



Standard Test Method for Thermal Endurance of Coating Powders Used for Integral Bus Bar Insulation Systems¹

This standard is issued under the fixed designation D7894/D7894M; 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 provides a procedure for evaluating thermal endurance of coating powders by determining the length of aging time at selected elevated temperatures required to achieve dielectric breakdown at room temperature at a pre-determined proof voltage. Thermal endurance is expressed in terms of a temperature index.

1.2 This test method is applicable to insulating powders used over a substrate material of copper or aluminum.

1.3 *Units*—The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system are not necessarily exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems is likely to result in non-conformance with the standard.

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.* Specific precautionary statements are given in Section 7.

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

D1711 Terminology Relating to Electrical Insulation

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

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 Varnishes, Powders and Encapsulating Compounds.

Current edition approved Nov. 1, 2014. Published November 2014. DOI: 10.1520/D7894_D7894M-14.

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.

2.2 IEEE Document:³

IEEE 101A Simplified Method for Calculation of the Regression Line

3. Terminology

3.1 *Definitions*—For definitions of terms used in this test method refer to Terminology **D1711**.

4. Summary of Test Method

4.1 Specimens are aged in air at a minimum of three temperatures above the expected use temperature of the material. Exposure to ambient stress conditions, followed by dielectric proof voltage tests in an electrically conductive solution, are periodically conducted to determine the time of aging at each elevated temperature required to reduce the breakdown voltage to a pre-selected percentage of the original breakdown value. These thermal life values are used to construct a thermal endurance graph by means of which it is possible to estimate a temperature index, corresponding to a thermal life as specified in the material specification or as agreed upon between the user and the supplier. It is possible that a material will have multiple indices, each corresponding to a different thermal life as required by a given application.

5. Significance and Use

5.1 A major factor affecting the life of insulating materials is thermal degradation. It is possible that other factors, such as moisture and vibration, will cause failures after the material has been weakened by thermal degradation.

5.2 Electrical insulation is effective in electrical equipment only as long as it retains its physical and electrical integrity. The following are potential indicators of thermal degradation: weight change, porosity, crazing, and generally a reduction in flexibility. Thermal degradation is usually accompanied by an ultimate reduction in dielectric breakdown.

5.3 This test method is useful in determining the thermal endurance of coating powders applied over a copper or aluminum substrate material.

³ Available from Institute of Electrical and Electronics Engineers, Inc. (IEEE), 445 Hoes Ln., P.O. Box 1331, Piscataway, NJ 08854-1331, <http://www.ieee.org>.