



Designation: D 3121 – 94 (Reapproved 1999)

Standard Test Method for Tack of Pressure-Sensitive Adhesives by Rolling Ball¹

This standard is issued under the fixed designation D 3121; 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 approval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This test method covers measurement of the comparative tack of pressure-sensitive adhesives by a rolling ball and is most appropriate for low-tack adhesives. This test method is only one of several available for the measurement of tack.

1.1.1 This test method is not recommended for the specification of end use products.

1.2 The values stated in inch-pound units are to be regarded as the standard. The values in the parentheses are given for information only.

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:*

D 907 Terminology of Adhesives²

E 171 Specification for Standard Atmospheres for Conditioning and Testing Flexible Barrier Materials³

3. Terminology

3.1 *Definitions*—Several terms in this test method are defined in accordance with Terminology D 907.

3.2 *Description of Term Specific to This Standard:*

3.2.1 *tack*—the property of an adhesive that enables it to form a bond of measurable strength immediately after adhesive and adherend are brought into contact under low pressure.

4. Summary of Test Method

4.1 In the determination of tack by the rolling-ball method, a steel ball is released at the top of an incline, allowed to accelerate down the incline and roll on to a horizontal surface covered with a pressure-sensitive adhesive. Tack is determined by measuring the distance that the ball travels across the

adhesive before stopping. There are two major retarding forces applied by the adhesive to the ball: (1) the adhesion between the ball and the adhesive, often called “grab,” and (2) the “plowing effect” or energy required to push the adhesive out of the ball’s path.

4.2 Test results are influenced by (1) adhesive film thickness, (2) bond of adhesive to backing, and (3) backing rigidity, so these factors must be carefully controlled for satisfactory comparisons.

5. Significance and Use

5.1 The rolling-ball tack test is fast, easy to run, and requires little investment in equipment and little operator training. This test is intended primarily for quality control use since it demonstrates good reproducibility within a single laboratory and ability to detect batch-to-batch variations accurately if adhesive film thickness is held constant. Rolling ball tack is not intended as an investigative tool since for most pressure sensitive adhesive applications rolling ball tack results do not correlate well with application tack requirements.

6. Apparatus (Fig. 1 and Fig. 2)

6.1 *Inclined Trough* equipped with a release lever at the top⁴ through which the ball gains downhill momentum. The ball is a $\frac{7}{16}$ -in. (11.1-mm) diameter steel ball unless otherwise specified.

7. Test Specimen

7.1 The test specimen is a substrate coated with a pressure-sensitive adhesive. It is generally about 2 in. (51 mm) wide and approximately 15 in. (381 mm) long. Specific sample dimensions can be selected for the adhesive to be tested since the length need only be sufficient to allow the adhesive to stop the ball, and the width need be only wide enough to encompass the ball track.

8. Conditioning

8.1 Before test, store the pressure-sensitive adhesive-coated substrate at the selected test conditions for 24 h. If other

¹ This test method is under the jurisdiction of ASTM Committee D-14 on Adhesives and is the direct responsibility of Subcommittee D14.50 on Hot Melt and Pressure Sensitive Adhesives.

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² *Annual Book of ASTM Standards*, Vol 15.06.

³ *Annual Book of ASTM Standards*, Vol 15.09.

⁴ A suitable apparatus is available through the Pressure Sensitive Tape Council, The Breeden Co., 104 Wilmot Rd., Suite 201, Deerfield, IL 60015.