



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

This standard is issued under the fixed designation D5638; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

## 1. Scope\*

1.1 This test method covers the mechanical performance of insulating varnishes after exposure to various chemicals.

1.2 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this 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.*

NOTE 1—There is no IEC/ISO equivalent.

## 2. Referenced Documents

2.1 *ASTM Standards:*<sup>2</sup>

**D2519 Test Method for Bond Strength of Electrical Insulating Varnishes by the Helical Coil Test**

## 3. Terminology

3.1 See Test Method **D2519**.

## 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 liquid chemicals.

## 5. Significance and Use

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

<sup>1</sup> This test method is under the jurisdiction of ASTM Committee **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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<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

## 6. Apparatus

6.1 *Tensile Testing Machine*—See Test Method **D2519**.

6.2 *Test Fixture*—See Test Method **D2519**.

6.3 *Chemical Containers*—Sealable 1000-mL containers of suitable material and design for containing the chemicals to be used.

## 7. Safety Precautions

7.1 It is unsafe to use varnish at temperatures above the flash point without adequate ventilation, especially if the possibility exists that flames or sparks are present. Store varnish in sealed containers.

## 8. Test Specimen

8.1 Prepare a minimum of five test specimens for each chemical solution to be tested and a minimum of five to determine unconditioned bond strength in accordance with Test Method **D2519** using a wire mutually agreed upon by supplier and user.

## 9. Procedure

9.1 Condition a minimum of five test specimens in each chemical. Chemicals, test temperature, and conditioning time are mutually agreed upon by supplier and user.

9.2 Test specimens both conditioned and unconditioned as described in Test Method **D2519** at standard laboratory conditions. Test conditioned specimens within 15 min of removal from container to minimize any change in bond strength after exposure. Rinse conditioned specimens with water and pat dry when water soluble chemicals were used for conditioning. Otherwise wipe specimens to remove excess chemical.

## 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,

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

10.1.6 Description of chemical, exposure temperature, and exposure time to which the specimens were subjected, and  
10.1.7 Percent retention of bond strength after conditioning per the formula below.

$$\% \text{ Retained Bond Strength} = \frac{\text{Average Bond Strength [conditioned]}}{\text{Average Bond Strength [unconditioned]}} \times 100$$

## 11. Precision and Bias

11.1 *Precision*—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 chemical resistance is determined solely in terms of this test method.

## 12. Keywords

12.1 bond strength; chemical resistance; helical coils; varnish

## SUMMARY OF CHANGES

Committee **D09** has identified the location of selected changes to this standard since the last issue (D5638 – 05 (2010)) that may impact the use of this standard. (Approved Nov. 1, 2014.)

(1) Revised Subsection **8.1**.

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