



Standard Test Method for Peel Adhesion of Pressure-Sensitive Tape¹

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1. Scope

1.1 These test methods cover the measurement of the peel adhesion of pressure-sensitive tapes.

1.1.1 Test Method A gives a measure of the adherence, when peeled at 180° angle, to a standard steel panel or to other surface of interest for a single-coated tape.

1.1.2 Test Method B gives a measure of the adherence to the backing of a single-coated tape.

1.1.3 Test Method C gives a measure of the adherence of double-coated tape to a standard steel panel or other surface of interest.

1.1.4 Test Method D gives a measure of the adherence of the release liner to the adhesive of either single- or double-coated tape.

1.1.5 Test Method E gives a measure of the adherence of an adhesive transfer tape to a standard steel panel or other surface of interest.

1.1.6 Test Method F gives a measure of the adherence, when peeled at 90° angle, to a standard steel panel or other surface of interest for a single-coated tape.

1.2 These test methods provide a means of assessing the uniformity of the adhesion of a given type of pressure-sensitive adhesive tape. The assessment may be within a roll of tape, between rolls, or between production lots.

1.3 Variations in either the tape backing or the adhesive, or both, affect the response. Therefore, these test methods cannot be used to pinpoint the specific cause(s) of non-uniformity.

1.4 These test methods may not be appropriate to test tapes having relatively stiff backings, stiff liners, or backings showing high stretch at low forces. These characteristics will result in a high variability for the test response which is not a true indication of the real nature of the adhesive bond.

1.5 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.

1.6 These test methods are intended to replace AFERA 4001, EN 1939, PSTC-1, PSTC-2, PSTC-3 and PSTC-4.

1.7 *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:

A 666 Specification for Austenitic Stainless Steel, Sheet, Strip, Plate and Flat Bar²

D 996 Terminology of Packaging and Distribution Environments³

D 3715/D 3715M Practice for Quality Assurance of Pressure-Sensitive Tapes³

D 4332 Practice for Conditioning Containers, Packages or Packaging Components for Testing³

D 5750 Guide for Width and Lengths of Pressure-Sensitive Tape³

E 122 Practice for Choice of Sample Size to Estimate a Measure of Quality for a Lot or Process⁴

2.2 AFERA Standard:⁵

4001 Self adhesive tapes – Measurement of peel adhesion

2.3 European Norm:⁶

EN 1939 Self adhesive tapes – Measurement of peel adhesion from stainless steel or from its own backing

2.4 Pressure Sensitive Tape Council Standards:⁷

PSTC-1 Peel Adhesion of Single Coated Pressure-Sensitive Tapes at 180° Angle

PSTC-2 Peel Adhesion for Single Coated Pressure-Sensitive Tapes at 90° Angle

PSTC-3 Peel Adhesion of Double Coated Pressure-Sensitive Tapes at 180° Angle

PSTC-4 Adhesion to Liner of Pressure-Sensitive Tapes at 180° Angle

3. Terminology

3.1 *Definitions*—Terminology found in Terminology D 996 shall apply.

² Annual Book of ASTM Standards, Vol 01.03.

³ Annual Book of ASTM Standards, Vol 15.09.

⁴ Annual Book of ASTM Standards, Vol 14.02.

⁵ Association des Fabricants Européens de Rubans Auto Adhésifs (AFERA), LAM, Laan Copes van Cattenburch 79, NL-2858 EW, The Hauge, Netherlands.

⁶ European Norm, (EN); available from Comité Européen de Normalisation (CEN), Rue de Stassart, 36, B-1050, Brussels, Belgium.

⁷ Pressure Sensitive Tape Council (PSTC), 400 North Michigan Ave., #2200, Chicago, IL 60611-4267.

¹ These test methods are under the jurisdiction of ASTM Committee D-10 on Packaging and are the direct responsibility of Subcommittee D10.14 on Tape and Labels.

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4. Summary of Test Method

4.1 *Test Method A—Single-Coated Tapes, Peel Adhesion at 180° Angle*—A strip of tape is applied to a standard test panel (or other surface of interest) with controlled pressure. The tape is peeled from the panel at 180° angle at a specified rate, during which time the force required to effect peel is measured.

4.2 *Test Method B—Adhesion to Backing, Single-Coated Tapes*—A strip of the tape under test is applied to a rigid panel. A strip of the tape under test is applied to the backing of the first strip of tape and tested for peel adhesion as described in Test Method A.

4.3 *Test Method C—Double-Coated Tapes:*

4.3.1 *Face Side Adhesion*—The double-coated tape is adhered to a stainless steel panel (or other surface of interest), liner side up. The liner is removed and the exposed adhesive covered with a strip of 0.025-mm [0.001-in.] thick polyester film. The resulting tape is then tested as described in Test Method A.

4.3.2 *Liner Side Adhesion*—The face side adhesive is adhered to a 0.025-mm [0.001-in.] polyester film. The liner is removed and the tape is applied adhesive down to a stainless steel panel (or other surface of interest). Testing is conducted as described in Test Method A.

4.4 *Test Method D—Adhesion to Liner*—The tape is adhered to a standard steel test panel with the liner side up. The liner is peeled from the adhesive in the same manner as in peeling a single-coated tape from a standard panel as described in Test Method A.

4.5 *Test Method E—Adhesion of Adhesive Transfer Tapes:*

4.5.1 *Face Side*—The tape is adhered to a standard panel (or other surface of interest). The liner is removed and a 0.025-mm [0.001-in.] thick strip of polyester is adhered to form a film-backed strip of tape. The adhesion is measured as described in Test Method A.

4.5.2 *Linear Side*—The transfer tape is applied to a strip of 0.025-mm [0.001-in.] thick polyester film, the liner is removed and the resulting tape's adhesion is measured as described in Test Method A.

4.6 *Test Method F—Single-Coated Tapes, 90° Peel*—A strip of tape is applied to a standard test panel (or other surface of interest) with controlled pressure. The tape is peeled from the panel at 90° angle at a specified rate, during which time the force required to effect peel is measured.

5. Significance and Use

5.1 These test methods are tools for quality assurance use. Given specific pressure-sensitive tape and a requirement in terms of the minimum or maximum peel value expected for this tape, the data from the test can be used in conjunction with acceptance criteria.

5.2 Test Method A, B, C, E, or F can show the relative bond strength of a given tape to one or more surfaces (material and texture) as compared to the standard stainless steel panel. Substitution of representative samples of materials in question for the standard steel panel would suffice to do this.

5.3 Test Methods A, B, C, E or F cannot be used to compare two pressure-sensitive tapes of the same type but of different manufacture for their ability to adhere to a surface. This is

because the measured peel force is not normalized for a fixed area of stress. The area under stress varies with backing stiffness and adhesive rheology (firmness). Two different tapes seldom agree in these properties.

5.4 Test Method D can show the amount of force required to remove a liner that covers the adhesive side of a tape at a specified peel rate. The force will be different at other peel rates.

5.5 These test methods may not provide design information as there is usually no direct relationship between peel adhesion and any functional requirement.

6. Apparatus

6.1 *Specimen Cutter*⁸—The specimen cutter shall hold two single-edged razor blades in parallel planes, a precise distance apart, to form a cutter of exact specimens widths. Two cutters, 12- and 24-mm [0.05- and 1-in.] cutting width, shall be available. Appropriate alternates which will not cause edge damage may be used.⁹

NOTE 1—The 12-mm [0.5-in.] cutter shall consist of a 12-mm [0.5-in.] thick by 220-mm [8-in.] length aluminum bar stock 12-mm [0.05-in.] wide. The edges for about 125 mm [5 in.] from one end shall be slightly rounded to form a handle. The width of the bar for 75 mm [3 in.] from the opposite end shall be narrowed to exactly 12 mm [0.5 in.] minus the thickness of a single razor blade (one of two used as cutting edges). The razor blades shall be held in position using side plates. The end of the cutter shall be cut away at 45° angle to expose the cutting edge at one end of the blades. The edges shall be separated by 12 ± 0.10 mm [0.5 in.]. The 24-mm [1-in.] cutter shall follow the same description except the bar stock shall be 24.0 mm [1 in.] and shall be narrowed exactly 24 mm [1 in.] minus the thickness of a single razor blade.

6.2 *Dispensing System*—For solvents, such as a wash bottle.

6.3 *Panel*⁸—A stainless steel panel, 50 by 125 mm [2 by 5 in.] no less than 1.1 mm [0.043 in.] thickness, conforming to Type 302 or 304 of Specification A 666, having a bright annealed finish. The surface roughness height shall be 50 ± 25 nm [2.0 ± 1.0 μ m.] arithmetical average deviation from the mean line. Panels showing stains, discoloration, or many scratches are not acceptable. New panels should be cleaned prior to use as described in 11.1, except with ten washes of the final solvent. Between uses, the panel test surface shall be protected from scratches and contamination, and the panels stored at conditions described in Section 10.

6.4 *Roller*—Mechanically or hand operated.⁸

6.4.1 A steel roller 85 ± 2.5 mm [3.25 ± 0.1 in.] in diameter and 45 ± 1.5 mm [1.75 ± 0.005 in.] in width, covered with rubber approximately 6 mm [0.25 in.] in thickness, having a Shore scale A durometer hardness of 80 ± 5 . The surface shall be a true cylinder void of any convex or concave deviations. The mass of the roller shall be 2040 ± 45 g [4.5 ± 0.1 lb].

6.4.2 No part of the apparatus shall increase the mass of the roller during use. The roller shall move either mechanically or

⁸ Available from Chemsultants International, 9349 Hamilton Dr., Mentor, OH 44061-1118, and PSTC, 400 North Michigan Ave., #2200, Chicago, IL 60611-4267.

⁹ These widths correspond to the primary metric (SI) units described in Guide D 5750. These so-called "modular metric" units are used throughout the world, except for Europe. If it is desirable to test slightly different widths (for example, 25 mm) of specimens than those described in 9.1, this should be noted (see 18.1.7) and calculations must also account for the difference (see 17.1).