
Standard Method of Test for

Evaluation of the Tracking Resistance of Hot-Poured Asphalt Crack Sealant by Dynamic Shear Rheometer (DSR)

AASHTO Designation: T 404-23¹

Adopted without Revisions: 2023

Technical Subcommittee: 4e, Joints and Bearings



American Association of State Highway and Transportation Officials
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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 R 116.
- 1.2. This test method is used to determine the resistance of hot-poured asphalt crack sealant to tracking and deformation at summer temperatures.
- 1.3. This test method covers the determination of flow and shear thinning propensity in hot-poured asphalt crack sealant with the use of a dynamic shear rheometer and by means of creep-recovery tests.
- 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 STANDARDS

- 2.1. *AASHTO Standards:*
 - < M 338, Performance-Graded Hot-Poured Asphalt Crack Sealant
 - < M 339M/M 339, Thermometers Used in the Testing of Construction Materials
 - < 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
 - < R 116, Grading or Verifying the Sealant Grade (SG) of a Hot-Poured Asphalt Crack Sealant
 - < T 315, Determining the Rheological Properties of Asphalt Binder Using a Dynamic Shear Rheometer (DSR)
 - < T 368, Measuring Low-Temperature Flexural Creep Stiffness of Hot-Poured Asphalt Crack Sealant by Bending Beam Rheometer (BBR)
 - < T 369, Evaluation of the Low-Temperature Tensile Property of Hot-Poured Asphalt Crack Sealant by Direct Tension Test

- < T 370, Measuring Adhesion of Hot-Poured Asphalt Crack Sealant Using Direct Adhesion Tester

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, Test Method for Inspection and Verification of Thermometers
- < E230/E230M, Standard Specification for Temperature-Electromotive Force (emf) Tables for Standardized Thermocouples
- < E2877, Standard Guide for Digital Contact Thermometers

2.3. *International Electrotechnical Commission Standard:*

- < IEC 60584-1:2013, Thermocouples - Part 1: EMF Specifications and Tolerances

3. TERMINOLOGY

3.1. *Definitions:*

- 3.1.1. *hot-poured asphalt crack sealant*—Polymer- or rubber-modified asphalt materials most often formulated with mineral filler, 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. *creep*—Slow deformation under a force.

- 3.1.3. *flow coefficient*—Empirical constant C in viscosity units in the Ostwald–de Waele equation.

- 3.1.4. *limiting shear viscosity*—Low shear viscosity that tends towards the Newtonian viscosity.

- 3.1.5. *Newtonian viscosity*—Viscosity independent of the applied stress.

- 3.1.6. *recovery*—Elastic recoil after the removal of a stress. See creep.

- 3.1.7. *shear thinning*—Reduction in viscosity due to an increase in stress rate.

- 3.1.8. *shear thinning exponent*—Exponent P of the Ostwald–de Waele equation.

4. SUMMARY OF TEST METHOD

- 4.1. This standard contains the procedure to measure the flow coefficient and the shear-thinning exponent of a hot-poured asphalt crack sealant by means of a dynamic shear rheometer.

- 4.2. The hot-poured asphalt crack sealant material is placed between two parallel test plates in a dynamic shear rheometer and subjected to eight cycles of creep and recovery at increasing stresses and at a fixed temperature. The limiting shear rate is obtained from the end of the creep phase for each stress level. After the eight cycles, the stresses are plotted against the limiting shear rates and a power-law fit of the data provides two parameters to characterize the asphalt crack sealant flow properties: C , the flow coefficient; and P , the shear thinning exponent.

- 4.3. Apparent viscosities between 0.1 kPa·s and 100 kPa·s are typically obtained between 46°C and 82°C when the applied shear stress varies from 25 Pa to 3200 Pa.