

Effect of mineral filler type and particle size on asphalt-filler mastic and stone mastic asphalt laboratory measured properties

ABSTRACT

This study examines four types of industrial and by-product wastes filler, namely; limestone as reference filler, ceramic waste, coal fly ash, and steel slag. One filler content consists of 10% by total weight of aggregate with three proportions; 100% passing 75micron (μm), 50/50 % passing 75 μm /20 μm , and 100% passing 20 μm was used. Laboratory tests were performed to determine the impact of different filler types and filler particle size on some properties of asphalt-filler mastics and Stone Mastic Asphalt mixture (SMA). The results indicate that the application of industrial and byproducts wastes as filler improves the properties of asphalt-filler mastic and SMA mixtures. The increased stiffness, due to addition of the filler, is represented by an increase in softening point, in viscosity, stability and resilient modulus as well as a decrease in penetration. The optimum asphalt content at given filler to asphalt ratio increased with the decrease in filler particle size regardless filler type. It was also determined that the filler type and particle size has significant effect on the mixture property. Among these three proportions, the samples prepared with the filler size proportion of 100% passing the 75microm gave the best value in terms of Marshall Quotient, the filler size proportion of 50/50 gave the best value in terms of Resilient Modulus while Stability vary depends on filler type.

Keyword: Filler type; Particle size; Mastic; Stone mastic asphalt properties