



Standard Test Method for Thermal Endurance of Flexible Electrical Insulating Varnishes¹

This standard is issued under the fixed designation D 1932; 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 Department of Defense.

1. Scope

1.1 This test method covers the determination of the relative thermal endurance of flexible electrical insulating varnishes by determining the aging time necessary at elevated temperatures to decrease the dielectric breakdown of the varnish to an arbitrarily selected value when applied to a standard glass fiber fabric.

1.2 This test method does not apply to varnishes that lose a high percentage of their dielectric breakdown voltage when flexed before aging as prescribed in the screening test (Section 9). Examples of such varnishes are those used for high speed armatures and laminated structures. Also, this test method is not applicable to varnishes which distort sufficiently during thermal aging so that they cannot be tested using the curved electrode assembly.

1.3 Thermal endurance is expressed in terms of a temperature index.

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 and health practices and determine the applicability of regulatory limitations prior to use.* For specific hazard statements, see Section 7.

1.5 The values stated in acceptable metric units are to be regarded as the standard.

2. Referenced Documents

2.1 ASTM Standards:

D 149 Test Method for Dielectric Breakdown Voltage and Dielectric Strength of Solid Electrical Insulating Materials at Commercial Power Frequencies²

D 374 Test Methods for Thickness of Solid Electrical Insulation²

D 580 Specification for Greige Woven Glass Tapes and Webbing³

D 618 Practice for Conditioning Plastics and Electrical Insulating Materials for Testing²

D 1346 Methods of Testing Electrical Insulating Varnishes for 180°C and Above⁴

D 1711 Terminology Relating to Electrical Insulation²

D 2518 Specification for Woven Glass Fabrics for Electrical Insulation⁵

D 5423 Specification for Forced-Convection Laboratory Ovens for Evaluation of Electrical Insulation⁵

2.2 IEEE Publications:⁶

IEEE No. 101A Guide for the Statistical Analysis of Thermal Life Test Data (including Appendix A)

2.3 IEC Publications:

IEC 216 Guide for the Determination of Thermal Endurance Properties of Electrical Insulating Materials (Parts 1 and 2)⁷

3. Terminology

3.1 Definitions:

3.1.1 *temperature index (TI), n*—a number which permits comparison of the temperature/time characteristics of an electrical insulating material, or a simple combination of materials, based on the temperature in degrees Celsius which is obtained by extrapolating the Arrhenius plot of life versus temperature to a specified time, usually 20 000 h.

3.1.2 *thermal endurance graph, n*—an Arrhenius plot.

3.1.3 *thermal life, n*—the time necessary for a specific property of a material, or a simple combination of materials, to degrade to a defined end point when aged at a specified temperature.

3.1.4 *thermal life curve, n*—a graphical representation of thermal life at a specified aging temperature in which the value

¹ 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.

Current edition approved Sept. 10, 1997. Published November 1997. Originally published as D 1932 – 67. Last previous edition D 1932 – 96.

² *Annual Book of ASTM Standards*, Vol 10.01.

³ *Annual Book of ASTM Standards*, Vol 07.01.

⁴ Discontinued; see 1986 *Annual Book of ASTM Standards*, Vol 10.01.

⁵ *Annual Book of ASTM Standards*, Vol 10.02.

⁶ Available from the Institute of Electrical and Electronics Engineers, 345 E. 47th St., New York, NY 10017.

⁷ Available from American National Standards Institute, 11 West 42nd St., 13th Floor, New York, NY 10036.