



Standard Test Method for Determining the Fracture Properties of Asphalt Binder in Direct Tension (DT)¹

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1. Scope

1.1 This test method covers the determination of the failure strain and failure stress of asphalt binders by means of a direct tension test. It can be used with unaged material or with material aged using Test Method D 2872 (RTFOT), Practice D 6521 (PAV), or AASHTO T240 (RTFOT) and AASHTO PP1 (PAV). The test apparatus is designed for testing within the temperature range from +6 to -36°C.

1.2 This test method is limited to asphalt binders containing particulate material having dimensions less than 250 μm .

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

1.4 *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 and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:

C 670 Practice for Preparing Precision and Bias Statements for Test Methods for Construction Materials²

D 8 Terminology Relating to Materials for Roads and Pavements³

D 140 Practice for Sampling Bituminous Materials³

D 2872 Test Method for Effect of Heat and Air on a Moving Film of Asphalt (Rolling Thin-Film Oven Test)³

D 6373 Specification for Performance Graded Asphalt Binder³

D 6521 Practice for Accelerated Aging of Asphalt Binder Using a Pressurized Aging Vessel (PAV)³

E 1 Specification for ASTM Thermometers⁴

E 4 Practices for Force Verification of Testing Machines⁵

E 77 Test Method for Inspection and Verification of Thermometers⁴

E 83 Practice for Verification and Classification of Extensometer System⁵

E 220 Test Method for Calibration of Thermocouples by Comparison Techniques⁴

E 691 Practice for Conducting an Interlaboratory Study to Determine the Precision and Bias of a Test Method⁶

2.2 Deutsche Industrie Norm (DIN) Standard:

43760 Standard for Calibrating Thermocouples⁷

2.3 AASHTO Standards:

T 240⁸

PPI (PAV)⁸

3. Terminology

3.1 *Definitions*—For definitions of general terms used in this standard, refer to Terminology D 8.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *brittle, adj*—type of failure in a direct tension test where the stress-strain curve is essentially linear up to the point of failure and the failure is by sudden rupture of the test specimen without appreciable reduction in cross-section of the specimen.

3.2.2 *brittle-ductile, adj*—type of failure in a direct tension test where the stress-strain curve is curvilinear and the failure is by sudden rupture of the test specimen. Limited reduction in cross-section of the specimen occurs before rupture.

3.2.3 *ductile, adj*—type of failure in a direct tension test where the specimen does not rupture but fails by flow at large strains.

3.2.4 *effective gage length, n*—for specimens used in this test, the effective gage length, L_e , has been determined to be 33.8 mm. This is an effective gage length that represents the portion of the specimen that contributes to the majority of the strain.

3.2.5 *failure, n*—point at which the tensile load reaches a maximum value as the test specimen is pulled at a constant rate of elongation.

3.2.6 *failure strain, n*—the tensile strain corresponding to the failure stress.

¹ This test method is under the jurisdiction of ASTM Committee D04 on Road and Paving Materials and is the direct responsibility of Subcommittee D04.44 on Rheological Tests.

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² *Annual Book of ASTM Standards*, Vol 04.02.

³ *Annual Book of ASTM Standards*, Vol 04.03.

⁴ *Annual Book of ASTM Standards*, Vol 14.03.

⁵ *Annual Book of ASTM Standards*, Vol 03.01.

⁶ *Annual Book of ASTM Standards*, Vol 14.02.

⁷ Deutsches Institut für Normung e.V. (German Standards Institute), Beuth Verlag GmbH, Burggrafenstrasse 6, 10787, Berlin Germany.

⁸ Available from the American State Highway and Transportation Officials, 444 N. Capitol Street, N.W., Washington, DC 20001.