



Standard Test Method for Thermal Endurance of Flexible Sheet Materials Used for Electrical Insulation by the Curved Electrode Method¹

This standard is issued under the fixed designation D1830; 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 U.S. Department of Defense.

1. Scope

1.1 This test method provides a procedure for evaluating thermal endurance of flexible sheet materials by determining dielectric breakdown voltage at room temperature after aging in air at selected elevated temperatures. Thermal endurance is expressed in terms of a temperature index.

1.2 This test method is applicable to such solid electrical insulating materials as coated fabrics, dielectric films, composite laminates, and other materials where retention of flexibility after heat aging is of major importance (see **Note 4**).

1.3 This test method is not intended for the evaluation of rigid laminate materials nor for the determination of thermal endurance of those materials which are not expected or required to retain flexibility in actual service.

1.4 The values stated in acceptable metric units are to be regarded as the standard. The values in parentheses are for information only.

1.5 *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 a specific hazard statement, see **10.1**.

2. Referenced Documents

2.1 ASTM Standards:²

- D149** Test Method for Dielectric Breakdown Voltage and Dielectric Strength of Solid Electrical Insulating Materials at Commercial Power Frequencies
- D374** Test Methods for Thickness of Solid Electrical Insulation (Withdrawn 2013)³

2.2 *Institute of Electrical and Electronics Engineers Publications:*⁴

IEEE No. 1 General Principles for Temperature Limits in the Rating of Electrical Equipment

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)⁵

3. Terminology

3.1 Definitions:

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

3.1.3 *thermal life curve, n*—a graphical representation of thermal life at a specified aging temperature in which the value of a property of a material, or a simple combination of materials, is measured at room temperature and the values plotted as a function of time.

3.2 Definitions of Terms Specific to This Standard:

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 D09.19 on Dielectric Sheet and Roll 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 The last approved version of this historical standard is referenced on www.astm.org.

⁴ Available from Institute of Electrical and Electronics Engineers, Inc. (IEEE), 445 Hoes Ln., P.O. Box 1331, Piscataway, NJ 08854-1331.

⁵ Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036.