

Call Letters	PSTC-16
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# Loop Tack

## 1. SCOPE

1.1 This test method is intended to determine the tack properties of a pressure sensitive adhesive. This test method is applicable to those adhesives that form a bond of measurable strength rapidly upon contact with another surface. Tack force may be measured as the force required to separate the adhesive from the adherend at the interface shortly after they have been brought into contact under a load equal only to the weight of the pressure sensitive article (e.g., tape, label, sticker, etc.) on a one square inch contact area.

1.2 The following test methods are included:

Test Method A (using tensile tester)

Test Method B (using loop tack tester)

1.3 The values stated in Newtons per 10 mm of width are to be regarded as the standard. The values given in parentheses are for information purposes only.

## 2. SUMMARY OF TEST METHODS

2.1 These methods involve allowing a loop of pressure sensitive adhesive with its backing to be brought into controlled contact with a 24 mm x 24 mm (one square inch) surface of stainless steel, with the only force applied being the weight of the pressure sensitive article itself. The pressure sensitive article is then removed from the substrate, with the force to remove the pressure sensitive article from the adherend measured by a recording instrument.

2.2 Test Method A (using a tensile tester) applies when a tensile tester is used to measure loop tack and involves the use of a loop prepared from a 175 mm (7") specimen strip.

2.3 Test Method B (using a loop tack tester) applies when a loop tack tester is used to measure loop tack and involves the use of a loop prepared from a 125 mm (5") specimen strip.

## 3. SIGNIFICANCE AND USE

3.1 These test methods provide a quantitative measure of the tack property of a pressure sensitive adhesive.

3.2 These test methods are designed to measure the tack property of the adhesive mass. The tack of a given adhesive may vary depending on the backing (generally a stiffer backing leads to higher values).

3.3 These test methods are suitable for quality control, quality assurance and research purposes.

3.4 Test Method A (using a tensile tester) makes use of a specimen strip 175 mm (7") in length.

3.5 Test Method B (using a loop tack tester) makes use of a specimen strip 125 mm (5") in length. That is the only specimen strip that fits properly in the loop tack tester.

3.6 If the adhesive is not already coated onto a backing, these test methods incorporate the use of a clear nominal 50 micron (2 mil) PET film backing for specimen preparation. Use of other backing materials will change performance of the specimen to be tested.

A Summary of Changes section appears at the end of this test method.

3.7 If the sample is a double-coated product, laminate a piece of nominal 50 micron (2 mil) PET to the side not being tested. If the product is an unsupported product, laminate a piece of nominal 50 micron (2 mil) PET to the non-liner side.

## **TEST METHOD A (USING TENSILE TESTER)**

### **4. APPARATUS - See Appendix B**

4.1 Tensile tester - A constant rate of extension type.

4.2 Test fixture (Figure 3 - 5) - To be mounted into the jaws of the tensile tester. A panel held by the test fixture allows for a 625 sq mm (one square inch) contact area of the pressure sensitive adhesive article. Alternately, the test fixture may include a raised area that allows a 625 sq mm (one square inch) contact area of the pressure sensitive article.

4.3 Apparatus for cutting

4.3.1 Die cutter - A 24 mm x 175 mm (1" x 7") rectangular mallet-type die cutter with mallet, or use a clicking press cutter with corresponding die of equivalent dimension, for sample preparation.

4.3.2 If a fixed dimension die is unavailable, substitute a 24 mm (1") steel bar with a double razor knife or other apparatus suitable for cutting the specimen into the specified dimensions to prepare the 24 mm (1") wide specimen strips.

4.4 Absorbent lint-free cleaning wipes - Materials produced from entirely virgin raw materials and containing less than 0.25% by weight of solvent-leachable materials.

4.5 Masking tape - 24 mm (1") wide.

4.6 50 microns (2 mil) polyester film (PET) - To be used as a support medium in evaluating unsupported adhesives such as transfer tapes, laminating adhesives, or other film free adhesives.

4.7 Reagents - Appropriate reagents include acetone, methyl ethyl ketone, diacetone alcohol, n-heptane and toluene, reagent or analytical grade, or an ethanol cleaner for water-based adhesives.

### **5. SAMPLE PREPARATION**

5.1 Cut sample into 24 mm x 175 mm (1" x 7") specimen strips in the machine direction of the pressure sensitive article. Use of strips with other lengths may change the results. Cut at least three specimen strips for each adhesive to be tested.

5.2 Condition specimens to be tested for at least 24 hours in the testing room at  $23 \pm 2^{\circ}\text{C}$  ( $73.4 \pm 3.6^{\circ}\text{F}$ ) and a relative humidity of  $50 \pm 5\%$  prior to conducting the test.

### **6. PROCEDURE**

#### **TEST METHOD A (USING TENSILE TESTER)**

6.1 Ensure the tensile tester is calibrated according to instructions supplied by the manufacturer.

6.2 Set instrument crosshead speed at 300 mm (12 inches) per minute.

6.3 Place the test fixture in the lower grip of the tensile tester. It is important that the test fixture be level and straight in the lower grip. (See Figure 2 and 4.) Set gaps for the crosshead using the minimum and maximum gap setting on the extension cycle. Set gaps 24 mm  $\pm$  1 mm (1"  $\pm$  0.05") (critical) and 100 mm  $\pm$  3 mm (4"  $\pm$  0.1") (optional) from the bottom of the upper grips to the face of the stainless steel portion of the test fixture when the test fixture is locked in the lower grips.

6.4 Clean the stainless steel portion of the test fixture (the area the pressure sensitive article will contact) of large amounts of residue using an appropriate reagent from section 4.7. Next clean the panel as per method in Appendix C. Allow 2 minutes to elapse after cleaning to ensure complete evaporation of the cleaning solvent. User must ensure that the cleaning method used removes all residues from the test fixture.

- 6.5 Completely remove the release liner (if the pressure sensitive article normally includes a release liner) from the specimen.
- 6.6 Bend the specimen completely back on itself, being careful not to crease it. The specimen forms a teardrop-shaped loop with the adhesive surface facing out (Figures 1 and 6).
- 6.7 Fasten the ends of the loop together, using a strip of masking tape 24 mm (1 inch) wide. The masking tape covers the ends of the loop, preventing contamination of the grips of the tensile tester.
- 6.8 Insert the tape end of the specimen loop into the upper grips so that the bottom edge of the masking tape is even with the bottom edges of the grips.
- 6.9 Activate the tensile tester so that the crosshead moves downward. The mid-section of the specimen loop must contact the center of the stainless steel portion of the test fixture. When the crosshead reaches its minimum position, it will immediately switch direction and move upward. When the crosshead is at its minimum position, the specimen loop will completely cover the 1 square inch (645 square mm) area of the stainless steel portion of the test fixture without excessive “hang-over” of the edges.

NOTE: If tensile tester does not have automatic cycling, cycling must be done manually.

6.10 Record the maximum force required to remove the specimen loop from the stainless steel portion of the test fixture as well as the mode of failure.

6.10.1 Record the failure mode as adhesive failure, cohesive failure or adhesive transfer.

6.11 Repeat the procedure at least two additional times for each adhesive to be tested (for a minimum of three replicates). Use a fresh specimen strip for each test.

6.12 When testing is complete, clean the stainless steel portion of the test fixture with approved reagent. Cover with surface protective tape when not in use to protect surface from scratches.

## **TEST METHOD B (USING LOOP TACK TESTER)**

### **7. APPARATUS**

7.1 Loop tack tester (Figure 5).

7.2 Stainless steel test panels - 24 mm x 150 mm (1" x 6"), stainless steel as specified in ASTM Specification A 666. See PSTC-101 section 5.3.

7.3 Apparatus for cutting.

7.3.1 Die cutter - A 24 mm x 125 mm (1" x 5") rectangular mallet-type die cutter with mallet for sample preparation.

7.3.2 If a fixed dimension die is unavailable, substitute a 24 mm (1") steel bar with a double razor knife or other apparatus suitable for cutting the specimen into the specified dimensions to prepare the 24 mm (1") wide specimen strips.

7.4 Absorbent lint-free cleaning wipes - Materials produced from entirely virgin raw materials and containing less than 0.25% by weight of solvent-leachable materials.

7.5 Masking tape - 12 mm (0.5") wide.

7.6 A nominal 50 micron (2 mil) PET film - To be used as support medium in evaluating unsupported adhesives such as transfer tapes, laminating adhesives, or other free film adhesives.

7.7 Reagents - Appropriate reagents include acetone, methyl ethyl ketone, diacetone alcohol, n-heptane and toluene, reagent or analytical grade, or an ethanol cleaner for water-based adhesives.

## 8. SAMPLE PREPARATION

8.1 Cut sample into 24 mm x 125 mm (1" x 5") specimen strips in the machine direction of the pressure sensitive article. Use of strips of other lengths may change results and will not fit properly in the loop tack tester. Cut at least three specimen strips for each adhesive to be tested.

NOTE: If transfer or unsupported adhesives are to be tested, these are to be laminated to a nominal 50 micron (2 mil) PET film, used as an adhesive support, prior to cutting the samples into the 24 mm x 125 mm (1" x 5") specimen strips.

8.2 Condition specimens to be tested for at least 24 hours in the testing room at  $23 \pm 2^\circ\text{C}$  ( $73.4 \pm 3.6^\circ\text{F}$ ) and a relative humidity of  $50 \pm 5\%$  prior to conducting the test.

## 9. PROCEDURE

9.1 Ensure that the loop tack tester is leveled.

9.2 Clean the stainless steel panel of large amounts of residue using an appropriate reagent from section 4.7. Next clean the panel as per method in Appendix C. Use a separate piece of cleaning wipe each time. Repeat for a total of three washes after the test panel appears clean. Allow two minutes to elapse after cleaning to ensure complete evaporation of the cleaning solvent. User must ensure that cleaning method used removes all residue from the old test fixture.

9.3 Insert the test panel and tighten the four clamp screws.

9.4 Completely remove the release liner (if the pressure sensitive article normally includes a release liner) from the specimen.

9.5 Bend the specimen completely back on itself, being careful not to crease it. The specimen forms a teardrop-shaped loop with the adhesive surface facing out (Figures 1 and 6).

9.6 Fasten the ends of the specimen loop together, using a strip of masking tape 12 mm (0.5 inch) wide.

9.7 Insert the specimen loop into the specimen jaw until it touches the guide pins near the center of the jaw. Inserting the specimen loop in this way ensures that it is positioned properly. Ensure that the grip is in its upward most position.

9.8 Zero the force gauge according to instructions provided by the manufacturer.

9.9 Activate the loop tack tester. The upper assembly will complete one full cycle and automatically shut off when the force gauge again reaches its starting position.

9.9.1 This cycle will first move the upper assembly downward, bringing the specimen loop into contact with the test surface, forming a bond.

9.9.2 The assembly will then move upward and the force gauge measures the force required to break the bond.

9.9.3 The cycle will end when the assembly returns to its original starting position.

9.10 Record the maximum force required to remove the specimen loop from the stainless steel panel as well as the mode of failure.

9.10.1 Record the failure mode as adhesive failure, cohesive failure or adhesive transfer.

9.11 Repeat procedure at least two additional times for each adhesive to be tested (for a minimum of three replicates). Use a fresh specimen strip for each test.

9.12 When testing is complete, clean the stainless steel panel with approved reagent from section 4.7. Cover with surface protection tape when not in use to protect the surface from scratches.

## **10. CALCULATION**

10.1 Calculate the average peak reading in Newtons/10 mm (pounds/inch) using at least three specimens for each adhesive.

## **11. REPORT**

11.1 Report the following:

11.1.1 Test Method A or B.

11.1.2 Identification of the adhesive.

11.1.3 Reagent(s) and method used for cleaning the stainless steel portion of the test fixture.

11.1.4 Conditioning time for prepared specimens.

11.1.5 Adhesive type and coating thickness in mm (mils).

11.1.6 Backing material used for the adhesive.

11.1.7 Release liner used, if any.

11.1.8 Temperature and humidity conditions.

11.1.9 Average peak reading in Newtons/10 mm (pounds/inch).

11.1.10 Visual failure mode as adhesive failure, cohesive failure or adhesive transfer.

11.1.11 Length of the specimen strip in mm (inches).

## **12. KEYWORDS**

12.1 Adhesive; loop tack; pressure sensitive article; tack.

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## **SUMMARY OF CHANGES**

- Made consistent metric references of 24 mm and 48 mm for standard 1" and 2" tape rolls.

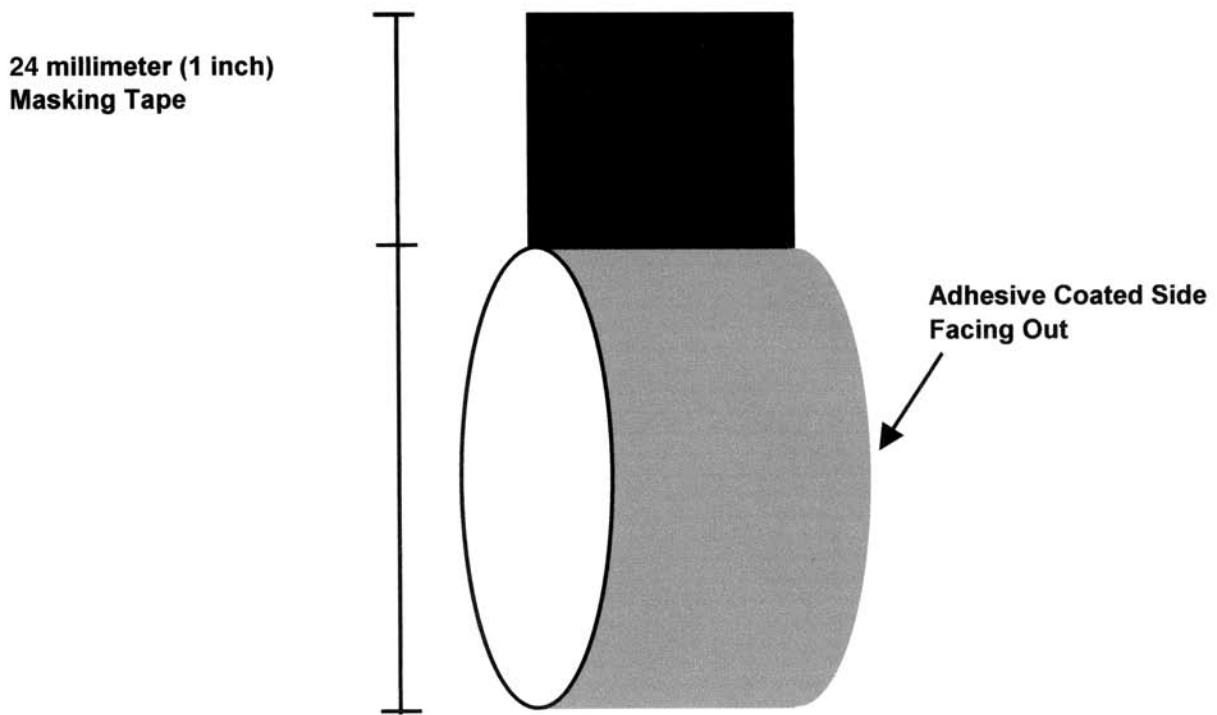


Figure 1. Specimen loop - Test Method A.

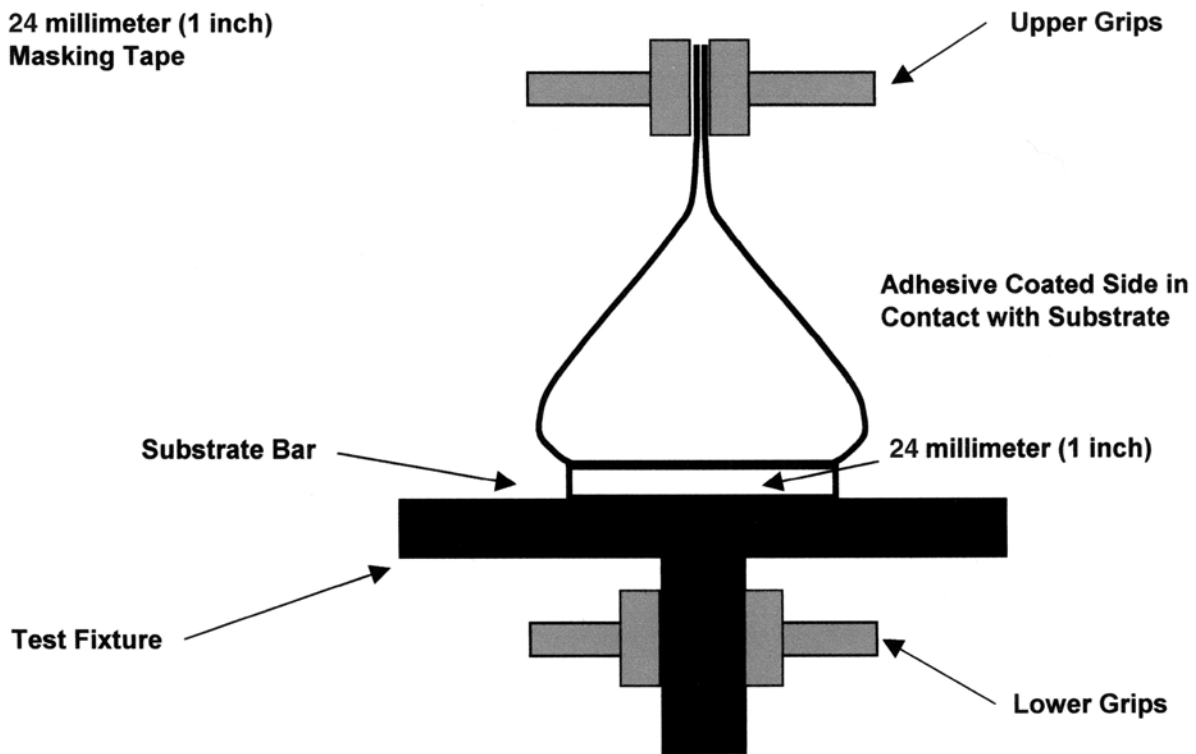


Figure 2. Loop tack sample during test.

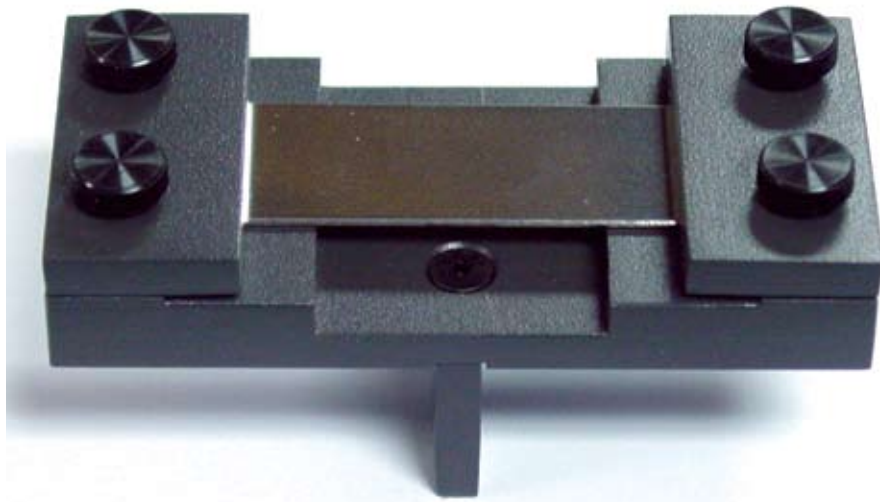


Figure 3. Loop tack tensile fixture - rotated view.



Figure 4. Tensile fixture mounted in tensile tester.



Figure 5. Loop fixture mounted in loop tack tester.



Figure 6. Creating loop specimen.