



Designation: **D 6140 – 9700**

Standard Test Method to Determine Asphalt Retention of Paving Fabrics Used in Asphalt Paving for Full-Width Applications¹

This standard is issued under the fixed designation D 6140; 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 a procedure for determining the asphalt retention for paving fabrics. Paving fabrics are used in a fabric membrane interlayer system in pavements before the placement of an asphaltic overlay.

1.2 This test method shows the values in both SI units and inch-pound units. SI Units is the name for the system of metric units known as the International System of Units. Inch-pound units is the correct name for the customary units used in the United States. The values in inch-pound units are provided for information only.

1.3 *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:*

¹ This test method is under the jurisdiction of ASTM Committee D-35 on Geosynthetics and is the direct responsibility of Subcommittee D35.03 on Permeability and Filtration.

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D 123 Terminology Relating to Textiles²

D 1776 Practice for Conditioning Textiles for Testing²

D 3381 Specification for Viscosity Graded Asphalt Cement for Use In Pavement Construction³

D 4354 Practice for Sampling of ~~Geotextiles~~ Geosynthetics for Testing⁴

D 4439 Terminology for ~~Geotextiles~~ Geosynthetics⁴

D 4632 Test Method for Grab Breaking Load and Elongation of Geotextiles⁴

3. Terminology

3.1 *Definitions:*

3.1.1 *asphalt retention, n*—~~the weight~~ volume of asphalt cement retained by paving fabrics per unit area of specimen after submersion in asphalt cement.

3.1.2 *atmosphere for testing geotextiles, n*—air maintained at a relative humidity of 50 to 70 % and a temperature of 21 ± 2°C (70 ± 4°F).

3.1.3 *paving fabrics, n*—geotextile used for paving applications.

3.2 For definitions of other terms relating to geotextiles, refer to Terminology D 4439. For definitions of other terms relating to textiles, refer to Terminology D 123.

4. Summary of Test Method

4.1 Test specimens are individually weighed prior to being submerged in an asphalt cement that will be used for the overlay. The asphalt cement is maintained at a specified temperature. After submerging the specimens in the asphalt cement test, the specimens are hung to drain in the oven for a specified period of time at the same oven temperature.

4.2 Upon completion of specimen submersion in asphalt, and draining, the individual specimens are weighed and asphalt retention is determined.

5. Significance and Use

5.1 The asphalt retention is a test procedure for full-width paving ~~grade~~ fabrics. The use of this test method is to establish an index value by providing standard criteria and a basis for uniform reporting.

5.2 This procedure is applicable for testing conditioned specimens (see 8.1). The results obtained may vary, depending on which type of asphalt cement is used for the test. Unless stated otherwise, use A.C. 20 as defined in Specification D 3381 or equivalent asphalt cement.

5.3 This procedure is applicable whenever it is desired to determine an index asphalt retention of paving ~~grade~~ fabric.

5.4 If it becomes necessary for the purchaser and the seller to use this test method for acceptance testing, the statistical bias, if any, between the purchaser's and seller's laboratories should be determined. Such comparison is to be based on specimens randomly drawn from the sample of geotextile being evaluated.

6. Apparatus

6.1 *Scale or Balance*, with a capacity and sensitivity sufficient to weigh the specimens to within ~~±0.1 % of their gross weight.~~ ±0.1 grams. The accuracy of the scale should be certified by a recognized authority.

6.2 *Cutting Die or Cutting Template*, measuring 100 by 200 mm (4 by 8 in.) with a tolerance of ±1 mm (1/16 in.) in each linear dimension.

6.3 *Mechanical Convection Oven*, capable of maintaining the required test temperature within ±2°C (4°F).

6.4 *Asphalt Cement*, viscosity Grade A.C.20, or equivalent, as recommended by the specifying agency.

6.4.1 Asphalt cement should not be used for more than three series of tests. Repeated heating and cooling may change the test results due to handling of the asphalt.

NOTE 1—Repeated heating and cooling of the asphalt can change the viscosity of the asphalt and lead to higher values of asphalt retention. If an increasing trend in asphalt retention values is observed the asphalt cement should be changed.

7. Sampling and Test Specimens

7.1 As a lot sample for acceptance testing, take at random the number of rolls of fabric directed in an applicable material specification or other agreement between the purchaser and the supplier. Consider rolls of fabric to be the primary sampling units. If the specification requires sampling during manufacture, select the rolls for the lot sample at uniformly spaced time intervals throughout the production period.

7.2 Take for the laboratory sample, a sample extending the full width of the fabric of sufficient length along the selvage from each sample roll such that the requirements of 8.1 are met. The sample shall exclude material from the outer wrap of the roll or the inner wrap around the core unless the sample is taken at the production site, at which point inner and outer wrap material may be used.

² Annual Book of ASTM Standards, Vol 07.01.

³ Annual Book of ASTM Standards, Vol 04.03.

⁴ Annual Book of ASTM Standards, Vol ~~04.09~~ 04.13.

7.3 *Test Specimens*—Cut four specimens in the cross-machine direction and four specimens in the machine direction from each sample.

8. Conditioning

8.1 Condition the specimens by bringing them to approximate moisture equilibrium in the standard atmosphere for testing.

8.1.1 Equilibrium is considered to have been reached when the increase in weight of the specimen in successive weighing made at intervals of not less than 2 h does not exceed 0.1 % of the weight of the specimen.

8.2 Paving fabrics that are not significantly affected by minor variations in atmospheric conditions may be tested in prevailing room atmospheres.

8.3 If the samples cannot be properly conditioned in a reasonable time with the facilities available, perform the test determinations on the material without conditioning. When tests are carried out under conditions which vary from the standard, report the actual conditions prevailing at the time of test. It must be recognized that such results may not correspond with the results obtained from testing specimens conditioned and tested in the standard atmosphere for testing.

9. Preparation of Test Specimens

9.1 Prepare the specimens in accordance with Test Method D 4632.

10. Procedure

10.1 Select at random four machine direction and four cross-machine direction specimens measuring 100 by 200 mm (4 by 8 in.) from the individual test sample.

10.2 Condition the individual test specimens in accordance with 8.1, and then individually weigh to the nearest 0.1 g.

10.3 Preheat asphalt cement to $135 \pm 2^\circ\text{C}$ ($275 \pm 4^\circ\text{F}$).

10.4 Then submerge the individual test specimens in the specified asphalt cement maintained at a temperature of $135 \pm 2^\circ\text{C}$ ($275 \pm 4^\circ\text{F}$) in a mechanical convection oven. Keep the specimens submerged for 30 min. Two clamps may be placed on the fabric, one on each end to facilitate handling the specimen.

10.5 After the required submersion, remove the asphalt cement-coated, saturated test specimens and hang to drain (long axis vertical) in the oven at $135 \pm 2^\circ\text{C}$ ($275 \pm 4^\circ\text{F}$). Hang the test specimens for 30 min from one end and then 30 min from the other end to obtain a uniform saturation of the fabric. Before reversing the hanging direction, also place two clamps on the bottom side which will make it easier to hang the specimen. After securing the specimen, remove the first clamps.

10.6 Allow the asphalt cement-coated, saturated test specimens to cool for a minimum of 30 min and then trim any excess asphalt cement, such as edge drippings, after removing the clamps that were holding the samples.

10.7 Weigh the trimmed asphalt cement-coated, saturated test specimens to the nearest 0.1 g.

NOTE 2—It has been observed that this procedure may not result in complete saturation of paving fabrics with a mass per unit area greater than about 170 g/m^2 (5 ounces/square yard). For these fabrics the interior of the specimens should be inspected visually for dry fibers, not coated with asphalt. If this condition is observed it should be reported with the test results.

11. Calculation

11.1 *Asphalt Retention, g/m^2 (oz/ft^2)*—Calculate the average of the asphalt retention observed for all acceptable test specimens. Calculate the asphalt retention for individual test specimens as follows:

$$R_A = \frac{W_{sat} - W_g}{A_g} G$$

where:

R_A = asphalt retention, g/m^2 (oz/ft^2),

W_{sat} = weight of saturated test specimens, g (oz),

W_g = weight of geotextile test specimen before saturation, g (oz), and

A_g = area of geotextile test specimen before test, m^2 (ft^2), and

G = specific gravity of asphalt cement at 21°C . g/l.

NOTE 1—To express asphalt retention in oz/ft^2 , multiply 3—If the weight in g/m^2 specific gravity of the asphalt cement retained by 0.158— is not known, a default specific gravity of 1 or 1000 g/l can be used.

NOTE 2—To express asphalt retention in gal/yd^2 4—To convert from g/m^2 , multiply the weight in g/m^2 of asphalt cement retained by 0.00022.

NOTE 3—To express asphalt retention gal/yd^2 , multiply the weight in oz/ft^2 of asphalt cement retained by 0.066-0.221.

12. Report

12.1 Report the following information:

12.1.1 The specimens were tested as directed in test method D 6140.

12.1.2 Average value of ~~five~~ four test specimens in the machine direction.

12.1.3 Average value of ~~five~~ four test specimens in the cross-machine direction.

12.1.4 Average asphalt retention, g/m^2 (oz/ft^2) (gal/yd^2). (The average of both 12.1.2 and 12.1.3 test results.)

12.1.5 Any deviation from the described test method.

12.1.6 The type or grade of asphalt cement used.

NOTE 45—If dimensional stability of the fabric is a concern, it can be evaluated by determining change in area after the test. Remove all the wrinkles and flatten the specimen before checking the dimensions.

13. Precision and Bias

13.1 The precision of this test method is being established.

13.2 This test method has no bias because the value of asphalt retention can be defined only in terms of this test method.

14. Keywords

14.1 asphalt; full width; geosynthetic; geotextile; paving asphalt; retention

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