Standard Method of Test for

Evaluation of the Low-Temperature Tensile Property of Hot-Poured Asphalt Crack Sealant by Direct Tension Test

AASHTO Designation: T 369-17 (2021)[1]

Adopted: 2017 **Reviewed but Not Updated: 2021**

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

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1. SCOPE

1.1. This test method applies to hot-poured asphalt crack sealant used in the construction and maintenance of roadways as specified in M 338 and PP 85.

1.2. The test method is used to determine the extendibility and strain energy density (SED) of sealants at low temperature. It can be used with unaged material or with material aged according to R 95. The test apparatus is designed for testing within the temperature range from –4 to –40°C.

1.3. This standard covers the determination of extendibility and percent modulus decay in hot-poured asphalt crack sealant with the use of direct tension testing and by applying the tensile stress–strain test.

1.4. *The quality of the results produced by this standard are dependent on the competence of the personnel performing the procedure and the capability, calibration, and maintenance of the equipment used. Agencies that meet the criteria of R 18 are generally considered capable of competent and objective testing/sampling/inspection/etc. Users of this standard are cautioned that compliance with R 18 alone does not completely assure reliable results. Reliable results depend on many factors; following the suggestions of R 18 or some similar acceptable guideline provides a means of evaluating and controlling some of those factors.*

2. REFERENCED DOCUMENTS

2.1. *AASHTO Standards*:
- M 320, Performance-Graded Asphalt Binder
- M 338, 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
- R 95, Accelerated Aging of Hot-Poured Asphalt Crack Sealant Using a Vacuum Oven
- T 314, Determining the Fracture Properties of Asphalt Binder in Direct Tension (DT)

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 in 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. *effective gauge length*—elongation of a standard dog bone–shaped test specimen due to an applied axial load P is equivalent to that of a simple rectangular specimen with the same cross-sectional dimensions of the restricted section. Effective gauge length, L_e, is defined as the length of the simple rectangular specimen and has been determined to be 20.3 mm.

3.1.3. *tensile stress*—tensile load divided by the true area of a cross section of the specimen.

3.1.4. *tensile strain*—change in the effective gauge length by the application of tensile load divided by the original unloaded effective gauge length.

3.1.5. *brittle material*—the stress–strain curve is linear up to fracture at about 1 to 2 percent elongation.

3.1.6. *brittle-ductile material*—the stress–strain curve is curvilinear and the stress is gradually reduced after the peak point. The failure happens by gradually breaking the molecular bond within the material.

3.1.7. *ductile material*—the material does not rupture in the direct tension test but elongates due to high strain.

3.1.8. *rubbery behavior*—materials that exhibit rubbery behavior can be stretched to extreme elongation without rupture.

3.1.9. *percent modulus decay*—the percentage modulus deduction after 10 s of loading.

4. SUMMARY OF PRACTICE

4.1. This practice contains the procedure to measure the extendibility and the strain energy density of a hot-poured asphalt crack sealant using a direct tension test (DTT). The material is bonded between two end tabs made of poly(methyl methacrylate) (PMMA) and subjected to a constant strain rate at a specific temperature.

4.2. The test method is developed to select a hot-poured asphalt crack sealant at temperatures where it exhibits rubbery behavior.

4.3. A linear variable differential transformer (LVDT) is used to measure the elongation of the test specimen as it is pulled in tension at a constant strain rate of 6 percent/min (1.2 mm/min). A load cell is used to monitor the load during the test. The stress and strain at the point of rupture or peak load are reported.