



Designation: **D3811/D3811M—21** **D3811/D3811M – 21a**

## Standard Test Method for Unwind Force of Pressure-Sensitive Tapes<sup>1</sup>

This standard is issued under the fixed designation D3811/D3811M; 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 reappraisal. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reappraisal.

*This standard has been approved for use by agencies of the U.S. Department of Defense.*

### 1. Scope

1.1 This test method covers one procedure for determining the force required to unwind a roll of pressure-sensitive tape.

1.2 The values stated in either SI 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 must be used independently, without combining values in any way.

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

1.4 *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.*

### 2. Referenced Documents

#### 2.1 ASTM Standards:<sup>2</sup>

[D996 Terminology of Packaging and Distribution Environments](#)

[D3715/D3715M Practice for Quality Assurance of Pressure-Sensitive Tapes](#)

[D4332 Practice for Conditioning Containers, Packages, or Packaging Components for Testing](#)

[E122 Practice for Calculating Sample Size to Estimate, With Specified Precision, the Average for a Characteristic of a Lot or Process](#)

### 3. Terminology

3.1 *Definitions*—General terms in this test method are defined in Terminology [D996](#).

### 4. Summary of Test Method

4.1 The sample roll of tape is placed on a free-turning spindle held in a CRE (constant-rate-of-extension) tension tester. While the crosshead is moved at a specified rate, the maximum force measured during unwinding of approximately 150 mm [6 in.] of tape is taken as the unwind force.

<sup>1</sup> This test method is under the jurisdiction of ASTM Committee [D10](#) on Packaging and is the direct responsibility of Subcommittee [D10.14](#) on Tape and Labels. Current edition approved April 15, 2021; Nov. 1, 2021. Published April 2021. Originally approved in 1979. Last previous edition approved in 2018 as [D3811/D3811M – 96 \(2018\)](#); [D3811/D3811M – 21](#). DOI: [10.1520/D3811-D3811M-21-10.1520/D3811\\_D3811M-21A](#).

<sup>2</sup> 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.

## 5. Significance and Use

5.1 This procedure simulates hand and machine unwinding of tape at low rates. The force required for unwinding at low rates is a function of rate. At some rate (expected to be different for each construction type and manufacturer) there occurs an inversion of the response. The rate for this test method does not allow for comparisons of different tapes that will be unwound at high rates.

5.2 This procedure can be used to indicate satisfaction where a specification for unwind; either maximum, minimum, or mean; is established and when the responses referred to in 5.1 are taken into consideration.

## 6. Apparatus

6.1 *Unwind Force Tester*—A CRE tension tester shall be used. The tester shall have two clamps with centers in the same plane, parallel with the direction of motion of the stressing clamp, and so aligned that they will hold the specimen wholly in the same plane; a means of moving the stressing clamp at a uniform rate of  $5 \pm 0.2$  mm/s [ $12.0 \pm 0.5$  in./min]; and an autographic device for recording load. The instrument shall be calibrated to an accuracy of 0.5 % full scale. The scale range used for any test shall be such that the mean test level falls within 20 to 50 % of full scale.

6.2 *Free-Turning Spindle*, sized to fit snugly inside the sample tape core, with its axis horizontally supported in a frame that can be held in the clamp on the crosshead of the unwind tester that is not supporting the load cell.

## 7. Sampling

7.1 *Acceptance Sampling*—Sampling shall be in accordance with Practice [D3715/D3715M](#).

7.2 *Sampling for Other Purposes*—The sampling and number of test specimens depends on the purpose of the testing. Practice [E122](#) is recommended. It is common to test at least five specimens of a particular tape. Test specimens should be taken from several rolls of tape and wherever possible, among several production runs of tape. Strong conclusions about a specific property of a tape cannot be based on test results of a single unit (roll) of a product.

## 8. Test Specimens

8.1 Specimens shall be the strip of tape unwound from the originally wound sample roll during performance in accordance with Section [10](#). The specimen shall be as wide as the sample roll.

8.2 Unwind and discard at least three, but no more than six, outer wraps of tape from the sample roll before unwinding specimens for test.

## 9. Conditioning

9.1 Condition the sample rolls in the standard conditioning atmosphere as described in Practice [D4332](#) for a period of not less than 24 h. Test at these conditions.

## 10. Procedure

10.1 Place the free-turning spindle into the clamp not associated with the load cell.

10.2 Place the sample roll on the spindle.

10.3 Unwind sufficient tape by hand to allow folding the end over to form a tab and insertion of the tab into the opposite clamp.

10.4 Unwind approximately 150 mm [6 in.] mechanically at 5 mm/s [12 in./min].

10.5 Observe the autographic record to find the maximum force to the nearest N/100 mm [0.1 lbf/in.] during the unwinding in [10.4](#). Examine the roll and the unwound strip for evidence of transfer of adhesive and tearing, or delamination of the backing.