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Assessment of Threshold Film Thickness Using Surface Area for RAR Modified Asphalt Mixtures

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ABSTRACT: The objective of the study was to arrive at a minimum threshold value of the binder film thickness coating the aggregate particles and assess the performance characteristics of reacted and activated rubber (RARX) modified asphalt mixtures. Six varieties of asphalt mixtures and twelve different types of RAR-modified asphalt mixtures that were also placed as actual field sections were evaluated based on the estimated film thickness (T_f) using volumetric analysis. It was found that mixtures having higher surface area and lower binder contents had lower amount of coating on aggregate particles. It was noteworthy that for increasing RARX content by weight of the asphalt mix, T_f increased. This was attributed to the fact that RARX particles act as liquid asphalt-rubber matrix while replacing aggregate filler fractions in the mixture, thereby coating significant amount of aggregates and increasing the film thickness in the mix matrix. Based on the volumetric calculations and field performance data assessment, twelve microns was identified as the minimum threshold value of binder film thickness to coat the different fractions of aggregates in the RAR-modified mixtures.

KEYWORDS: Binder film thickness, Reacted and Activated Rubber, Surface area, Volumetric analysis, Fatigue cracking.
