Effect of 20 micron filler particle size and filler type on rheological and performance properties of stone mastic asphalt-filler mastics

ABSTRACT

This paper evaluates the relative performance of a series of 20 micron filler particle size and filler type asphalt-filler mastics in terms of the two main distress modes associated with flexible asphalt pavements of permanent deformation and fatigue damage. The study makes use of the fundamental rheological binder testing using a dynamic shear rheometer (DSR), pavement performance prediction by means of the Superpave binder parameters, dynamic creep, temperature steps, and time sweep tests. The fundamental rheological data at given filler/asphalt ratio together with the permanent deformation and fatigue testing in the DSR all indicate an improved rutting and fatigue performance for the coarse (greater than 75 micron) asphalt-filler mastics compared to the fine (less than 20 micron) asphalt-filler mastics regardless filler type. In terms of filler type, ceramic waste filler found to be more effective on producing mastics that are more elastic and less susceptible to rutting and cracking than the control mastic.

Keyword: 20 micron filler particle size; Mastic rheological properties; Superpave binder parameters; Mastics performance