



Designation: **D 5637 – 9500**

An American National Standard

## Standard Test Method for Moisture Resistance of Electrical Insulating Varnishes<sup>1</sup>

This standard is issued under the fixed designation D 5637; 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.

### 1. Scope

1.1 This test method covers the mechanical performance of electrical insulating varnishes subjected to high humidity conditions.

1.2 The values stated in SI units are to be regarded as standard.

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. See 7.1.*

### 2. Referenced Documents

2.1 *ASTM Standards:*

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<sup>1</sup> This test method is under the jurisdiction of ASTM Committee ~~D-9~~ D09 on Electrical and Electronic Insulating Materials and is the direct responsibility of Subcommittee D09.01 on Electrical Insulating Varnishes, Powders, and Encapsulating Compounds.

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D 2519 Test Method for Bond Strength of Electrical Insulating Varnishes by the Helical Coil Test<sup>2</sup>

2.2 IEEE Standard:

IEEE 117 Standard Test Procedure for Evaluation of Systems of Insulating Materials for Random-Wound AC Electric Machinery<sup>3</sup>

**3. Terminology**

3.1 See Test Method D 2519.

**4. Summary of Test Method**

4.1 Flexural strength tests are made on varnish-treated helical coils to determine the force required to break the coil under specified conditions both before and after exposure to high humidity conditions.

**5. Significance and Use**

5.1 This test method is useful for the evaluation of insulating varnish performance in high humidity exposure.

**6. Apparatus**

6.1 *Tensile Testing Machine*—See Test Method D 2519.

6.2 *Test Fixture*—See Test Method D 2519.

6.3 *Exposure Chamber*—A chamber capable of maintaining a minimum of 98 % 100 % relative humidity with condensation, at 30 ± 1°C.

NOTE 1—The exposure chamber described in IEEE 117 has been found suitable.

**7. Safety Precautions**

~~7.1 Do not~~

~~7.1 It is unsafe to use varnish, solvents and reagents liquid varnish at temperatures above their the flash point when without adequate ventilation, especially if the possibility of exists that flames or sparks exist. Store varnish, solvents and reagents in sealed containers. are present.~~

**8. Test Specimens**

8.1 Prepare a minimum of ten test specimens in accordance with Test Method D 2519 using a wire mutually agreed upon by supplier and purchaser.

**9. Procedure**

9.1 Condition half of the test specimens in the exposure chamber maintaining a minimum of 98 % relative humidity for 336 ± 1 h.

9.2 Test specimens both conditioned and unconditioned as described in Test Method D 2519 at standard laboratory conditions. ~~¶ If possible, test conditioned specimens w in the exposure chamber. When specimen-15s are not tested in the exposure chamber, they should be removed one at a time from the chamber and tested as soon as possible. The time after removal from the chamber and room conditions may affect test results. Take care to minimize any change in humidity within the cabinet during testing.~~

**10. Report**

10.1 Report the following information:

10.1.1 Description of varnish,

10.1.2 Identification of wire used,

10.1.3 Cure time and temperature and number of dips used to prepare the coils,

10.1.4 Average bond strength in newtons (pounds-force) of unconditioned coils,

10.1.5 Average bond strength in newtons (pounds-force) of conditioned coils, and

10.1.6 Percent retention of bond strength after conditioning—(

$$\text{Percent Retained Bond} = (\text{Average Bond Strength [conditioned]} / \text{Average Bond Strength [unconditioned]}) \times 100. \quad (1)$$

$$\text{Percent retained bond strength} = \frac{\text{average bond strength (conditioned)}}{\text{average bond strength (unconditioned)}} \times 100 \quad (1)$$

**11. Precision and Bias**

11.1 *Precision*—~~¶ No information has been presented to ASTM upon which to base a statement of this test method precision. No activity has not been evaluated. planned to develop such information.~~

<sup>2</sup> Annual Book of ASTM Standards, Vol 10.02.

<sup>3</sup> Available from Institute of Electrical and Electronics Engineers, Inc., 345 E. 47th St., New York, NY 10017.

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

## 12. Keywords

12.1 bond strength; helical coils; moisture resistance; varnish

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