



# Standard Test Method for Thermal-Aging Characteristics of Electrical Insulating Varnishes Applied Over Film-Insulated Magnet Wire<sup>1</sup>

This standard is issued under the fixed designation D 3251; 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 determination of the thermal-aging characteristics of electrical insulating varnishes and film-insulated magnet wire in combination.

1.2 The values stated in SI units are to be regarded as the 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.* For specific hazard statements, see Section 6.

NOTE 1—This test method is equivalent to IEC 60172.

## 2. Referenced Documents

### 2.1 ASTM Standards:

D 115 Test Methods for Testing Solvent Containing Varnishes Used for Electrical Insulation<sup>2</sup>

D 1711 Terminology Relating to Electrical Insulation<sup>2</sup>

D 2307 Test Method for Relative Thermal Endurance of Film-Insulated Round Magnet Wire<sup>2</sup>

### 2.2 IEC Standard:

IEC 60172 Test Procedure for the determination of the temperature index of enameled winding wires<sup>3</sup>

## 3. Terminology

### 3.1 Definitions:

3.1.1 For definitions of terms used in this test method refer to Terminology D 1711.

## 4. Summary of Test Method

4.1 A varnish is applied to twisted pairs of film-insulated magnet wire and aged at several elevated temperatures. Life test results are compared to those of unvarnished twisted pairs.

<sup>1</sup> This test method is under the jurisdiction of ASTM Committee D-9 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> *Annual Book of ASTM Standards*, Vol 10.01.

<sup>3</sup> Available from American National Standards Association, 11 W. 42nd St., 13th Floor, New York, NY 10036.

## 5. Significance and Use

5.1 Individual varnishes may behave differently when applied to the same film-insulated magnet wire and aged at elevated temperatures. Likewise, a varnish may not behave the same when applied to different types of film-insulated magnet wires and aged at elevated temperatures.

5.2 This test method is used to determine the effect on the electrical properties of a varnish applied to film-insulated magnet wire and the combination aged at prescribed elevated temperatures.

## 6. Safety Precautions

6.1 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. This also applies to specified reagents and solvents.

**Warning**—*Lethal voltages are a potential hazard during the performance of this test. It is essential that the test apparatus, and all associated equipment electrically connected to it, be properly designed and installed for safe operation. Solidly ground all electrically conductive parts which it is possible for a person to contact during the test. Provide means for use at the completion of any test to ground any parts which were at high voltage during the test or have the potential for acquiring an induced charge during the test or retaining a charge even after disconnection of the voltage source. Thoroughly instruct all operators as to the correct procedures for performing tests safely. When making high voltage tests, particularly in compressed gas or in oil, it is possible for the energy released at breakdown to be sufficient to result in fire, explosion, or rupture of the test chamber. Design test equipment, test chambers, and test specimens so as to minimize the possibility of such occurrences and to eliminate the possibility of personal injury. If the potential for fire exists, have fire suppression equipment available.*

## 7. Sampling

7.1 Sample the varnish in accordance with Test Methods D 115.

## 8. Test Specimen

8.1 Twist two pieces of heavy-build film-insulated wire in