

DOUBLE-EDGE-NOTCHED TENSION TESTING OF ASPHALT CEMENT FOR THE CONTROL OF CRACKING IN FLEXIBLE ASPHALT PAVEMENTS

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ABSTRACT

The Superpave™ asphalt cement specification as implemented in much of North America sets an upper limit on the loss modulus ($G^*\sin\delta$) in an attempt to control fatigue cracking. However, soon after its implementation, $G^*\sin\delta$ was found to be deficient in that it lacks the ability to accurately correlate with fatigue performance in service. This is likely because $G^*\sin\delta$ reflects energy dissipation due to both detrimental damage and beneficial viscous flow processes in the linear viscoelastic regime, with only the former contributing to fatigue cracking. Our hypothesis has been that, within limits, cracking distress is inversely proportional to tensile failure strain in a thin fiber of asphalt cement as estimated by the critical crack tip opening displacement (CTOD). This paper compares CTOD values for a set of straight and modified asphalt cements with various rheological parameters. Large ranking differences are found and this is thought to relate to the base asphalt cement as well as the amount and type of modifiers present.