



Designation: D8303 – 20

Standard Test Method for Determining Thermal Cracking Properties of Asphalt Mixtures Through Measurement of Thermally Induced Stress and Strain¹

This standard is issued under the fixed designation D8303; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This method of test is used to determine the thermal viscoelastic and thermal volumetric properties of field-cored or laboratory-compacted asphalt mixture specimens by measuring the thermally induced stress and strain while being cooled at a constant rate from an initial equilibrium temperature. The thermal stress and strain shall be measured using the uniaxial thermal stress and strain tester (UTSST).

1.2 This standard test method covers procedures for preparing and testing asphalt mixtures to measure thermal stress and strain and directly calculate: (1) the coefficient of axial thermal contraction, and (2) the modulus of asphalt mixture over a range of temperatures.

1.3 The procedure described in this standard provides required information for estimation of thermal cracking susceptibility of asphalt mixtures. The procedure applies to test specimens having a maximum aggregate size of 19 mm or less.

1.4 This standard can be used for conventional and nonconventional asphalt mixtures including but not limited to: hot asphalt mixtures, asphalt mixture with recycled materials, cold asphalt mixtures, warm asphalt mixtures, and neat or modified asphalt mixtures (for example, polymer or rubber-modified).

1.5 This standard can be used to determine the following:

1.5.1 Thermal stress buildup in asphalt mixture during a single cooling event.

1.5.2 Thermal strain in asphalt mixtures as a function of temperature.

1.5.3 Coefficient of axial thermal contraction.

1.5.4 Modulus of asphalt mixture as a function of temperature.

1.5.5 Thermal viscoelastic properties of asphalt mixture: viscous softening, viscous-glassy transition, glassy hardening, crack initiation, fracture temperature, and fracture stress.

1.5.6 UTSST cracking resistance index (CRI).

1.5.7 UTSST CRI adjusted for environmental condition (CRI_{Env}).

1.6 *Units*—The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.7 The text of this standard references notes and footnotes which provide explanatory material. These notes and footnotes (excluding those in tables and figures) shall not be considered as requirements of the standard.

1.8 *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 appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.9 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards*:²

A36/A36M Specification for Carbon Structural Steel
D8 Terminology Relating to Materials for Roads and Pavements

D979/D979M Practice for Sampling Bituminous Paving Mixtures

D2041/D2041M Test Method for Theoretical Maximum Specific Gravity and Density of Asphalt Mixtures

D2726/D2726M Test Method for Bulk Specific Gravity and Density of Non-Absorptive Compacted Asphalt Mixtures

D3203/D3203M Test Method for Percent Air Voids in Compacted Asphalt Mixtures

D3549/D3549M Test Method for Thickness or Height of

¹ This test method is under the jurisdiction of ASTM Committee D04 on Road and Paving Materials and is the direct responsibility of Subcommittee D04.26 on Fundamental/Mechanistic Tests.

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.