



**Designation: D7239 – 13 (Reapproved 2023)**

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

1.7 *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.*

<sup>1</sup> This specification is under the jurisdiction of ASTM Committee D35 on Geosynthetics and is the direct responsibility of Subcommittee D35.06 on Geosynthetic Specifications.

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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 (Withdrawn 2021)<sup>3</sup>

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/D4873M 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 manmade 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.

<sup>3</sup> The last approved version of this historical standard is referenced on [www.astm.org](http://www.astm.org).

4.1.1 *Type I*—A single-layer, nonwoven 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 IIy*—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**), and

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 by 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 D5035 <sup>C,F</sup> | N/50 mm          | 200    | 3250                 | 400      | 3250    |
| Ultimate Elongation | ASTM D5035 <sup>C,F</sup> | %                | ≤5     | ≤10                  | ≤10      | ≤10     |
| Mass per Unit Area  | ASTM D5261                | g/m <sup>2</sup> | 125    | 300                  | 300      | 450     |
| Asphalt Retention   | ASTM D6140                | L/m <sup>2</sup> | D,E    | D,E                  | D,E      | D,E     |
| Melting Point       | ASTM 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.