



Designation: ~~D69~~—12 D69 – 19

Standard Test Methods for Friction Tapes¹

This standard is issued under the fixed designation D69; 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 reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

This standard has been approved for use by agencies of the U.S. 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 [D4514](#).

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

	Sections
Adhesion	6 – 11
Aged Adhesion	12 – 17
Breaking Strength	18 – 23
Dielectric Breakdown Voltage	24 – 29
Dimensions	30 – 35
Discoloration of Copper	36 – 40
Parallelism	41 – 45

1.3 Units—The values stated in inch-pound and SI units are the standard. The inch-pound units in parentheses are for information only. The values stated in each system are not necessarily exact equivalents; therefore, to ensure conformance with the standard, each system shall be used independently of the other, and values from the two systems shall not be combined.

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

NOTE 2—There is no equivalent IEC standard.

1.5 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*:²

[D149 Test Method for Dielectric Breakdown Voltage and Dielectric Strength of Solid Electrical Insulating Materials at Commercial Power Frequencies](#)

[D412 Test Methods for Vulcanized Rubber and Thermoplastic Elastomers—Tension](#)

[D1711 Terminology Relating to Electrical Insulation](#)

[D4514 Specification for Friction Tape](#)

[D5423 Specification for Forced-Convection Laboratory Ovens for Evaluation of Electrical Insulation](#)

[D6054 Practice for Conditioning Electrical Insulating Materials for Testing \(Withdrawn 2012\)](#)³

¹ 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 Electrical Insulating Materials.

Current edition approved ~~April 1, 2012~~ Aug. 1, 2019. Published ~~April 2012~~ August 2019. Originally approved in 1920. Last previous edition approved in ~~2006~~ 2012 as ~~D69–06~~ D69–12. DOI: ~~10.1520/D0069-12~~ 10.1520/D0069-19.

² 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.

³ The last approved version of this historical standard is referenced on www.astm.org.

*A Summary of Changes section appears at the end of this standard

3. Terminology

3.1 Definitions:

3.1.1 For definitions of other terms used in this specification, refer to Terminology [D1711](#).

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~~meters 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 The producer and consumer shall agree upon the number of rolls selected. Unless otherwise specified a minimum of three rolls per lot shall be tested.

4.2 For sampling purposes, a lot consists of identifiable materials of the same type manufactured in one production run and offered for delivery at the same time.

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)~~610 mm (24 in.) 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 [D6054](#).

5.2 Unless otherwise specified, condition the test specimens for 1 h in a standard laboratory atmosphere as specified in Practice [D6054](#).

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)~~6 mm (0.25 in.) in diameter with a slot ~~approximately 0.0625 in. (1.6 mm)~~1.6 mm (0.0625 in.) 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)~~0.07 N (0.25 Ozf) 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)~~50 mm (2 in.) below the mandrel and extended downward for a distance of ~~36 in. (915 mm)~~915 mm (36 in.). The scale shall be readable to ~~1/8 in. (3.2 mm)~~1/8 (3.2 mm); in.

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 17.8 N/25 mm (4 lbf/in.) and 44.5 N/25 mm (10 lbf/in.) is achieved.

8. Test Specimen

8.1 Cut a test specimen ~~23 in. (580 mm)~~580 mm (23 in.) 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)~~50 mm (2 in.) onto the mandrel.

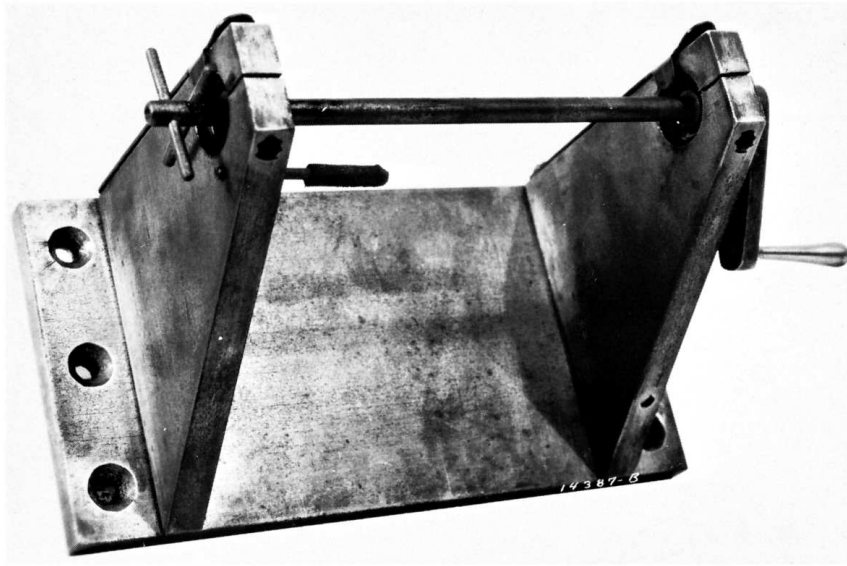


FIG. 1 Tester for Adhesion Test of Friction Tape

9.2 Attach a total weight of 10 lbf/in. (44.5 N/25 mm) 44.5 N/25 mm (10 lbf/in.) to the end of the specimen and wind the remaining 19 in. (480 mm) 480 mm (19 in.) of the specimen onto the mandrel at an approximate rate of $\pm 300 \text{ mm-in./min/min}$ (12 in. (300 mm/min)/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) 17.8 N/25 mm (4 lbf/in.) and allow the tape to unwind.

9.4 After the first 2 in. (51 mm) 50 mm (2 in.) 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.

11.2 *Bias*—This test method has no bias because the value for adhesion is determined solely in terms of this test method itself.

AGED ADHESION

12. Significance and Use

12.1 The adhesion of a friction tape must remain adequate after the tape has aged. Exposure in a dry oven is an attempt to simulate such shelf-storage aging.

13. Apparatus

13.1 *Oven*—An oven conforming to the requirements of Specification **D5423**.

13.2 *Adhesion Tester*, in accordance with **7.1**.

13.3 *Weights*, in accordance with **7.2**, except that a total load of 3 lbf/in. (13.3 N/25 mm) instead of 4 lbf/in. (17.8 N/25 mm) can be 13.3 N/25 mm (3 lbf/in.) instead of 17.8 N/25 mm (4 lbf/in.) is achieved.

14. Test Specimen

14.1 Prepare the test specimen as described in Section **8**.

15. Procedure

15.1 Expose the specimen to dry air in an oven at a temperature of $212 \pm 2 \text{ }^\circ\text{F}$ ($100 \pm 1 \text{ }^\circ\text{C}$) $100 \pm 1 \text{ }^\circ\text{C}$ ($212 \pm 2 \text{ }^\circ\text{F}$) for a period of 16 h. Support the specimen in the oven by clips or other suitable devices, in such a way that the adhesion test portion hangs free and out of contact with oven parts or other tape specimens.