Standard Method of Test for

Measuring Low-Temperature Flexural Creep Stiffness of Hot-Poured Asphalt Crack Sealant by Bending Beam Rheometer (BBR)

AASHTO Designation: T 368-17 (2021)[1]

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

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

AASHTO

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1. SCOPE

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

1.2. The method is used to determine the hot-poured asphalt crack sealant flexural stiffness. It can be used on unaged material or on material aged using R 95. The test apparatus is designed for testing within the temperature range from –4° to –40°C.

1.3. The values stated in SI units are to be regarded as the standard.

1.4. This standard covers the determination of flexural stiffness in hot-poured asphalt crack sealant using the bending beam rheometer and by conducting the creep test.

1.5. *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 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 313, Determining the Flexural Creep Stiffness of Asphalt Binder Using the Bending Beam Rheometer (BBR)

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. *Definition*:

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.

3.2. *Definitions of Terms Specific to This Standard*:

3.2.1. *contact load, n*—the load, P_c, required to maintain positive contact between the test specimen, supports, and the loading shaft, 35 ± 10 mN.

3.2.2. *flexural creep compliance, D(t), n*—the ratio obtained by dividing the maximum bending strain in a beam by the maximum bending stress. The flexural creep stiffness is the inverse of the flexural creep compliance.

3.2.3. *flexural creep stiffness, S(t), n*—the creep stiffness obtained by fitting a second order polynomial to the logarithm of the measured stiffness at 8.0, 15.0, 30.0, 60.0, 120.0, and 240.0 s and the logarithm of time.

3.2.4. *measured flexural creep stiffness, $S_m(t)$, n*—the ratio obtained by dividing the measured maximum bending stress by the measured maximum bending strain. Flexural creep stiffness has been used historically in asphalt technology, while creep compliance is commonly used in studies of viscoelasticity.

3.2.5. *average creep rate*—the average creep rate obtained by fitting the power law model of the logarithm of the strain versus the logarithm of time. The average creep rate is the absolute value of the exponents of the power law model.

3.2.6. *test load, n*—the load, P_t, of 240 s duration is used to determine the stiffness of the crack sealant being tested, 980 ± 50 mN.

4. SUMMARY OF PRACTICE

4.1. The bending beam rheometer is used to measure the midpoint deflection of a simply supported prismatic beam of hot-poured asphalt crack sealant subjected to a constant load applied to the midpoint of the test specimen. The device operates only in the loading mode.

4.2. A prismatic test specimen is placed in the controlled temperature fluid bath and loaded with a constant test load for 240.0 s and unloaded for 480.0 s. The test load (980 ± 50 mN) and the midpoint deflection of the test specimen are monitored versus time using a computerized data acquisition system.