



Designation: D6390 – 23

Standard Test Method for Determination of Draindown Characteristics in Uncompacted Asphalt Mixtures¹

This standard is issued under the fixed designation D6390; 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 test method covers the determination of the amount of draindown in an uncompacted asphalt mixture sample when the sample is held at elevated temperatures comparable to those encountered during the production, storage, transport, and placement of the mixture. The test is particularly applicable to mixtures such as porous asphalt (open-graded friction course) and stone matrix asphalt (SMA).

1.2 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.3 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.

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

1.5 *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

[C670 Practice for Preparing Precision and Bias Statements for Test Methods for Construction Materials](#)

[D979/D979M Practice for Sampling Asphalt Mixtures](#)

[D3666 Specification for Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials](#)

[D4753 Guide for Evaluating, Selecting, and Specifying Balances and Standard Masses for Use in Soil, Rock, and Construction Materials Testing](#)

[D6926 Practice for Preparation of Asphalt Mixture Specimens Using Marshall Apparatus](#)

[E11 Specification for Woven Wire Test Sieve Cloth and Test Sieves](#)

3. Terminology

3.1 *Definitions:*

3.1.1 *draindown*—for the purpose of this test method, draindown is considered to be that portion of material which separates itself from the sample as a whole and is deposited outside the wire basket during the test. The material which drains may be composed of either asphalt binder or a combination of asphalt binder, additives, or fine aggregate.

4. Summary of Test Method

4.1 A sample of the asphalt mixture to be tested is prepared in the laboratory or obtained from field production. The sample is placed in a wire basket which is positioned on a plate or other suitable container of known mass. The sample, basket, and plate or container are placed in a forced-draft oven for 1 h at a pre-selected temperature. At the end of 1 h, the basket containing the sample is removed from the oven along with the plate or container and the mass of the plate or container containing the drained material, if any, is determined. The amount of draindown is then calculated.

5. Significance and Use

5.1 This test method can be used to determine whether the amount of draindown measured for a given asphalt mixture is within specified acceptable levels. The test provides an evaluation of the draindown potential of an asphalt mixture during mixture design and/or during field production. This test is primarily used for mixtures with high coarse aggregate content such as porous asphalt (open-graded friction course) and stone matrix asphalt (SMA).

NOTE 1—The quality of the results produced by this standard are dependent on the competence of the personnel performing the procedure

¹ This test method is under the jurisdiction of ASTM Committee D04 on Road and Paving Materials and is the direct responsibility of Subcommittee D04.25 on Analysis of Asphalt Mixtures.

Current edition approved Dec. 1, 2023. Published December 2023. Originally approved in 1999. Last previous edition approved in 2017 as D6390 – 11 (2017). DOI: 10.1520/D6390-23.

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.

and the capability, calibration, and maintenance of the equipment used. Agencies that meet the criteria of Specification D3666 are generally considered capable of competent and objective testing, sampling, inspection, etc. Users of this standard are cautioned that compliance with Specification D3666 alone does not completely ensure reliable results. Reliable results depend on many factors; following the suggestions of Specification D3666 or some similar acceptable guideline provides a means of evaluating and controlling some of those factors.

6. Apparatus

6.1 *Forced-Draft Oven*, capable of maintaining the temperature in a range from 120 to 175 °C and the set temperature to within ± 2 °C.

6.2 *Plates*, or other suitable containers of appropriate size. The plates or containers used shall be of appropriate durability to withstand the oven temperatures. Cake pans or pie tins are examples of suitable types of containers.

6.3 *Standard Basket*, meeting the dimensions shown in Fig. 1. The basket shall be constructed using standard 6.3 mm sieve cloth as specified in Specification E11.

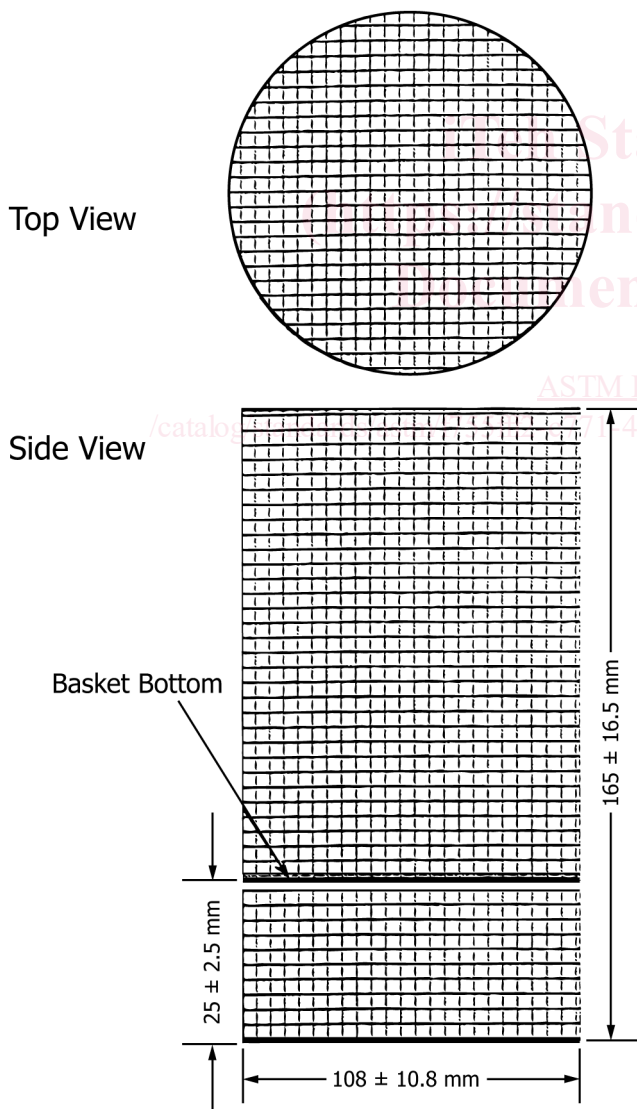


FIG. 1 Wire Basket Assembly (Not to Scale)

6.4 *Miscellaneous Equipment*—Any of the following, as needed: flat bottom metal pans for heating aggregates; scoops for batching aggregates; containers for heating asphalt binders; mixing spoons; trowels; spatulas; welder’s gloves for handling hot equipment; laboratory timers; and mechanical mixers.

6.5 *Balance*—A balance readable to 0.1 g and conforming to the requirements of Guide D4753, GP2.

7. Sample Preparation

7.1 Laboratory-Prepared Samples:

7.1.1 *Number of Samples*—For each mixture tested, the draindown characteristics shall be determined at two different temperatures. The two temperatures shall be the anticipated plant production temperature as well as 10 °C above (see Note 2). For each temperature, duplicate samples shall be tested. Thus for one asphalt mixture, a minimum of four samples will be tested.

7.1.2 Dry the aggregate to a constant mass and sieve it into appropriate size fractions as indicated in Practice D6926.

7.1.3 Determine the anticipated plant production temperature for the specific mix to be tested based on the specifications, mix design, or recommendations of the binder supplier.

7.1.4 Place into separate pans for each test sample the amount of each size fraction required to produce completed mixture samples having a mass of 1200 ± 200 g. The aggregate fractions shall be combined such that the resulting aggregate blend has the same gradation as the job-mix formula. Place the aggregate samples in an oven and heat to a temperature not to exceed the temperature established in 7.1.1.

7.1.5 Heat the asphalt binder to the temperature established in 7.1.1.

7.1.6 Place the heated aggregate in the mixing bowl. Add any stabilizers (see Note 3) and thoroughly mix the dry components. Form a crater in the aggregate blend and add the required amount of asphalt binder. The amount of asphalt binder shall be such that the final sample has the same asphalt content as the job-mix formula. At this point, the temperature of the aggregate and asphalt binder shall be at the temperature determined in 7.1.1. Mix the aggregate (and stabilizer if any) and asphalt binder quickly until the aggregate is thoroughly coated.

7.2 Plant-Produced Samples:

7.2.1 *Number of Samples*—For plant-produced samples, triplicate samples shall be tested at the plant production temperature.

7.2.2 Samples shall be obtained in accordance with Practice D979/D979M during plant production by sampling the mixture at any appropriate location such as the trucks prior to the mixture leaving the plant. Samples obtained during actual production shall be reduced to the proper test sample size.

NOTE 2—When using the test as part of the mixture design procedure, the test should be performed at two temperatures in order to determine the potential effect that plant temperature variation may have on the mixture during production. When the test is used in the field during production, it should be necessary to perform the test at the plant production temperature only.

NOTE 3—Some types of stabilizers, such as fibers or some polymers, are added directly to the aggregate prior to mixing with the asphalt binder.