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.

Designation: D2304 – 18

Standard Test Method for Thermal Endurance of Rigid Electrical Insulating Materials[1]

This standard is issued under the fixed designation D2304; 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[2] provides procedures for evaluating the thermal endurance of rigid electrical insulating materials. Dielectric strength, flexural strength, or water absorption are determined at room temperature after aging for increasing periods of time in air at selected-elevated temperatures. A thermal-endurance graph is plotted using a selected end point at each aging temperature. A means is described for determining a temperature index by extrapolation of the thermal endurance graph to a selected time.

1.2 This test method is most applicable to rigid electrical insulation such as supports, spacers, voltage barriers, coil forms, terminal boards, circuit boards and enclosures for many types of application where retention of the selected property after heat aging is important.

1.3 When dielectric strength is used as the aging criterion, it is also acceptable to use this test method for some thin sheet (flexible) materials, which become rigid with thermal aging, but is not intended to replace Test Method D1830 for those materials which must retain a degree of flexibility in use.

1.4 This test method is not applicable to ceramics, glass, or similar inorganic materials.

1.5 The values stated in metric units are to be regarded as standard. Other units (in parentheses) are provided for information.

1.6 *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.* A specific warning statement is given in 11.3.4.

1.7 *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:*[3]

D149 Test Method for Dielectric Breakdown Voltage and Dielectric Strength of Solid Electrical Insulating Materials at Commercial Power Frequencies

D229 Test Methods for Rigid Sheet and Plate Materials Used for Electrical Insulation

D570 Test Method for Water Absorption of Plastics

D790 Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials

D1830 Test Method for Thermal Endurance of Flexible Sheet Materials Used for Electrical Insulation by the Curved Electrode Method

D5423 Specification for Forced-Convection Laboratory Ovens for Evaluation of Electrical Insulation

2.2 *IEEE:*[4]

No. 1 General Principles Upon Which Temperature Limits Are Based in the Rating of Electric Equipment

No. 98 Guide for the Preparation of Test Procedures for the Thermal Evaluation of Electrical Insulating Materials

No. 101 Guide for the Statistical Analysis of Test Data

3. Terminology

3.1 *Definitions:*

3.1.1 *Arrhenius plot, n*—a graph of the logarithm of thermal life as a function of the reciprocal of absolute temperature.

3.1.1.1 *Discussion*—This is normally depicted as the best straight line fit, determined by least squares, of end points obtained at aging temperatures. It is important that the slope,

[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 D09.07 on Electrical Insulating Materials.

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[2] This test method is a revision of a procedure written by the Working Group on Rigid Electrical Insulating Materials of the Subcommittee on Thermal Evaluation, IEEE Electrical Insulation Committee, which was presented as CP 59-113 at the IEEE Winter General Meeting Feb. 1–6, 1959. See references at end of this test method.

[3] 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.

[4] Available from the Institute of Electrical and Electronics Engineers, 445 Hoes Ln., P.O. Box 1331, Piscataway, NJ 08854-1331.

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

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