Standard Method of Test for

Measuring Interfacial Fracture Energy of Hot-Poured Asphalt Crack Sealant Using a Blister Test

AASHTO Designation: T 371-17[1]

Technical Section: 4e, Joints, Bearings, and Geosynthetics

Release: Group 2 (June 2017)

AASHTO

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1. SCOPE

1.1. The blister test is used to determine the interfacial fracture energy (IFE) of hot-poured asphalt crack sealant at the application temperature as specified in MP 25 and PP 85.

1.2. The blister test is a fracture test. The objective of the test is to apply tensile forces using hydrostatic pressure to delaminate sealant from a substrate. A thin film of sealant is poured on the top of a substrate (usually aluminum) disk that has a hole at the center. Hydrostatic pressure is applied through this hole at a constant flow rate causing delamination between the sealant film and substrate. Sealant deformation and applied hydrostatic pressure are recorded as a function of time. The amount of energy required to achieve complete delamination is called interfacial fracture energy and can be calculated from the pressure-deformation curve. This energy is considered a measure of bonding potential.

1.3. *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish and follow appropriate health and safety practices and to determine the applicability of regulatory limitations prior to use.*

2. REFERENCED DOCUMENTS

2.1. *AASHTO Standard*:

- MP 25, Performance-Graded Hot-Poured Asphalt Crack Sealant
- PP 85, Grading or Verifying the Sealant Grade (SG) of a Hot-Poured Asphalt Crack Sealant
- R 18, Establishing and Implementing a Quality Management System for Construction Materials Testing Laboratories
- T 314, Determining the Fracture Properties of Asphalt Binder in Direct Tension (DT)
- T 367, Accelerated Aging of Hot-Poured Asphalt Crack Sealant Using a Vacuum Oven

2.2. *ASTM Standards*:

- D5167, Standard Practice for Melting of Hot-Applied Joint and Crack Sealant and Filler for Evaluation
- E1, Standard Specification for ASTM Liquid-in-Glass Thermometers

- E77, Standard Test Method for Inspection and Verification of Thermometers

3. TERMINOLOGY

3.1. *Definitions*:

3.1.1. *hot-poured asphalt crack sealant*—hot-poured modified asphaltic material used to seal pavement cracks and joints.

Note 1—Based on the references, hot-poured asphalt crack sealant is typically applied at a temperature of 160°C or above.

3.1.2. *interfacial fracture energy (IFE)*—the energy required to separate hot-poured asphalt crack sealant from a substrate.

4. SUMMARY OF METHOD

4.1. Hot-poured asphalt crack sealant material is homogenized following the procedure given in ASTM D5167. For each test, including four replicates, cut 320 g of sealant and heat to the manufacturer's recommended pouring temperature. Sealant will be poured in the mold assembled on top of an annular-shaped disk of substrate. An aluminum plug will be inserted into the hole of the substrate to close it. The sealant will be poured on top of the plugged substrate to provide a film of 4.6-mm thickness. Hydrostatic pressure is applied through the hole to cause delamination between the sealant film and the substrate. Sealant deformations and applied hydrostatic pressure can be recorded as a function of time. The amount of energy required for complete delamination is called interfacial fracture energy and can be calculated from the pressure-deformation curve. This energy can be considered an indication of bonding potential.

5. SIGNIFICANCE AND USE

5.1. This procedure is designed to measure the adhesion potential of hot-poured sealant to aggregate.

5.2. Sealants must be homogenized (ASTM D5167) before measuring adhesion by this method.

6. APPARATUS

6.1. *Direct Tension Test (DTT) Device*—Modified T 314 direct tension test (DTT) machine or an equivalent system with environmental chamber and motor or screw driven actuator;

6.2. *Test Chamber*—Test chamber that can reach –40 ± 0.5°C;

6.3. *Laboratory Oven*—Any standard laboratory oven capable of producing and maintaining temperatures up to 200°C ± 2.0°C;

6.4. *Release Agent*—A proper release agent to prevent the crack sealant from sticking to indicated test specimen mold setup pieces. A silicon-based release agent is recommended.

6.5. *Test Specimen Mold Setups*—Four aluminum molds, four plugs, and four rubber bands. (See Figures 1, 2, and 3.)