



# Standard Test Methods for Friction Tapes<sup>1</sup>

This standard is issued under the fixed designation D 69; 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 Department of Defense.*

## 1. Scope

1.1 These test methods cover the methods and procedures for testing friction tapes. Such tapes consist of a woven fabric sheeting that has been impregnated with an adhesive insulating compound and cut into rolls of narrow width. These tapes are commonly used for protecting and binding in place, insulation applied to joints of electrical wires and cables, and for other mechanical purposes.

NOTE 1—The material specifications formerly included in these test methods are now contained in Specification D 4514.

1.2 The test methods included in this standard are as follows:

	Sections
Adhesion	6-11
Aged Adhesion	12-17
Breaking Strength	18-22
Dielectric Breakdown Voltage	23-28
Dimensions	29-34
Discoloration of Copper	35-39
Parallelism	40-44
Tackiness	45-51

1.3 The values stated in inch-pound units are the standard. The SI units in parentheses are for information only.

1.4 *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.*

NOTE 2—There is no equivalent IEC standard.

## 2. Referenced Documents

### 2.1 ASTM Standards:

D 149 Test Method for Dielectric Breakdown Voltage and Dielectric Strength of Solid Electrical Insulating Materials at Commercial Power Frequencies<sup>2</sup>

<sup>1</sup> These test methods are under the jurisdiction of ASTM Committee D09 on Electrical and Electronic Insulating Materials and are the direct responsibility of Subcommittee D09.07 on Flexible and Rigid Insulating Materials.

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<sup>2</sup> *Annual Book of ASTM Standards*, Vol 10.01.

D 412 Test Methods for Vulcanized Rubber and Thermoplastic Elastomers—Tension<sup>3</sup>  
D 1711 Terminology Relating to Electrical Insulation<sup>2</sup>  
D 4514 Specification for Friction Tape<sup>4</sup>  
D 5423 Specification for Forced-Convection Laboratory Ovens for Evaluation of Electrical Insulation<sup>4</sup>  
D 6054 Practice for Conditioning Electrical Insulating Materials for Testing<sup>5</sup>

## 3. Terminology

### 3.1 Definitions:

3.1.1 For definitions of other terms used in this specification, refer to Terminology D 1711.

### 3.2 Definitions of Terms Specific to This Standard:

3.2.1 *adhesion, n*—the resistance of the tape to unwind itself after being wound up under pressure, in accordance with this test method.

3.2.2 *breaking strength, n*—the force required, per unit width, to break the tape when tested in accordance with this test method.

3.2.3 *conditioning, n*—the exposure of the tape to the influence of a prescribed atmosphere for a stipulated period of time.

3.2.4 *length of tape in a roll, n*—the number of linear yards or metres of tape wound into a roll as measured in accordance with this test method.

3.2.5 *parallelism, n*—the difference in width between two mated ends of a tape that has been split in half, in accordance with this test method.

3.2.6 *tackiness, n*—the adherence of the friction tape surfaces to themselves after light contact has been made, in accordance with this test method.

## 4. Sampling

4.1 Select sample rolls at random from each shipment in accordance with the following table:

Number of Rolls in Shipment	Number of Rolls in Sample
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<sup>3</sup> *Annual Book of ASTM Standards*, Vol 09.01.

<sup>4</sup> *Annual Book of ASTM Standards*, Vol 10.02.

<sup>5</sup> *Annual Book of ASTM Standards*, Vol 08.01.

50 to 200	2
201 to 500	3
501 to 1000	4
1001 to 5000	5

For shipments in excess of 5000 rolls, take one additional roll for each additional 1000 rolls or fraction thereof.

4.2 A shipment shall consist of material shipped or intended for shipment to a customer and covered by one bill of lading.

4.3 Test each sample roll for conformance to all the requirements of the specification.

4.4 Remove and discard at least 24 in. (610 mm) of the outer layer of each sample roll before taking test specimens.

4.5 Unwind the test specimen from the roll at a slow, uniform rate without jerking.

**5. Conditioning**

5.1 Unless otherwise specified, condition the rolls for 16 h in a standard laboratory atmosphere as specified in Practice D 6054.

5.2 Unless otherwise specified, condition the test specimens for 1 h in a standard laboratory atmosphere as specified in Practice D 6054.

**ADHESION TEST**

**6. Significance and Use**

6.1 In most applications, a friction tape must have adequate adhesion to remain in place and function properly.

**7. Apparatus**

7.1 *Adhesion Tester*—An assembly similar to that shown in Fig. 1, consisting of a mandrel mounted in a level position in ball bearings. The mandrel shall be 0.25 in. (6.4 mm) in diameter with a slot approximately 0.0625 in. (1.6 mm) in width and long enough to accommodate the full width of tape. The mandrel shall turn freely under a force of 0.25 ozf (0.07 N) suspended from a thread wound in a single layer on the center of the mandrel. This assembly is mounted on a wall or other

vertical surface to which a vertical scale has been affixed. This scale shall begin 2 in. (51 mm) below the mandrel and extended downward for a distance of 36 in. (915 mm). The scale shall be readable to 1/8 in. (3.2 mm).

7.2 *Weights*—Two sets of weights and a device suitable for clamping the weights to the end of a tape sample, such that a total load of 4.0 lbf/in. (17.8 N/25 mm) and 10 lbf/in. (44.5 N/25 mm) can be achieved.

**8. Test Specimen**

8.1 Cut a test specimen 23 in. (580 mm) in length of tape removed from the sample roll, with care being taken not to touch the adhesive surfaces to be tested.

**9. Procedure**

9.1 Insert one end of the specimen into the slot of the mandrel and wind 2 in. (51 mm) onto the mandrel.

9.2 Attach a total weight of 10 lbf/in. (44.5 N/25 mm) to the end of the specimen and wind the remaining 19 in. (480 mm) of the specimen onto the mandrel at an approximate rate of 12 in./min (300 mm/min).

9.3 Allow the tape to remain for 3 min with the weight attached, after which substitute a weight of 4.0 lbf/in. (17.8 N/25 mm) and allow the tape to unwind.

9.4 After the first 2 in. (51 mm) have unwound, start a timer. Stop the unwinding process after 60 s have elapsed, and measure the length which has unwound in that time.

**10. Report**

10.1 For each sample roll, report the adhesion as the length unwound in one minute.

**11. Precision and Bias**

11.1 *Precision*—This test method has been in use for many years, but no information has been presented to ASTM upon which to base a statement of precision. No activity has been planned to develop such information.

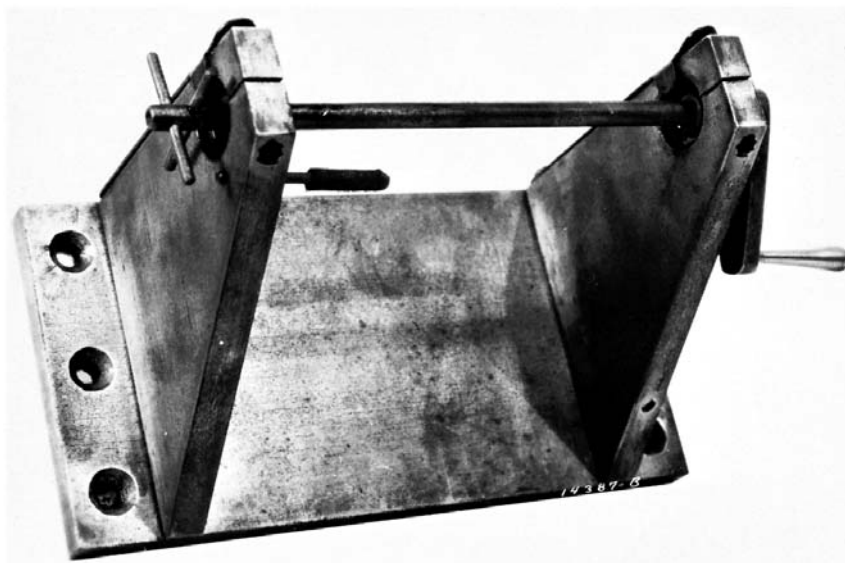


FIG. 1 Tester for Adhesion Test of Friction Tape