



Project Summary

Texas Department of Transportation

0-5457: Evaluation of the Overlay Tester for Adhesion Testing of Crack Sealants

Background

Crack sealing is one of the main pavement preservation strategies used by the Texas Department of Transportation (TxDOT). It prevents water entering lower pavement layers thereby extending pavement life. However, it is often observed that the crack sealants currently used fail in the adhesion mode within the first three years of service. Currently, only the bond test (ASTM D5329-04) is specifically designated to evaluate the adhesion potential of crack sealants. However, the bond test has several limitations: 1) long test time (several days), 2) subjective pass/fail criterion (visual observation), and 3) weak or non-existent correlation with field adhesion failure. Therefore, a simple, fast, and performance-related test is needed to assist TxDOT with sealant evaluation and selection. The main objective of this study was to develop such a test and draft specification to quickly evaluate the adhesion properties of crack sealants in the laboratory.

What the Researchers Did

The work conducted in this study is described below:

1. The overlay tester-based crack sealant adhesion tester (shown below) was developed. As part of the test protocol guidelines were developed for specimen preparation, test conditioning, and data interpretation.

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Overlay Tester-based Crack Sealant Adhesion Tester.



2. Repeatability of the crack sealant adhesion test was investigated under several test temperatures. Five replicates of test specimens were recommended to evaluate the adhesion performance of sealants.
3. Thirteen crack sealants from different vendors were evaluated at different test temperatures following the proposed crack sealant adhesion test protocol.
4. Extensive studies were conducted to determine the sensitivity of the test results to test temperature. The sealants were found to be very sensitive to test temperature. Based on these results tentative recommendations were made on sealant type selection for the different environmental zones in Texas.
5. As part of this study researchers compared TxDOT's current crack sealants with several new sealants proposed by sealant vendors. Many of the new sealants were found to have significantly better performance in the new adhesion test.

What They Found

The major findings from this study are:

1. The proposed test equipment and protocol were found to easily distinguish the poor adhesion sealants from the good ones.
2. The draft crack sealant special specification was proposed. Significantly different from the current crumb rubber content based specification, the new special specification is intended to be performance based, primarily on the performance in the crack sealant adhesion test. Meanwhile, other factors such as flash point, softening point, and viscosity are also considered.

What This Means

As discussed above, significant progress has been made in laboratory evaluation of crack sealant adhesion failure and a draft crack sealant special specification has been proposed. The researchers strongly recommend that the findings from this research project be evaluated for statewide implementation; in the short term TxDOT could construct experimental test sections in four districts to validate and/or refine the draft crack sealant special specification.

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