



# Standard Specification for Hybrid Geosynthetic Paving Mat for Highway Applications<sup>1</sup>

This standard is issued under the fixed designation D7239; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

## 1. Scope

1.1 This is a material specification covering hybrid geosynthetic paving mats typically used for, but not limited to, use in joint and localized (spot) pavement repairs; and paving mats intended for curb-to-curb coverage to provide a moisture barrier for the pavement structure and retard reflective cracking in bituminous overlays. They are typically non-woven in construction. This is a material purchasing specification and design review of use is recommended.

1.2 This is not a construction or design specification. This specification is based on hybrid geosynthetic paving mat survivability from installation stresses.

1.3 For purposes of determining conformance to this specification, values for length or area shall be rounded to the nearest 0.1 m or 0.1 m<sup>2</sup>, respectively. Values for mass shall be rounded to the nearest gram, and for force to the nearest Newton, and volume to the nearest 0.01 L, in accordance with the rounding method in Practice E29.

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

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

1.6 *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.* For product specific safety recommendations, consult the manufacturer.

<sup>1</sup> This specification is under the jurisdiction of ASTM Committee D35 on Geosynthetics and is the direct responsibility of Subcommittee D35.03 on Permeability and Filtration.

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## 2. Referenced Documents

### 2.1 ASTM Standards:<sup>2</sup>

- D123 Terminology Relating to Textiles
- D276 Test Methods for Identification of Fibers in Textiles
- D4354 Practice for Sampling of Geosynthetics and Rolled Erosion Control Products (RECPs) for Testing
- D4439 Terminology for Geosynthetics
- D4759 Practice for Determining the Specification Conformance of Geosynthetics
- D4873 Guide for Identification, Storage, and Handling of Geosynthetic Rolls and Samples
- D5035 Test Method for Breaking Force and Elongation of Textile Fabrics (Strip Method)
- D5261 Test Method for Measuring Mass per Unit Area of Geotextiles
- D6140 Test Method to Determine Asphalt Retention of Paving Fabrics Used in Asphalt Paving for Full-Width Applications
- E29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications

## 3. Terminology

3.1 *Definition of Terms*—For definitions of terms relating to geotextiles, refer to Terminology D4439. For definitions of other terms relating to textiles, refer to Terminology D123.

### 3.2 Definitions of Terms Specific to This Standard:

3.2.1 *hybrid geosynthetic paving mat, n*—a planar product manufactured from primarily inorganic materials used as an integral part of a man-made project, structure, or system. It is primarily intended for, but not limited to bituminous paving applications.

## 4. Classification

4.1 *Type*—Five types of hybrid geosynthetic paving mats are covered in this specification as follows:

<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

4.1.1 *Type I*—A single layer non-woven paving mat of 136 g/m<sup>2</sup> unit weight intended for curb-to-curb repaving of bituminous or Portland cement concrete pavements with hot mix asphaltic concrete meeting the requirements of **Table 1**.

4.1.2 *Type IIx*—A uniaxial high-strength hybrid geosynthetic paving mat consisting of a Type I mat plus reinforcement strands in the machine direction. The reinforcement strands shall be attached onto the base paving mat, and the inorganic fabric shall meet the physical properties requirements of **Table 1**. This material is intended for localized or spot repairs during the repaving of bituminous or Portland cement concrete pavements with hot mix asphalt concrete.

4.1.3 *Type Ily*—A uniaxial high-strength hybrid geosynthetic paving mat consisting of a Type I mat plus reinforcement strands in the cross direction. The reinforcement strands shall be attached onto the base paving mat, and the inorganic fabric shall meet the physical properties requirements of **Table 1**. This material is intended for localized or spot repairs during the repaving of bituminous or Portland cement concrete pavements with hot mix asphalt concrete.

4.1.4 *Type III*—A multidirectional high-strength hybrid geosynthetic paving mat consisting of a Type I mat plus reinforcement strands that are randomly oriented on the paving mat. The reinforcement shall be attached onto the base paving mat, and the inorganic fabric shall meet the physical properties requirements of **Table 1**. This material is intended for localized or spot repairs during the repaving of bituminous or Portland cement concrete pavements with hot mix asphalt concrete.

4.1.5 *Type IV*—A multidirectional high-strength hybrid geosynthetic paving mat consisting of a Type I mat plus reinforcement strands in both the machine and cross direction. The reinforcement strands shall be attached onto the base paving mat, and the inorganic fabric shall meet the physical properties requirements of **Table 1**. This material is intended for localized

or spot repairs during the repaving of bituminous or Portland cement concrete pavements with hot mix asphalt concrete.

## 5. Ordering Information

5.1 Orders for material under this specification shall include the following information:

5.1.1 This specification designation and date of issue,

5.1.2 Type I, II, III, or IV paving mat,

5.1.3 Amount in square meters or square yards required,

5.1.4 Whether special sampling for inspection is required (see Section 12),

5.1.5 Whether special packaging or marking is required (see Section 16).

## 6. Materials and Manufacture

6.1 Fibers used in the manufacture of hybrid geosynthetic paving mats may be inorganic or a combination of inorganic and organic fibers, and shall not melt at temperatures below 205°C. Any threads used in joining paving mats by sewing or knitting shall consist of long-chain synthetic polymers, and shall also be heat stable to temperatures of 205°C. They shall be formed into a stable network such that the filaments or yarns retain their dimensional stability relative to each other, including selvages.

## 7. Mechanical Properties

7.1 All property values in these specifications represent minimum average roll values (MARV; that is, average test results of any roll in a lot sampled for conformance or quality assurance testing shall meet or exceed the minimum values provided herein).

## 8. Dimensions, Mass, and Permissible Variations

### 8.1 Roll Sizes:

8.1.1 The manufacturer and purchaser shall agree upon the length and width of the hybrid geosynthetic paving mat rolls.

8.1.1.1 Roll dimensions of all types of hybrid geosynthetic paving mats shall not vary more than 0.5 % of the stated length and width.

### 8.2 Mass Measurements:

8.2.1 Mass of all types of hybrid geosynthetic paving mats shall not be less than the MARV values shown in **Table 1**.

## 9. Workmanship, Finish, and Appearance

9.1 Rolls of hybrid geosynthetic paving mats should be free of cuts or rips in the outer covering that may cause damage to the integrity of the Paving mat. Minor scuffing or damage to the roll may be removed by cutting off the damaged section of the Paving mat.

9.2 The ends of the cardboard tubes that serve as the core around which the hybrid geosynthetic paving mat is wrapped should be free of serious damage that might impede smooth rollout of the Paving mat during application. Minor denting or tearing will not impede normal application, but severely damaged rolls shall be returned for credit to the supplier.

**TABLE 1 Hybrid Geosynthetic Paving Mat Property Requirements<sup>A</sup>**

| Property            | Test Method                  | Units            | Type I     | Type II <sup>B</sup> | Type III   | Type IV    |
|---------------------|------------------------------|------------------|------------|----------------------|------------|------------|
| Breaking Strength   | ASTM<br>D5035 <sup>C,F</sup> | N/50 mm          | 200        | 3250                 | 400        | 3250       |
| Ultimate Elongation | ASTM<br>D5035 <sup>C,F</sup> | %                | ≤5         | ≤10                  | ≤10        | ≤10        |
| Mass per Unit Area  | ASTM<br>D5261                | g/m <sup>2</sup> | 125        | 300                  | 300        | 450        |
| Asphalt Retention   | ASTM<br>D6140                | L/m <sup>2</sup> | <i>D,E</i> | <i>D,E</i>           | <i>D,E</i> | <i>D,E</i> |
| Melting Point       | ASTM<br>D276                 | °C               | 205        | 205                  | 205        | 205        |

<sup>A</sup> All numeric values represent MARV in the weaker principal direction.

<sup>B</sup> Strength measurement minimum shall represent the direction of the reinforcing fibers in the Type II product.

<sup>C</sup> Sample length: 250 mm. Sample width: 50 mm. Gauge length: 180 mm. Crosshead speed: 50 mm/min.

<sup>D</sup> Asphalt required to saturate paving mat only. Asphalt retention must be provided in manufacturer certification (refer to Section 14). Value does not indicate the asphalt application rate required for construction.

<sup>E</sup> Asphalt retention property must meet the MARV value provided by the manufacturer certification (refer to Section 14).

<sup>F</sup> Hybrid geosynthetic paving mat materials should be manufactured in such a way that the properties of the material are consistent. It is therefore suggested that the option of symmetrical testing in an off-axis orientation, for example +45°, and +315°, be considered to demonstrate consistent quality of manufacturing.

## 10. Sampling

10.1 Hybrid geosynthetic paving mats shall be subject to sampling and testing to verify conformance with this specification. Sampling shall be in accordance with Practice **D4354**, using the section titled, “Procedure for Sampling for Purchaser’s Specification Conformance Testing.” In the absence of purchaser’s testing, verification may be based on manufacturer’s certifications as a result of testing by the manufacturer of quality assurance samples obtained using the procedure for Sampling for Manufacturer’s Quality Assurance (MQA) Testing. A lot size shall be considered to be the shipment quantity of the given product, or a truckload of the given product, whichever is smaller.

## 11. Number of Tests and Retests

11.1 Testing shall be performed in accordance with the methods referenced in this specification for the indicated application. The number of specimens to test per sample is specified by each test method. Paving mat product acceptance shall be based on Practice **D4759**. Product acceptance is determined by comparing the average test results of all specimens within a given sample to the specification MARV. Refer to Practice **D4759** for more details regarding geotextile acceptance procedures.

## 12. Inspection

12.1 Unless otherwise specified in the contract or purchase order, the supplier shall be responsible for the performance of all inspection requirements as specified herein.

12.2 Except as otherwise specified, the supplier shall use their own facilities or any commercial laboratory acceptable to the purchaser for analysis of material. The purchaser reserves the right to perform any of the inspections set forth in this specification where such inspections are deemed necessary to ensure that supplies and services conform to the prescribed requirements.

## 13. Rejection and Rehearing

13.1 The hybrid geosynthetic paving mat shall be subject to rejection if it fails to conform to any of the requirements of this specification. Rejection should be reported to the producer or supplier promptly and in writing. In case of dissatisfaction with the results of the test, the producer or supplier may make claim for a rehearing.

## 14. Certification

14.1 The supplier shall provide to the purchaser a certificate stating the name of the manufacturer, product name, hybrid

geosynthetic paving mat type, composition of the hybrid geosynthetic paving mat fabric and filaments or yarns, and other pertinent information to fully describe the hybrid geosynthetic paving mat.

14.2 The manufacturer is responsible for establishing and maintaining a quality control program to assure compliance with the requirements of the specification.

14.3 The manufacturer’s certificate shall state the asphalt retention rate based on the results from Test Method **D6140**.

14.4 The manufacturer’s certificate shall state that the furnished hybrid geosynthetic paving mat meets MARV requirements of the specification as evaluated under the manufacturer’s quality control program. A person having legal authority to bind the manufacturer shall attest to the certificate.

14.5 Either mislabeling or misrepresentation of materials shall be reason to reject those hybrid geosynthetic paving mat products.

## 15. Product Marking

15.1 Hybrid geosynthetic paving mat labeling, shipment, and storage shall follow Guide **D4873**. Product labels shall clearly show the manufacturer or supplier name, style name, roll number, and length and width of roll. Each shipping document shall include a notation certifying that the material is in accordance with the manufacturer’s certificate.

## 16. Packaging and Package Marking

16.1 Each hybrid geosynthetic paving mat roll shall be wrapped with a material that will protect the paving mat, including the ends of the roll, from damage due to shipment, water, and contaminants. The protective wrapping shall be maintained during periods of shipment and storage. Product labels shall clearly show the manufacturer or supplier name, style name, and roll number.

## 17. Supplementary Requirements

17.1 During storage, hybrid geosynthetic paving mat rolls shall be elevated off the ground and adequately covered to protect them from the following: site construction damage, precipitation, chemicals that are strong acids or strong bases, flames including welding sparks, temperatures in excess of 71°C, and any other environmental condition that may damage the physical property values of the paving mat.

## 18. Keywords

18.1 hybrid geosynthetic paving mats; moisture barriers; pavement joint repairs; paving mats; reflective crackings

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