



## Standard Test Methods for Strength of Modified Bitumen Sheet Material Laps Using Cold Process Adhesive<sup>1</sup>

This standard is issued under the fixed designation D7379/D7379M; 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.

<sup>ε1</sup> NOTE—Units information was editorially corrected in January 2015.

### 1. Scope

1.1 These test methods cover the procedure for sampling and testing the strength of laps formed with adhesive used with polymer-modified bituminous sheet materials.

1.2 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 non-conformance with the standard.

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:*<sup>2</sup>

D140 Practice for Sampling Bituminous Materials

D146 Test Methods for Sampling and Testing Bitumen-Saturated Felts and Woven Fabrics for Roofing and Waterproofing

D5147 Test Methods for Sampling and Testing Modified Bituminous Sheet Material

### 3. Significance and Use

3.1 These tests are useful in sampling and testing combinations of modified bitumen sheet materials used with cold applied adhesives.

<sup>1</sup> These test methods are 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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<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. Sampling

4.1 From each shipment or fraction thereof, select at random a number of modified bitumen rolls and containers of adhesive in accordance with the following. Determine the number of adhesive containers to be sampled in accordance with Practice D140. Determine the number of rolls to be selected in accordance with Section 3, Sampling, of Test Methods D146.

### 5. Conditioning

5.1 Condition test materials for a minimum of 4 h at  $23 \pm 2^\circ\text{C}$  [ $73.4 \pm 3.6^\circ\text{F}$ ] and  $50 \pm 5\%$  relative humidity before preparing specimens for testing.

### 6. Lap T-Peel Strength

6.1 This test method covers the determination of the T-peel strength of polymer-modified bituminous sheet material and cold applied adhesive combinations.

6.1.1 *Modified Bitumen Samples for Testing*—Samples for testing shall consist of two 140 by 152 mm [5.5 by 6 in.] test panels of modified bitumen, bonded with the adhesive to be tested, and cut into 25 mm [1 in.] specimens as shown in Fig. 1. Cut the modified bitumen sheet materials and mate the sides to be bonded facing each other.

6.1.2 Sides to be bonded shall be prepared in the same fashion as a field seam is constructed with the bottom side of a top panel bonded to the top side (selvage) of the bottom panel using the adhesive to be tested.

6.2 Stir the adhesive to be tested until it is uniform. Spread  $5.0 \pm 0.3$  g of the adhesive evenly over the selvage portion of a bottom panel. Place the top panel over the adhesive-coated area of the bottom panel (as shown in Fig. 1) in the same manner, as a field lap would be made.

6.3 Roll the freshly prepared panel combination three times with a back-and-forth motion, taking care not to move the panels during the rolling process. No downward pressure shall be exerted on the roller by the operator. The roller shall be placed in direct contact with the 3-in. wide cemented lap portion. The roller shall be 127 mm [5 in.]  $\pm 5\%$  wide, 127 mm [5 in.]  $\pm 5\%$  in diameter, and shall weigh 11.8 kg [26 lb]  $\pm 5\%$ .

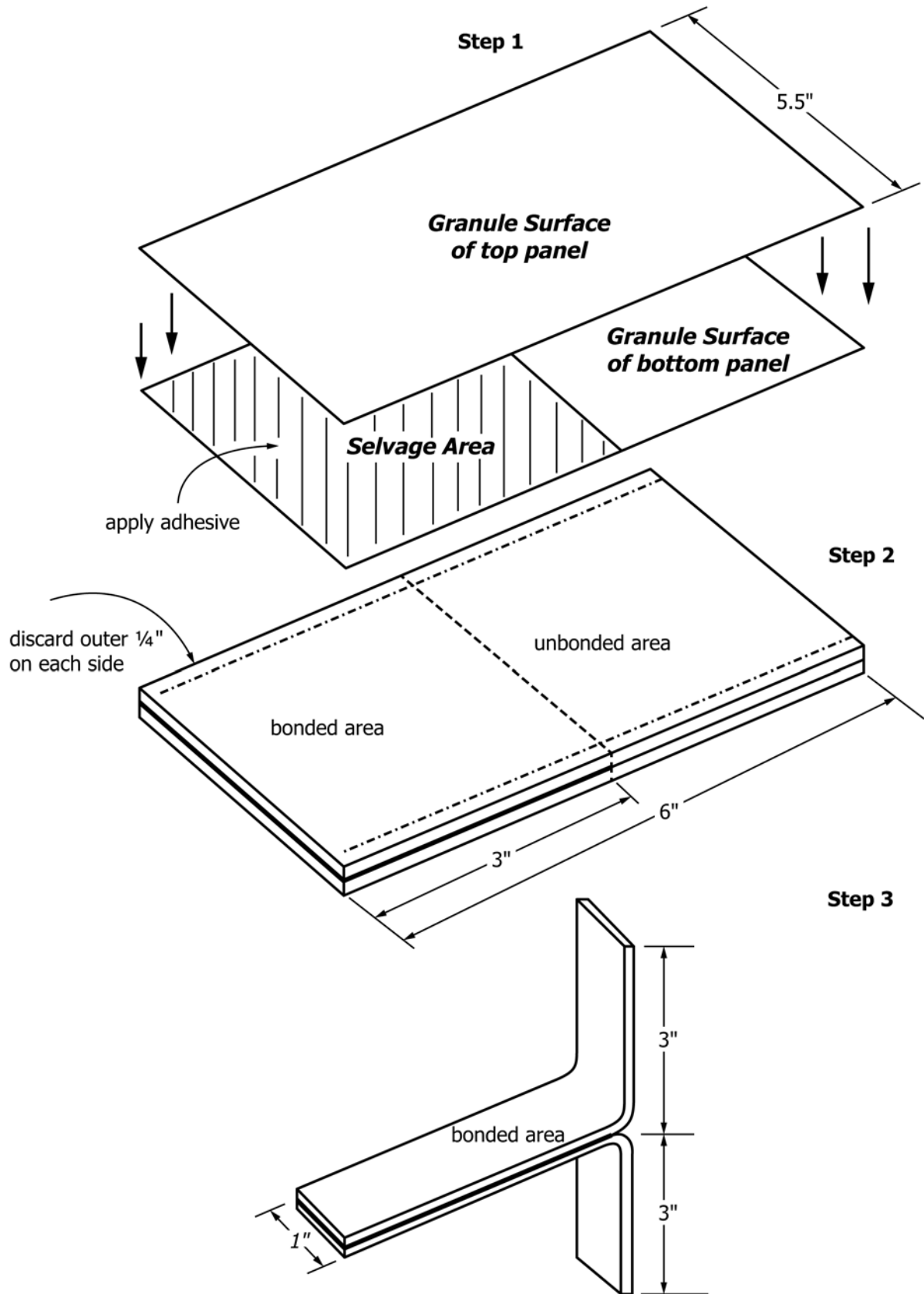


FIG. 1 T-Peel Bonding Configuration for a Modified Bitumen Lap

6.4 *Conditioning*—Heat condition completed modified bitumen panels prior to peel testing in a ventilated, forced air convection oven at  $70 \pm 3^\circ\text{C}$  [ $158 \pm 5^\circ\text{F}$ ] for 7 days  $\pm$  2 h. Panels are to be placed in the oven within 24 h of preparation.

6.4.1 After conditioning, allow panels to come to constant temperature at  $23 \pm 2^\circ\text{C}$  [ $73.4 \pm 3.6^\circ\text{F}$ ] and  $50 \pm 5\%$  humidity for  $24 \pm 1$  h prior to testing.

6.5 *Specimens*—Prepare five die cut test specimens from each panel. Discard the outer 5 mm [0.13 in.] of each panel to avoid any edge effects. Specimens shall be  $25.4 \pm 0.2$  mm [ $1 \pm 0.01$  in.] by  $152 \pm 2$  mm [ $6 \pm 0.05$  in.] long. Specimens for testing shall incorporate a  $25.4 \pm 0.2$  mm [ $1 \pm 0.01$  in.] by  $76 \pm 0.6$  mm [ $3.0 \pm 0.03$  in.] bonded area, as shown in Fig. 1.

6.6 *Procedure*—Test each specimen in accordance with Test Methods D5147, Section 6. Set the edges of the clamps apart  $25 \pm 0.2$  mm [ $1 \pm 0.01$  in.], and maintain a rate of separation of  $51 \pm 1.5$  mm/min. [ $2.0 \pm 0.06$  in./min.]. Specimen peel strength shall be measured over the interval between  $25 \pm 0.2$  mm [ $1 \pm 0.01$  in.] and  $152 \pm 1$  mm [ $6.0 \pm 0.05$  in.] of separation.

6.7 *Precision*—The following data should be used for judging the acceptability of results (95 % probability) on samples from the same lot from the same supplier.

6.7.1 *Repeatability and Reproducibility*—For materials in the peak peel strength range of 1751 to 2276 N/m [10 to 13 lbf/in.],  $S_r$ , the repeatability standard deviation, averaged 274 N/m [1.57 lbf/in.]. The 95 % repeatability range was  $\pm 550$  N/m [3.14 lbf/in.] or 27 % around the true average, 2031 N/m [11.6 lbf/in.]. The reproducibility standard deviation,  $S_R$ , averaged = 431 N/m [2.46 lbf/in.]. The 95 % reproducibility range was  $\pm 862$  N/m [4.92 lbf/in.] or 42 % around the true average.

6.7.2 *Repeatability and Reproducibility*—For materials in the average peel strength range of 1436 to 1716 N/m [8.2 to 9.8 lbf/in.],  $S_r$ , the repeatability standard deviation, averaged 144 N/m [0.82 lbf/in.]. The 95 % repeatability range was  $\pm 364$  N/m [2.08 lbf/in.] or 22.5 % around the true average, 1611 N/m [9.2 lbf/in.]. The reproducibility standard deviation,  $S_R$ , averaged = 352 N/m [2.01 lbf/in.]. The 95 % reproducibility range was  $\pm 704$  N/m [4.02 lbf/in.] or 42 % around the true average of 1615 N/m [9.22 lbf/in.].

## 7. Lap Shear Strength

7.1 This test method covers the determination of the shear strength of adhesives used with polymer modified bituminous sheet materials.

7.1.1 *Panels for Test*—Prepare pre-cut test panels, as shown in Fig. 2, by mating the sides to be bonded facing each other. Sides to be bonded shall be prepared in the same fashion as a field seam is constructed; that is, the bottom side of a top panel is bonded to the selvage portion of a bottom panel with the adhesive to be tested.

7.2 Prepare specimens for test as in 6.2 through 6.3 above except that shear test specimens shall be constructed as shown in Fig. 2.

7.3 Condition as in 6.4.

7.4 *Specimens*—Prepare five die cut test specimens from each panel. Discard the outer 5 mm [0.13 in.] of each panel. Specimens shall be  $25 \pm 0.2$  mm [ $1 \pm 0.01$  in.] by  $152 \pm 2$  mm [ $6.0 \pm 0.05$  in.] long. Specimens for test shall incorporate a  $25.4 \pm 0.2$  mm [ $1 \pm 0.01$  in.] by  $76 \pm 0.6$  mm [ $3 \pm 0.03$  in.] bonded area, as shown in Fig. 2.

7.5 *Procedure*—After specimens have been heat conditioned for the specified time, test each specimen in accordance with Test Methods D5147, Section 6. Set the edges of the clamps apart  $82.5 \pm 0.5$  mm [ $3.25 \pm 0.03$  in.], and maintain a rate of separation of  $51 \pm 2$  mm/min. [ $2.0 \pm 0.06$  in./min.]. Specimen shear strength shall be measured until sample separation is complete.

7.6 *Precision and Bias*—The following data should be used for judging the acceptability of peak peel and average peel strength results with a 95 % probability.

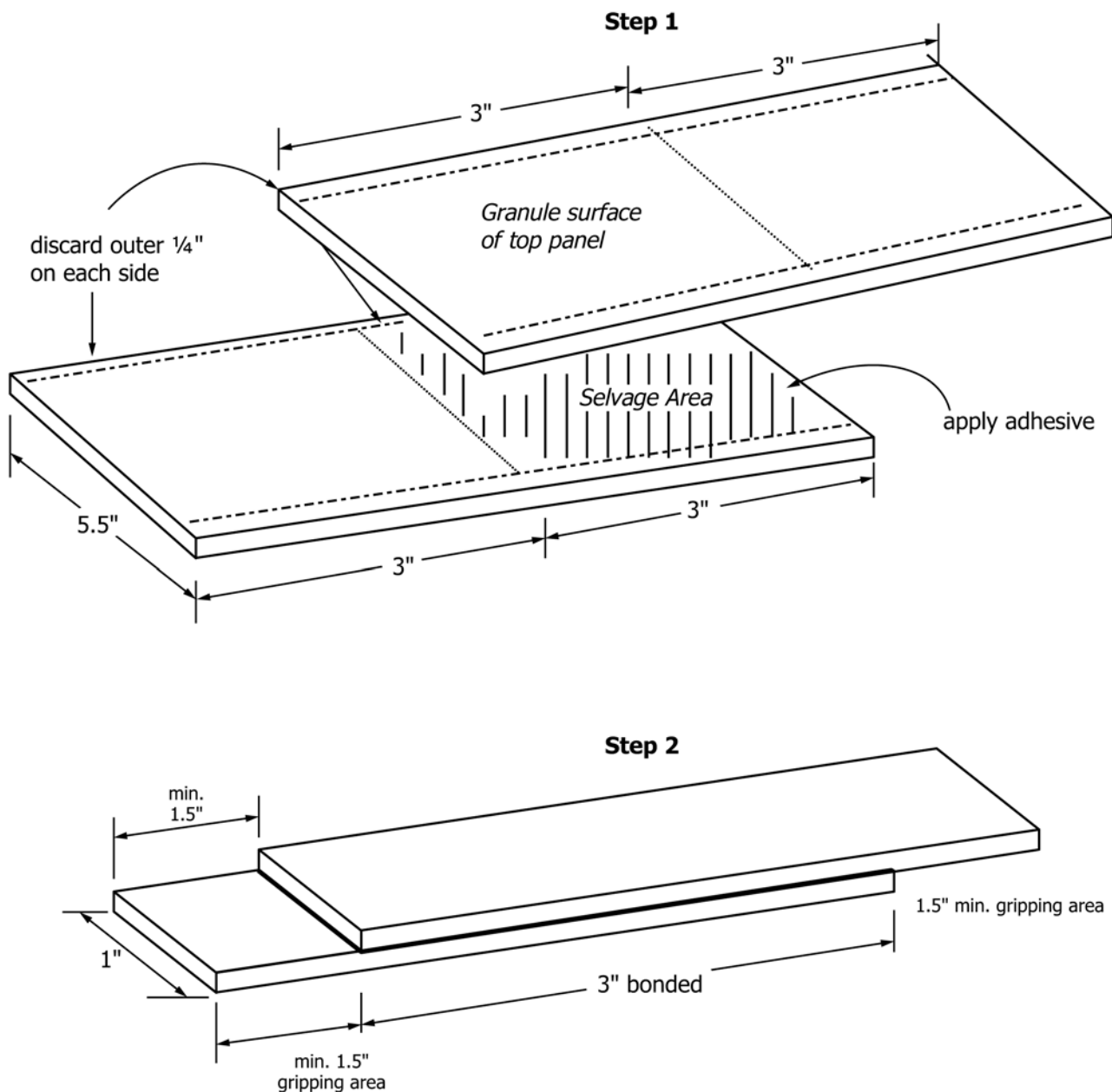
7.6.1 *Repeatability and Reproducibility*—For materials in the peak shear strength range of 53.04 to 71.69 N/m [46.99 to 63.51 lbf/in.],  $S_r$ , the repeatability standard deviation, averaged 8.02 N/m [7.10 lbf/in.]. The 95 % repeatability range was  $\pm 16.04$  N/m [14.21 lbf/in.] or 25.7 % around the true average, 62.36 N/m [55.24 lbf/in.]. The reproducibility standard deviation,  $S_R$ , averaged = 18.19 N/m [16.11 lbf/in.]. The 95 % reproducibility range was  $\pm 41.08$  N/m [36.39 lbf/in.] or 74 % around the true average of 55.24.

## 8. Report

8.1 Report the peak and average peel strength and the peak shear strength values in N/m [lbf/in.] for each specimen, and the average of specimens for each combination of adhesive and membrane tested.

## 9. Keywords

9.1 cold process adhesive; lap; modified bituminous sheet material; SBS; shear strength; T-peel strength



**FIG. 2 Shear Strength Bonding Configuration for a Modified Bitumen Lap**

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