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Standard Specification for Thermoplastic Fabrics Used in Hot-Applied Roofing and Waterproofing[1]

This standard is issued under the fixed designation D5726; 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 specification covers thermoplastic fabrics such as polyester, polyester/polyamide bicomponent, or composites with fiber glass or polyester scrims that can be used during the construction of hot-applied roofing and waterproofing.

1.2 This specification is intended as a material specification. Issues regarding the suitability of specific roof constructions or application techniques are beyond the scope of this specification.

1.3 The specified tests and property values used to characterize the respective fabrics are intended to establish minimum properties. In-place system design criteria or performance attributes are factors beyond the scope of this material specification.

1.4 The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.

1.5 *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:*[2]

D123 Terminology Relating to Textiles

D1079 Terminology Relating to Roofing and Waterproofing

D1117 Guide for Evaluating Nonwoven Fabrics (Withdrawn 2009)[3]

D1776 Practice for Conditioning and Testing Textiles

D1777 Test Method for Thickness of Textile Materials

D4830 Test Methods for Characterizing Thermoplastic Fabrics Used in Roofing and Waterproofing

D5035 Test Method for Breaking Force and Elongation of Textile Fabrics (Strip Method)

D5733 Test Method for Tearing Strength of Nonwoven Fabrics by the Trapezoid Procedure (Withdrawn 2008)[3]

E1 Specification for ASTM Liquid-in-Glass Thermometers

2.2 *Other Standard:*

AATCC Test Set No. 128, Wrinkle Recovery Test[4]

3. Terminology

3.1 *Definitions*—For definitions of terms used in this specification, refer to Terminologies D1079 and D123.

4. Classification

4.1 The thermoplastic fabrics covered by this specification are of the following general constructions and compositions. Each is a separate class or type, differentiated by polymer type, a combination of polymers, or the manufacturing process, or some combination thereof:

4.1.1 *Type I*—Polyester spunbonded with resin, unneedled;

4.1.2 *Type II*—Polyester spunbonded with resin, needled;

4.1.3 *Type III*—Polyester mat plus fiber glass scrim and resin; and

4.1.4 *Type IV*—Polyester core/polyamide sheath bicomponent spunbonded.

5. Materials and Manufacture

5.1 The fabric shall be a uniform, thin, porous mat of the primary thermoplastic polymer, with or without the addition of reinforcing stranded glass or thermoplastic yarns. Chemically bonding with a water-resistant resin or thermally bonding with other thermoplastic polymers shall be permitted.

6. Physical Properties, Thickness, and Mass

6.1 Fabrics shall conform to the thickness, mass, and physical properties presented in Table 1.

[1] This specification is under the jurisdiction of ASTM Committee D08 on Roofing and Waterproofing and is the direct responsibility of Subcommittee D08.04 on Felts, Fabrics and Bituminous Sheet Materials.

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[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.

[3] The last approved version of this historical standard is referenced on www.astm.org.

[4] Available from American Association of Textile Chemists and Colorists (AATCC), One Davis Dr., P.O. Box 12215, Research Triangle Park, NC 27709-2215.

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TABLE 1 Physical Properties of Thermoplastic Fabrics for Use in Hot-Applied Roofing and Waterproofing

Properties	Types			
	I	II	III	IV
Unit mass, nominal, g/m^2 (oz/yd ^{2}) (lb/100 ft^2)	155 (4.6) (3.2)	140 (4.1) (2.8)	125 (3.7) (2.6)	327 (9.6) (6.7)
Thickness, mm (mils), min	0.42 (16)	0.51 (20)	0.41 (16)	0.92 (36)
Breaking load, kN/m (lbf/in.), min, MD and CD	8.8 (50)	5.2 (30)	20.5 (117)	14.9 (85)
Elongation, % min, MD and CD	46	25	3.3	34
Trapezoid tearing strength, N (lbf), min, MD and CD	155 (35)	107 (24)	31 (7)	256 (57)
Puncture strength, N (lbf), min	231 (52)	169 (38)	53 (12)	316 (71)
Appearance rating (AATCC Test Set No. 128), pass (4 and 5) and fail (1 to 3)	Pass	Pass	Pass	Pass
Heat distortion stability, % change max, MD and CD	2	2	0.2	2

7. Unit Mass

7.1 Determine the unit mass of the fabric using the procedures described in Test Methods D1117.

8. Workmanship, Finish, and Appearance

8.1 The finished material shall be free of visible defects such as ragged or untrue edges, folds, creases, wrinkles, tears, and holes.

9. Sampling

9.1 Sample the material and determine the properties enumerated in this specification in accordance with the test procedures referenced and presented herein.

10. Thickness

10.1 Determine the thickness of the fabric using the procedures described in Test Method D1777.

11. Breaking Load and Elongation

11.1 Determine the breaking load and elongation by the cut strip method described in Test Methods D4830 and D5035. The preferred SI unit for breaking load is kN/m.

12. Trapezoid Tearing Strength

12.1 Determine the trapezoid tearing strength using the procedures described in Test Method D5733.

13. Puncture Strength

13.1 Determine the puncture strength using the procedures described in Test Methods D4830.

14. Heat Distortion/Stability

14.1 *Scope*—This test method, which uses hot silicone oil, is a procedure for simulating the distortion that may occur with the laying of a fabric roofing ply into hot bitumen during the construction of a hot-applied built-up roofing membrane.

14.2 *Summary of Test Method*—Fabric specimens are laid into hot silicone oil at 260°C (500°F), allowed to cool to room temperature, and then removed and measured for percent shrinkage and rated visually for distortion.

14.3 *Significance and Use*—Not all thermoplastic fabrics are suitable for hot-applied built-up roofing. This test procedure is designed to simulate hot-applied built-up application and to identify those thermoplastic fabrics that are suitable and not susceptible to excessive shrinkage or distortion, or both.

14.4 *Apparatus and Materials:*

14.4.1 *Stainless Steel Container,* appropriately sized, used to heat the silicone oil.

14.4.2 *Heating Mantle,* used in conjunction with the container and capable of heating the silicone oil adequately.

14.4.3 *Thermometer,* graduated in 1°C (2°F) intervals and including the range of 260 to 288°C (500 to 550°F) on its scale, such as ASTM No. 2F-86 (see Specification E1).

14.4.4 *Stainless Steel Ladle,* with a capacity of 0.09 L (3 oz).

14.4.5 *Aluminum Baking Pans,* measuring approximately 273-mm long by 178-wide by 25-mm deep (10.75 by 7 by 1 in.).

14.4.6 *Silicone Oil,* Dow Corning 710 Fluid[5] or an equivalent.

14.4.7 *Safety Equipment,* which includes long arm rubber gloves or hot gloves, an apron, and face shield, which are recommended to help prevent possible injury.

14.4.8 *Insulation Board,* a minimum 25-mm (1-in.) thickness, to be used beneath the metal pans as a method of reducing excessive heat loss when pouring the hot silicone oil just prior to introduction of the fabric sample.

14.4.9 The *AATCC Test Set No. 128, Wrinkle Recovery Test*, used to visually evaluate and rate the fabric distortion after testing.

14.5 *Preparation of Specimens:*

14.5.1 Each test specimen shall be 254-mm (10-in.) long and 152-mm (6-in.) wide, with the length dimension taken parallel to the machine direction of the fabric.

14.5.2 Cut five specimens spaced uniformly across the fabric sample. No specimen shall be taken within 51 mm (2 in.) of any selvage edge of the fabric.

14.5.3 Using an indelible marker, mark a 25-mm (1-in.) border from each outside edge, forming a block that will be used for measurement purposes.

14.6 *Conditioning*—Condition the test specimens using the procedures described in Practice D1776.

14.7 *Procedure:*

[5] Silicone oil, available from Dow Corning Corp., South Saginaw Road, Midland, MI 48686, has been found suitable for this purpose.

14.7.1 Heat the silicone oil to approximately 274°C (525°F). Place the ladle in the oil to allow it to equilibrate and minimize excessive, rapid cooling of the oil prior to adding to the test pans.

14.7.2 Measure and record the original length and width measurements of the bordered box pattern. Measure along each line and at a midpoint in both directions to provide for averaging of the measurements in both directions.

14.7.3 Lay an aluminum baking pan on top of the insulation board.

14.7.4 Remove a ladle full of silicone oil, and immerse the thermometer in the oil. When the temperature has dropped to 260°C (500°F), pour quickly into the test pan.

14.7.5 Within 3 s after pouring the oil, lay a fabric specimen into the oil, placing one end in the pan and rolling in the remaining length of the fabric.

14.7.6 Take additional pans, and repeat the process described in 14.7.3 through 14.7.5 for the remaining four specimens.

14.7.7 Once cooled to room temperature, remove the fabric specimen from the test pan and place it on an absorbent towel, dabbing with additional absorbent towels to remove as much excess oil as possible.

14.7.8 Rate and record the visual distortion and appearance rating of each specimen using AATCC Test Set No. 128. An average can then be determined for the sample fabric.

14.8 *Calculation:*

14.8.1 Remeasure the dimensions of the outlined block for each specimen as described in 14.7.2. Do not attempt to flatten or straighten the specimen for measurements.

14.8.2 Using the initial and final (as tested) measurements for each specimen, determine the percent of shrinkage of the fabric sample as follows:

$$\%\ \text{shrinkage}\ (\text{length}) = 100 \times \frac{\text{initial length} - \text{final length}}{\text{initial length}} \quad (1)$$

$$\%\ \text{shrinkage}\ (\text{width}) = 100 \times \frac{\text{initial width} - \text{final width}}{\text{initial width}} \quad (2)$$

14.9 *Report:*

14.9.1 State that the tests were performed in accordance with these specified test methods. Describe the material or product evaluated and sampling method used.

14.9.2 Record the distortion appearance rating for each test specimen as determined with AATCC Test Set No. 128, and determine the average.

14.9.3 The tested fabric will be qualified on a pass/fail basis. If the average visual rating as determined with AATCC Test Set No. 128 is found to be 4 or 5, the sample is considered to be suitable for application as a hot-applied built-up ply reinforcement. The test sample is considered to have failed with a visual rating of 1 to 3.

14.9.4 For fabrics that have passed the requirements given in 14.9.3, record the percent shrinkage in both directions for each specimen. Determine the respective averages, and report them as that sample's percent shrinkage.

14.10 *Precision and Bias:*

14.10.1 *Precision*—The precision of the procedure in this test method is being determined.

14.10.2 *Bias*—Since there is no accepted reference material to determine the bias for the procedure in this test method of determining the heat distortion/stability of thermoplastic fabrics for use in hot-applied built-up roofing, no bias statement is being made.

15. Inspection

15.1 *Inspection*—Inspection shall be in accordance with the requirements of this specification.

15.2 *Inspection Alternatives*—Alternative inspection requirements shall be determined by and as agreed upon between the purchaser and the supplier.

16. Rejection and Resubmittal

16.1 *Failure to Conform*—Failure to conform to any of the requirements as stated in this specification constitutes grounds for rejection.

16.2 *Rejection Redress*—The supplier shall have the right to inspect the rejected materials. The supplier and the purchaser shall agree to the quantity of rolls deemed unacceptable. The supplier shall then have the right to submit the same number of new rolls as replacement.

17. Packaging and Package Marking

17.1 The rolls shall be wrapped or banded securely with a substantial grade of paper, plastic wrap, or taping that encircles the roll in a manner that will prevent slipping or unraveling.

17.2 No roll shall contain more than two pieces, and no more than 3 % of the rolls in any lot (pallet or shipment) shall contain two pieces. Pieces represent roll ends that can be (*1*) individual and loose, (*2*) adhered, or (*3*) stitched to appear as one continuous piece. These rolls must be marked clearly with a red tag or other item to identify the location of the splice.

17.3 Unless otherwise specified, each package shall be marked plainly with the manufacturer's or supplier's name, product or brand name, or both, and the ASTM designation and type.

18. Keywords

18.1 fiber glass scrim; hot-applied roofing and waterproofing; polyester/polyamide reinforcement; polyester reinforcement; thermoplastic fabrics

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