ANSI/SPRI/FM TDP-1 2025

Test Standard for Comparative Adhesion Strengths of Waterproofing Membranes, Membrane Adhesives, and Board Stock Materials Used with Low Slope Roofing Systems

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Disclaimer

This standard is for use by architects, engineers, consultants, roofing contractors and owners of low slope roofing systems. This standard specifically does not address existing building drainage capacity or overflow drainage requirements and should not be used for those purposes. It is intended to provide data and guidance necessary to understand the implementation and use of retrofit roof drainage elements. Do not assume all existing buildings have code compliant drainage. SPRI, IT'S MEMBERS AND EMPLOYEES DO NOT WARRANT THAT THIS STANDARD IS PROPER AND APPLICABLE UNDER ALL CONDITIONS.

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1.0 Introduction

1.1 Scope

This standard provides basic requirements and procedures for determining the *maximum failure load* of *waterproofing membranes*, *membrane adhesives*, and *board stock* materials when tested for adhesion strength in peel.

1.2 Reference Document

1.2.1 ASTM D903 Standard Test Method for Peel or Stripping Strength of Adhesive Bonds

1.3 Significance and Use

1.3.1 Roof assemblies are tested for wind uplift resistance in accordance with various standards, such as *ANSI/FM 4474,* Florida Building Code TAS 114, UL 1897, or CSA A123.21. Each assembly is made up of various components. The test procedure in this standard is useful in qualifying components or component combinations to reduce the dependence on large scale roof assembly testing. See Appendix A—Commentary C1.3.1 for additional information.

1.3.2 This test procedure is used to determine the *maximum failure load* of *waterproofing membranes* and *board stock* materials when secured with a *membrane adhesive* and exposed to a linear load perpendicular to the plane in which the *waterproofing membrane* is installed.

2.0 General Information

2.1 Definitions

All words defined within this section are italicized throughout the standard.

2.1.1 ANSI
American National Standards Institute

2.1.2 Board Stock
A rigid board upon which a *waterproofing membrane* is secured to, ex: insulation board, cover board, plywood, osb, etc.

2.1.3 Maximum Failure Load
The peak load value observed when the test specimen is no longer able to resist the application of additional load.

2.1.4 Membrane Adhesive
A component used within a roof assembly to bond the *waterproofing membrane* to the top surface of the *board stock* material.

2.1.5 Standard Laboratory Conditions
The room or enclosure where the materials are conditioned, and test specimens are prepared and tested shall be protected from the elements and maintained at a temperature of 73 ± 4°F (23 ± 2°C) and 50% relative humidity ± 10%.

2.1.6 Waterproofing Membrane
A flexible rolled sheet product secured to the top layer of *board stock* material using a *membrane adhesive* intended to prevent water ingress to the structure.

2.2 Apparatus

2.2.1 A tensile test machine that applies load with a constant rate of speed and can measure the applied load. The equipment shall be calibrated within 12 months of the date of testing, in accordance with a standard that is traceable to a nationally recognized source. The load cell shall be of appropriate load capacity to ensure accurate results. See Appendix A—Commentary C2.2.1 for additional information.

2.2.2 Pinch wheel rollers or clamping device compatible with the tensile test machine used to attach the free ends of the *waterproofing membrane* to the cross head of the tensile testing machine.

2.3 Test Specimen Sourcing

2.3.1 All specimen components shall be provided by the program sponsor or component supplier and tested as received.

2.3.2 All test specimens shall be preconditioned and prepared for testing in *standard laboratory conditions*.

3.0 TDP-1 Procedure

3.1 Personal Protective Equipment

Adequate personal protective equipment shall be available and in use during specimen setup and testing such as eye protection, cut resistant gloves, PPE suggested by the adhesive manufacturer for adhesive application, etc.

3.2 Test Specimen Setup

3.2.1 The *waterproofing membrane* shall be cut to 2 in. (50.8 mm) wide by a minimum of 20 in. (508 mm) long strips. See Appendix A—Commentary C3.2.1 for additional information.

3.2.2 *Board stock* material shall be cut to an appropriate size that fits the *board stock* securement device used by the testing laboratory. See Appendix A—Commentary C3.2.2 for additional information.

3.2.3 The *waterproofing membrane* shall be installed using the *membrane adhesive* to the top surface of the *board stock* being evaluated following the *membrane adhesive* manufacturers installation guidelines. The *waterproofing membrane* shall be installed such that the center 2 in. × 6 in. (50.8 mm × 152.4 mm) section of the *waterproofing membrane* is centered on the *board stock* material leaving a minimum of a 7 in. (177.8 mm) free end on either side of the adhered center section that will be used to attach the *waterproofing membrane* portion of the test sample to the crosshead. See Appendix A—Commentary C3.2.3 for additional information.

3.2.4 The test specimen shall be installed, centered under the crosshead and secured in the tensile test machine in preparation for a load to be applied perpendicular to the plane of the *board stock* material's top surface on which the *waterproofing membrane* is adhered.

3.2.5 Statically secure the *board stock* material and move the *waterproofing membrane's* free ends or statically secure the *waterproofing membrane's* free ends and move the *board stock* material. See Appendix A—Commentary C3.2.5 for additional information.

3.2.6 Information on test specimen sampling size is provided in Commentary. See Appendix A—Commentary C3.2.6 for additional information.

3.3 Test Method

3.3.1 Testing shall be conducted in *standard laboratory conditions*.

3.3.2 Load is applied perpendicular to the plane of the *board stock* material's top surface on which the *waterproofing membrane* is adhered at a speed of 2.0 in./min. (50.8 mm/min.).

3.3.3 The *maximum failure load* and mode of failure shall be recorded for each test specimen.

3.3.3.1 Potential modes of failure include delamination of the *waterproofing membrane* or its backing, adhesive failure to the *waterproofing membrane*, adhesive failure to the *board stock* or suitable substrate, cohesive failure of the *membrane adhesive*.

4.0 Reporting—Test reports shall include the following:

4.1 Name and address of the manufacturer or supplier of each test specimen component.

4.2 Name or other identification marks of each test specimen component, including any relevant listing and labeling marks.

4.3 Description of each test specimen component.

4.4 Conditioning of the test specimens, environmental data during the test (temperature, RH, etc.).

4.5 Identification of the laboratory technician.

4.6 Identification of the test equipment and instruments used, including open area dimensions of the *board stock* securement device.

4.7 Calibration date of the tensile test machine.

4.8 Any deviations from the test method.

4.9 *Maximum Failure Load* of each test specimen.

4.10 Mode of failure of each test specimen and images representative of each mode of failure.

4.11 Statistics. See Appendix A—Commentary C4.11 for additional information.

5.0 5.0 Precision and Bias

There is not enough data available to establish precision and bias.

Appendix A—Commentary

This Commentary is not a part of this standard. It consists of explanatory and supplementary material designed to assist users in complying with the requirements. It is intended to create an understanding of the requirements through brief explanations of the reasoning employed in arriving at these requirements or to provide other clarifications. It therefore has not been processed in accordance with *ANSI* Essential Requirements and may contain material that has not been subjected to public review or a consensus process. Thus, it does not contain requirements necessary for conformance with the standard.

The sections of the Commentary are numbered to correspond to the sections of the standard to which they refer. Since it is not necessary to have supplementary material for every section in the standard itself, there may be gaps in the numbering in the Commentary.

C1.3.1 Significance and Use

This standard is intended to be a basis of practical comparative testing for roof system components that are within the scope of this standard. Acceptable applications include, but aren't limited to:

1. Determination of the comparative performance of component combinations—Prior to full scale roof assembly testing, it is reasonable to perform small scale testing in accordance with this standard to determine the most critical or lowest performing component combination(s). Using the most critical component combination(s) in full-scale roof assembly testing would allow the inclusion of the component combination(s) tested in accordance with this standard to be included in the full-scale assembly listings or approvals.
2. Inclusion of alternate components into existing roof assembly listings or approvals—Should a manufacturer desire to change a component, or include an alternate component, it is reasonable to perform comparative small-scale testing in accordance with this standard to determine if the proposed components perform as well or better than the existing components.

When comparing one data set to another to determine the most critical components, it is important to be sure those data sets were generated using the same testing conditions, apparatus, and test specimen setup. It is the responsibility of the program sponsor to determine their needs to meet the requirements of the authority having jurisdiction.

C2.2.1 Load Cell

Ensure the load cell is appropriate for the expected or discovered loads. In some cases, load cells have a recommended load range that differs from the stated maximum load capacity due to non-linearity near zero or near maximum load.

C3.2.1 Membrane Size

When cutting membrane strips, a consistent size is important to be sure a true comparative test is being executed. Both the length and width can affect the test result and care should be taken to ensure the *waterproofing membranes* being tested are cut to a consistent size. Cutting jigs, press dies, and roll slitting are a few commonly used methods to achieve this consistency.

C3.2.2 Board Stock Size

When cutting *board stock*, consistent sample dimensions are important to be sure a true comparative test is being executed. Both the size of the *board stock* and the size of the fixturing/holding device can affect the results of this test. When comparing one data set to another, it is important that the data sets were generated using the same *board stock* and fixturing sizes to eliminate variability. A common size used for the *board stock* is 8 in. × 15 in. (203.2 mm × 381 mm) and the fixturing device's open area is 6 in. × 12 in. (152.4 mm × 304.8 mm).

C3.2.3 Membrane Installation

When adhering the *waterproofing membrane* onto the *board stock* material, ensure the *waterproofing membrane* is adhered such that the long edges of the *waterproofing membrane* are parallel to the long edges of the *board stock* material. It is important to adhere the center 6 in. (152.4 mm) section of the *waterproofing membrane* to the center section of the *board stock* material so that when the sample is installed in the tensile tester the peel angles are appropriate and a consistent evaluation is performed.

C3.2.5 Test Specimen and Fixturing Schematics

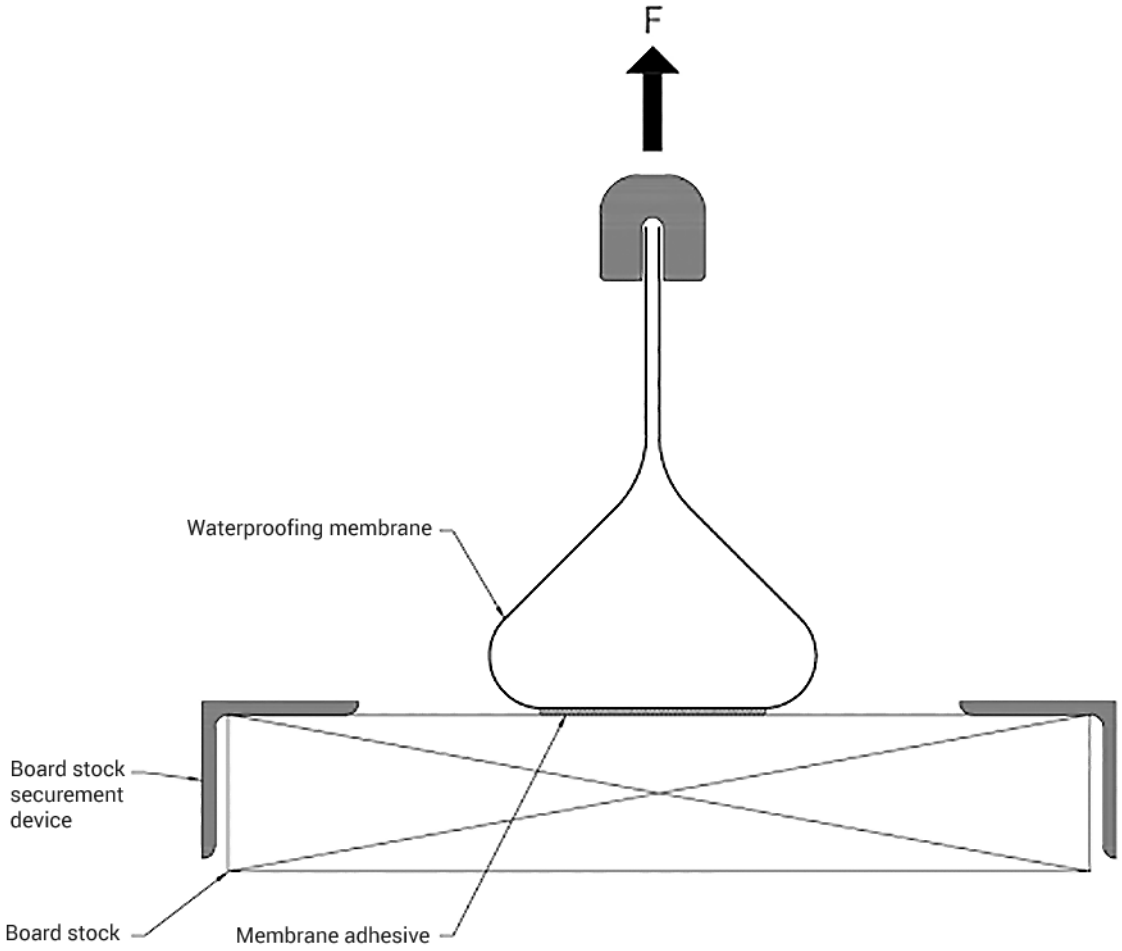

Figure C3.2.3A

Cross-sectional view of a test apparatus setup whereby the *board stock* material is statically secured and the *waterproofing membrane's* free ends are free to move when load is applied.

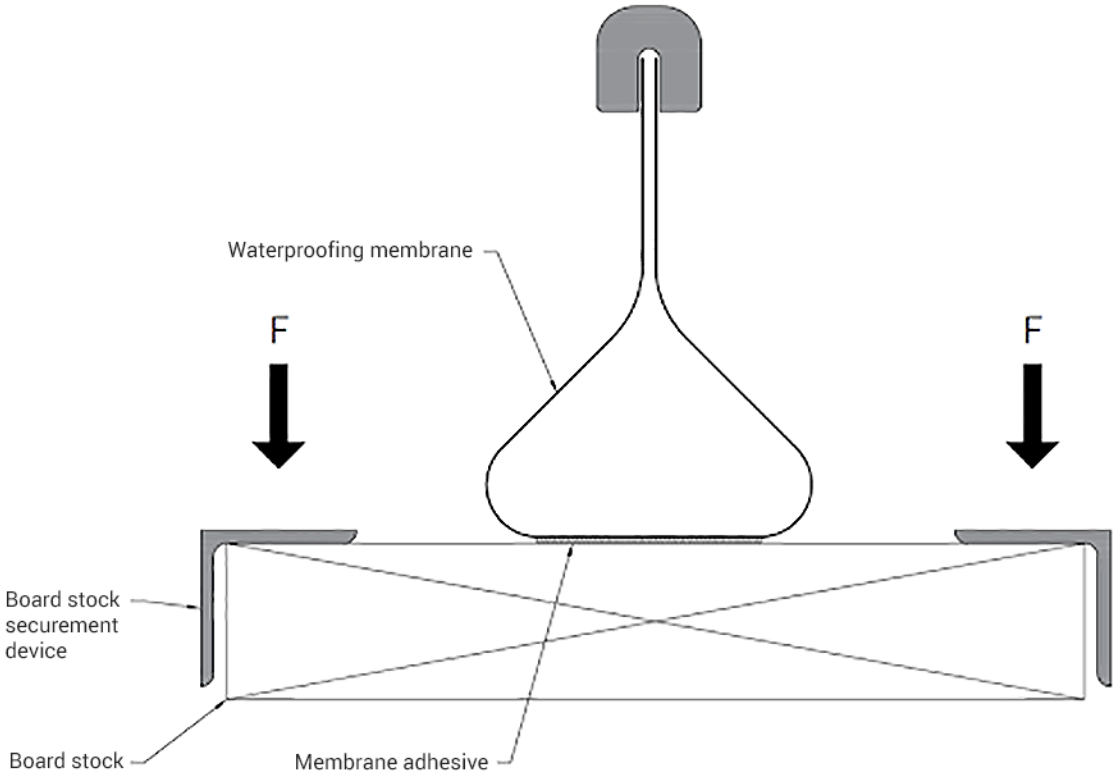

Figure C3.2.3B

Cross-sectional view of a test apparatus setup whereby the *waterproofing membrane's* free ends are statically secured and the *board stock* material is free to move when load is applied.

C3.2.6 Test Specimen Sampling Size

This standard does not provide requirements for test specimen sampling size. FM Approvals requires a minimum sampling size of three (n=3) for their purposes but other jurisdictions may have different requirements. It is the responsibility of the program sponsor to determine their needs to meet the requirements of the authority having jurisdiction.

C4.11 Statistics

Statistical information required for approvals or listings may vary depending on the jurisdictional requirements. It is the responsibility of the program sponsors to determine the appropriate statistics to report.