phone: +90 5067189410; Fax: +90 424 2340114