



Designation: D3251 – 19

Standard Test Method for Thermal Endurance Characteristics of Electrical Insulating Varnishes Applied Over Film-Insulated Magnet Wire¹

This standard is issued under the fixed designation D3251; 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.

1. Scope*

1.1 This test method covers the determination of the thermal endurance 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 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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

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

1.4 *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

[D115 Test Methods for Testing Solvent Containing Varnishes Used for Electrical Insulation](#)

[D1711 Terminology Relating to Electrical Insulation](#)

[D2307 Test Method for Thermal Endurance of Film-Insulated Round Magnet Wire](#)

2.2 *IEC Standard:*

[IEC 60172 Test Procedure for the determination of the temperature index of enameled winding wires](#)³

¹ 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 Products.

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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 Available from American National Standards Association, 25 W. 43rd St., 4th Floor, New York, NY 10036.

3. Terminology

3.1 *Definitions:*

3.1.1 For definitions of terms used in this test method refer to Terminology [D1711](#).

4. Summary of Test Method

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

5. Significance and Use

5.1 Different combinations of varnishes and film-insulated magnet wire behave differently when exposed to elevated temperatures. This includes different varnishes tested with the same film-insulated magnet wire and a single varnish tested with different film-insulated magnet wire.

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

6. Hazards

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

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