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Standard Specification for Self-Adhesive Polyester Fabric Reinforced Polymer-Modified Asphalt Steep Slope Roll Roofing Surfaced with Mineral Granules¹

This standard is issued under the fixed designation D7505/D7505M; 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 prefabricated, self-adhesive, polyester fabric reinforced, polymer-modified asphalt surfaced roll roofing products, with granule surfacing, designed for steep slope applications. These products use polymer modifiers in their top and bottom coatings. These products have an adhesive bottom layer which is exposed by removal of a peel-away protective release paper or film sheet.

1.2 The specified tests and property limits used to characterize the sheet materials are intended to establish minimum properties. In-place roof system design criteria such as fire resistance, field strength, impact/puncture resistance, material compatibility, uplift resistance, and others, are factors beyond the scope of this material specification. Factors regarding the suitability of specific roof constructions or application techniques are beyond this scope.

1.3 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in nonconformance with 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.*

¹ This specification is under the jurisdiction of ASTM Committee D08 on Roofing and Waterproofing and is the direct responsibility of Subcommittee D08.02 on Steep Roofing Products and Assemblies.

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2. Referenced Documents

2.1 *ASTM Standards:*²

D903 Test Method for Peel or Stripping Strength of Adhesive Bonds

D1079 Terminology Relating to Roofing and Waterproofing
D4977/D4977M Test Method for Granule Adhesion to Mineral-Surfaced Roofing by Abrasion

D5147/D5147M Test Methods for Sampling and Testing Modified Bituminous Sheet Material

3. Terminology

3.1 *Definitions:*

3.1.1 For definitions of terms used in this specification, refer to Terminology D1079.

3.1.2 *ultimate elongation, n*—the elongation measured on the load-elongation curve at which point the load has dropped to 5 % of its maximum value, after the peak load has been reached.

4. Materials and Manufacture

4.1 In the process of manufacture, the reinforcing mat is permitted to be impregnated with asphalt or modified asphalt and is coated on its top and bottom sides with polymer-modified asphalt coatings. The polymer-modified asphalt coatings are permitted to be compounded with a mineral stabilizer. The coating on the bottom side shall feature self-adhesive properties.

4.2 The sheet is surfaced on the weather side with mineral granules, except for any selvage.

5. Physical Properties

5.1 The sheet shall conform to the minimum physical properties prescribed in Table 1.

5.2 The finished product shall not crack nor be so sticky as to cause tearing or other material damage upon being unrolled

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.

TABLE 1 Physical Properties of Self-Adhesive Polyester Fabric Reinforced Polymer Modified Asphalt Steep Slope Roll Roofing Surfaced with Mineral Granules^{A,B}

Property	SI [inch-pound]
Thickness, min, mm [mils]	3 [120]
Peak Load at $-18 \pm 2 \text{ }^\circ\text{C}$ [$0 \pm 4 \text{ }^\circ\text{F}$], MD and XMD, min, before and after heat conditioning, kN/m [lbf/in.]	11.4 [65]
Elongation at $-18 \pm 2 \text{ }^\circ\text{C}$ [$0 \pm 4 \text{ }^\circ\text{F}$], MD and XMD, min, at Peak Load, before and after heat conditioning, %	15
Peak Load at $23 \pm 2 \text{ }^\circ\text{C}$ [$73 \pm 4 \text{ }^\circ\text{F}$], MD and XMD, min, before and after heat conditioning, kN/m [lbf/in.]	7.9 [45]
Elongation at $23 \pm 2 \text{ }^\circ\text{C}$ [$73 \pm 4 \text{ }^\circ\text{F}$], MD and XMD, min, at Peak Load, before and after heat conditioning, %	30
Ultimate Elongation at $23 \pm 2 \text{ }^\circ\text{C}$ [$73 \pm 4 \text{ }^\circ\text{F}$], MD and XMD, min, before and after heat conditioning, %	35
Tear strength at $23 \pm 2 \text{ }^\circ\text{C}$ [$73 \pm 4 \text{ }^\circ\text{F}$], min, N [lbf]	246 [55]
Low temperature flexibility, max, before and after heat conditioning, $^\circ\text{C}$ [$^\circ\text{F}$]	0 [32]
Adhesion to plywood, at $4 \pm 1 \text{ }^\circ\text{C}$ [$40 \pm 2 \text{ }^\circ\text{F}$], min, N/m, [lbf/ft]	30 [2]
Adhesion to plywood, at $23 \pm 2 \text{ }^\circ\text{C}$ [$73 \pm 4 \text{ }^\circ\text{F}$], min, N/m, [lbf/ft]	180 [12]
Side Lap Integrity (Head of Water Test)	Pass
Dimensional stability, max, %	0.5
Thermal stability at $70 \text{ }^\circ\text{C}$ [$158 \text{ }^\circ\text{F}$], max, mm [in.]	3 [0.1]
Granule loss, max, g	2.0

^A The properties in this table are "as manufactured" unless otherwise noted.

^B See Appendix X1.

at any product temperature between 4 and 60 °C [40 and 140 °F] or at a lower temperature if the manufacturer allows application at such lower temperature.

5.3 The release paper or film sheet shall not tear during removal.

6. Dimensions and Permissible Variations

6.1 The width and area of the finished product shall conform to the following:

6.1.1 The width of the roll shall be as agreed between the purchaser and the seller and shall not vary more than 1 %.

6.1.2 The area of the roll shall be no less than as agreed between the purchaser and the seller.

7. Workmanship, Finish, and Appearance

7.1 The reinforcement shall be coated completely in a continuous, unbroken film and shall be free of such defects as holes, tears, cracks, wrinkles, or permanent deformations, blisters, ragged or untrue edges, and areas of uncoated reinforcement.

7.2 The surface of the weather side, exclusive of any selvage, shall be uniform in finish and texture.

7.3 The mineral granules shall be distributed in a uniform layer over the entire surface, excluding any selvage, and shall be embedded firmly in the polymer-modified asphalt coating. The line of demarcation between the granule-surfaced portion of the weather side and any selvage shall be straight and parallel to the edges of the sheet.

7.4 When unrolled on a smooth plane, the sheet shall be straight and true so that the lap shall completely cover the selvage width without wrinkles, buckles, or fishmouths and without allowing any asphalt to show through.

8. Sampling and Test Methods

8.1 Sample the material and determine the properties described in this specification in accordance with Test Methods **D5147/D5147M**, unless otherwise indicated.

8.2 *Conditioning*—Unless otherwise specified, condition test specimens for at least 4 h at $23 \pm 2 \text{ }^\circ\text{C}$ [$73 \pm 4 \text{ }^\circ\text{F}$] and $50 \pm 10 \text{ } \%$ relative humidity prior to testing.

8.3 *Ultimate Elongation*—Sample the material and determine the ultimate elongation at $23 \pm 2 \text{ }^\circ\text{C}$ [$73 \pm 4 \text{ }^\circ\text{F}$] in accordance with Test Methods **D5147/D5147M** (Section 7) and as defined in 3.1.2.

8.4 *Adhesion to Plywood*—This test method covers the determination of the adhesive properties of the product sheets to plywood as set forth in Test Method **D903**, except as noted below.

8.4.1 *Conditioning*—Testing is to be performed at two temperatures, $23 \pm 2 \text{ }^\circ\text{C}$ [$73 \pm 4 \text{ }^\circ\text{F}$] and $4 \pm 1 \text{ }^\circ\text{C}$ [$40 \pm 2 \text{ }^\circ\text{F}$]. Materials used to construct test specimens, including the plywood and the roller, must be conditioned at the test temperature for at least 4 h prior to assembly. Similarly, the test assembly (specimen adhered to plywood) must be conditioned at the test temperature for at least 1 h prior to testing.

8.4.2 Specimen Preparation:

8.4.2.1 The test specimen shall consist of one piece of product sheet, 75 ± 2 by 200 ± 2 mm [3 ± 0.125 by 8 ± 0.125 in.], overlapped and bonded to an area of 9400 mm^2 [15 in.^2], 75 by 125 mm [3 by 5 in.], of the top surface of a piece of plywood, 75 by 150 mm [3 by 6 in.] so that the last inch of the plywood (a strip 25 by 75 mm [1 by 3 in.]) is exposed for subsequent gripping in the test machine, and 75 mm [3 in.] of the product is available for gripping in the test machine. The plywood shall be 6 mm [$1/4$ in.] minimum thickness, APA Grade, Exposure 1, and the product shall be adhered to the surface intended for exposure. The plywood must not be reused for testing.

8.4.2.2 Roll test specimen three times back and forth with a roller which has a mass of 12 kg [26 lb] $\pm 0.5 \text{ } \%$, diameter of 125 mm [5 in.] $\pm 5 \text{ } \%$, and width of 125 mm [5 in.] $\pm 5 \text{ } \%$. Roll at a rate of 2 to 3 s per back and forth cycle.

8.4.2.3 At least five specimens shall be tested for each test temperature.

8.4.2.4 The specimens shall be assembled individually. Cutting specimens to size after assembly may influence the test results.

NOTE 1—Adhesion to other potential wood deck materials and substrates may also be determined by this test method.

8.4.3 Apparatus:

8.4.3.1 Perform the test in a constant rate of extension type test machine.

8.4.3.2 The rate of travel of the crosshead shall be 50 mm [2 in.]/min $\pm 3\%$. This rate, which provides a laminate separation rate of 25 mm [1 in.]/min $\pm 3\%$, shall be uniform throughout the test.

8.4.4 Procedure:

8.4.4.1 Separate the free end of the sheet from the plywood for a distance of about 50 mm [2 in.] leaving about 75 mm [3 in.] of bonded length. Place the specimen in the testing machine by clamping the free end of the plywood in the fixed grip, turning back the free end of the sheet and clamping it in the other grip. Maintain the specimen in the approximate plane of the clamps during the test. Peel at least three quarters of the bonded area, even though a peel or stripping value may be indicated before this point.

8.4.5 Calculation—Determine the peel strength as the average load line that accommodates the recorded curve. Record the load so indicated, corrected for any initial off-zero starting point caused by the weight of the test assembly.

8.4.6 Reporting—For each series of tests, report the number of measurements, the average, and the standard deviation of all the test values in N/m of width [lbf/ft of width]. The average shall be used for comparison with the requirements in Table 1.

8.5 Thermal Stability—This test method determines the thermal stability of the product sheets.

8.5.1 Specimens:

8.5.1.1 The test assembly shall consist of one specimen of product sheet, $100 \pm 3 \text{ mm}^2$ [$4 \pm 0.125 \text{ in.}^2$], centered and bonded (as described in 8.4.2.2) to one piece of $\frac{1}{4}$ in. thick plywood, (APA Grade, Exposure 1) 150 ± 3 by 200 ± 3 mm [6 ± 0.125 by 8 ± 0.125 in.]. Center the product sheet relative to the 150 mm [6 in.] width of the plywood; position the sheet so the top edge is 25 ± 3 mm [1 ± 0.125 in.] below one of the 150 mm [6 in.] edges of the plywood; and bond the sheet to the plywood. Using a fine-point permanent marker, draw a line located at the bottom edge of the product sheet completely across the 150 mm [6 in.] width of plywood.

8.5.1.2 At least one specimen from each sample roll.

8.5.2 Procedure:

8.5.2.1 Set specimens at a 45° angle in a hot air circulating oven maintained at $70 \pm 2^\circ\text{C}$ [$158 \pm 4^\circ\text{F}$] for 14 days.

8.5.2.2 At the end of the oven exposure period, allow specimens to equilibrate to $23 \pm 2^\circ\text{C}$ [$73 \pm 4^\circ\text{F}$] and $50 \pm 10\%$ relative humidity for at least 4 h.

8.5.2.3 From the line that was drawn along the bottom edge of the product sheet, measure to the nearest 1 mm [0.05 in.] the furthest points of modified asphalt flow at five equally spaced locations across the width of the specimen. For each specimen, calculate the flow across the lower edge by averaging the values determined at the five equally spaced locations.

8.5.3 Report—Report the average of the individual specimen averages calculated in 8.5.2.3. The average of the individual specimen averages calculated in 8.5.2.3 shall be used for comparison with the requirement in Table 1.

8.6 Side Lap Integrity (Head of Water Test):

8.6.1 This test method determines the waterproof integrity of side lap seams formed according to the manufacturers' instructions or rolled as described in 8.4.2.2 at $23 \pm 2^\circ\text{C}$ [$73 \pm 4^\circ\text{F}$].

8.6.2 Specimens:

8.6.2.1 The test specimen shall consist of two pieces of sheet, one with a selvage along the longer dimension, 200 by 300 mm [8 by 12 in.] $\pm 5\%$ with the centerline of the selvage centered on a piece of 10 mm [$\frac{3}{8}$ in.] minimum thick, 300 by 300 mm [12 by 12 in.] $\pm 5\%$ APA Grade, Exposure 1 plywood. The second sample (no selvage) shall have dimensions of 200 by 250 mm [8 by 10 in.] $\pm 5\%$.

8.6.2.2 At least one specimen shall be tested for each sample roll.

8.6.3 Procedure:

8.6.3.1 At room temperature ($23 \pm 2^\circ\text{C}$ [$73 \pm 4^\circ\text{F}$]), peel the entire release paper or film off the first self-adhesive sheet and place the sheet on the plywood. Roll the sheet as described in 8.4.2.2. Place the second sheet (with release film partially peeled off only to expose bottom coating to cover just the selvage) over the selvage positioned in a way to allow 25 mm [1 in.] $\pm 5\%$ of the selvage below to be exposed per Fig. 1 and press down the edges of the sheet manually with finger pressure just hard enough to keep them from lifting. Roll over the lap as specified in 8.4.2.2. The top sheet must only be adhered over the selvage, and must be loose over plywood past the selvage area.

8.6.3.2 Cut the bottom out of a 4 L [1 gal] can with a can opener and center it, bottom side down, on the membrane centering it with the inner edge of the selvage. Apply a 6 mm [0.25 in.] bead of silicone sealant completely around the outside rim of the can to bond it to the membrane. As shown in Fig. 1, apply the bead of caulk around all three edges of the upper membrane until the end of the selvage area. Allow 2 h for the sealant to set, then apply another bead around the inside rim of the can.

8.6.3.3 After waiting 24 h at ambient temperature for the sealant caulking to cure, fill the can to a depth of 125 mm [5 in.] with deionized or distilled water. Set the test assembly over a container capable of catching all the water in case there is a leak. Place the entire assembly in a refrigeration unit maintained at $4 \pm 1^\circ\text{C}$ [$40 \pm 2^\circ\text{F}$] for a period of three days.

8.6.3.4 At the conclusion of the test, remove the test assembly from the refrigeration unit, pour the water from the can, and blot the inside dry. Peel the can from the sheet then lift the top sheet, and inspect the underside for any signs of water.

8.6.4 Report—Observe and report whether or not water is found between the plywood and the sheet. Report as a *failure* if water is present in any of these areas, or as a *pass* if dry. All specimens must pass to satisfy the requirements of Table 1.

8.7 Granule Embedment—Test in accordance with Test Method D4977/D4977M and report the average granule loss for each sample roll.

9. Inspection

9.1 Inspection of the material shall be agreed upon between the purchaser and the manufacturer/supplier as part of the purchase contract.