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AMERICAN SOCIETY FOR TESTING AND MATERIALS

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Standard Test Method for Polyimide Resin Film for Electrical Insulation and Dielectric Applications¹

This standard is issued under the fixed designation D 5214; 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 procedures for evaluating the property values of polyimide film, with or without heat sealable fluorinated poly(ethylene-propylene) (FEP) fluorocarbon coatings.

1.2 The values stated in SI units are to be regarded as the standard. The inch-pound units given in parentheses are for information only.

1.3 *This standard does not purport to address all of the safety problems, 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.*

2. Referenced Documents

2.1 ASTM Standards:

- D 149 Test Methods for Dielectric Breakdown Voltage and Dielectric Strength of Solid Electrical Insulating Materials at Commercial Power Frequencies²
- D 150 Test Methods for A-C Loss Characteristics and Permittivity (Dielectric Constant) of Solid Electrical Insulating Materials²
- D 257 Test Methods for D-C Resistance or Conductance of Insulating Materials²
- D 374 Test Methods for Thickness of Solid Electrical Insulation^{2,3}
- D 570 Test Method for Water Absorption of Plastics²
- D 618 Practice for Conditioning Plastics and Electrical Insulating Materials for Testing²
- D 882 Test Methods for Tensile Properties of Thin Plastic Sheet²
- D 883 Terminology Relating to Plastics²
- D 2305 Test Methods for Polymeric Films Used for Electrical Insulation³
- D 5213 Specification for Polyimide Resin Film for Electrical Insulation and Dielectric Applications⁴

3. Terminology

3.1 Definitions:

3.1.1 Definitions are in accordance with Terminology D 883 unless otherwise specified.

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 D09.07 on Flexible and Rigid Insulating Materials.

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² Annual Book of ASTM Standards, Vol 08.01.

³ Annual Book of ASTM Standards, Vol 10.01.

⁴ Annual Book of ASTM Standards, Vol 10.02.

3.2 Descriptions of Terms Specific to This Standard:

- 3.2.1 *sheet*—material greater than 76 mm (3 in.) in width.
- 3.2.2 *strip*—material 76 mm (3 in.) or less in width.

4. Significance and Use

4.1 This test method is intended to be used to determine compliance of polyimide polymer film material, in sheet or strip form, with the requirements of Specification D 5213. As written herein, they are intended for quality control use only.

5. Specimen Preparation

5.1 Prepare test specimens suitable for each test from samples that have been cut across the entire width of the sampled material. If the width of strip material is too small to permit preparation of specimens of the required dimensions, then specimens may be prepared from samples taken from mill rolls prior to slitting to the furnished width.

6. Conditioning

6.1 Condition test specimens in accordance with Procedure A of Practice D 618. Test at $23 \pm 2^\circ\text{C}$ ($73.4 \pm 3.6^\circ\text{F}$) and $50 \pm 5\%$ relative humidity.

7. Procedure

7.1 Tensile Strength and Elongation:

7.1.1 Prepare five specimens in each of the two principal directions, each 12 by 200 mm (0.5 by 8 in.), in accordance with Method A of Test Methods D 882.

7.1.2 Measure the tensile breaking strength and tensile elongation, with initial jaw separation of 100 ± 2 mm (4.0 ± 0.08 in.) and rate of jaw separation of 50 ± 2 mm (2 ± 0.08 in.) per minute.

7.1.3 For each specimen calculate the tensile strength in MPa (lb/in.²), using the initial thickness and specimen width. Average the five determinations for each of the two principal directions. Similarly, calculate the elongation at break as a percentage of the initial jaw separation.

7.1.4 Report separately the average tensile strengths and the average elongations in the machine and the transverse directions.

7.2 Shrinkage:

7.2.1 From a wrinkle-free area of the film sample prepare six specimens, each approximately 200 by 280 mm (8.5 by 11 in.), with three specimens having the longer dimension in the machine dimension, and three with the longer dimension in the transverse dimension.

7.2.2 Measure the length of each specimen to the nearest 0.25 mm (0.01 in.) at two marked distances, using a metal scale calibrated to 0.25 mm (0.01 in.).