Stabilized emulsions to produce warm asphalt mixtures with reclaimed asphalt pavements

López C., González A., Thenoux G., Sandoval G. and Marcobal J.

Abstract

Stabilized Emulsions (SE) is a Warm Mix Asphalt (WMA) technique that reduces mixing temperatures to approximately 100 °C, the range of WMA with the greatest reduction in temperature compared to Hot Mix Asphalt (HMA). The term ‘stabilized’ refers to the good storage stability of the stabilized emulsion compared to that of common emulsions. Another technique that reduces the environmental impact of asphalt mixtures is the addition of reclaimed asphalt pavement (RAP). This paper presents the research results in which the performance of SE-WMA with different amounts of added RAP were evaluated. SE-WMA was produced at 100 °C, and could be prepared with high RAP contents, reducing the consumption of virgin materials and lowering energy needs. The laboratory study and a pavement trial section were used to evaluate the performance of SE-WMA in comparison with HMA. The experimental results indicated that the physical and mechanical properties of SE-WMA, without RAP, are similar to conventional HMA, showing that the effect of reducing mixing temperature does not significantly affect the quality or performance of these asphalt mixtures. The performance of SE-WMA with 25% and 44% RAP, was slightly lower than that obtained from conventional HMA. However, the quality of the SE-WMA complied with the requirements of conventional HMA, indicating that SSE-WMA with up to 44% RAP content is suitable for pavement construction. Deflections measured in the HMA and SE-WMA trial sections without RAP and with 25% RAP showed similar results, although the SE-WMA with 44% RAP showed 8% higher deflection. The energy consumption to produce one ton of asphalt mixture calculated using a thermodynamic model showed that SE-WMA is effective for the reduction of energy consumption in asphalt plants. Overall, the study concludes that SE-WMA with RAP is a sustainable material for pavement construction that could save energy and consume less virgin material than conventional HMA pavements.