



Designation: D229 – 19^{ε1}

Standard Test Methods for Rigid Sheet and Plate Materials Used for Electrical Insulation¹

This standard is issued under the fixed designation D229; 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.

^{ε1} NOTE—The title of Table 1 was editorially corrected in August 2019.

This standard has been approved for use by agencies of the U.S. Department of Defense.

1. Scope*

1.1 These test methods cover procedures for testing rigid electrical insulation normally manufactured in flat sheet or plate form. They are generally used as terminal boards, spacers, voltage barriers, and circuit boards.

1.2 Use Test Methods **D619** (withdrawn) or Specification **D710** for tests applying to vulcanized fibre.

1.3 Some of the test methods contained in this standard are similar to those contained in IEC 60893-2, which applies to rigid industrial laminated sheets based on thermosetting resins for electrical purposes.

1.4 The test methods appear in the following sections:

Test	Sections	ASTM Test Method
Acetone extractable matter	82 to 83	D494
Arc resistance	47	D495
Ash	56 to 60	...
Bonding strength	49 to 54	...
Flammability methods I and II	61 to 74	...
Coefficient of linear thermal expansion	76	D696
Compressive strength	25	D695
Conditioning	4	D6054
Dissipation factor	34 to 40	D669
Dielectric strength	28 to 33	D149
Expansion (linear thermal)	75	D696
Flexural properties	12 to 24	D790
Hardness (Rockwell)	55	D785
Insulation resistance and resistivity	41 to 46	D257
Permittivity	34 to 40	D150
Resistance to impact	26	D256
Tensile properties	7 to 11	D638
Thickness	5 to 6	D374
Tracking resistance	48	D2132
Warp or twist	76 to 81	...
Water absorption	27	D570

1.5 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical

conversions to SI units that are provided for information only and are not considered standard.

1.6 This is a fire-test-response standard. See Sections **61** through **74**, which are the procedures for assessing ignitability and burning time under specific test conditions

1.7 *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. Specific precautionary statements are given in **31.1** and **1.8**.*

1.8 *This standard measures and describes the response of materials, products, or assemblies to heat and flame under controlled conditions, but does not by itself incorporate all factors required for fire hazard or fire risk assessment of the materials, products, or assemblies under actual fire conditions.*

1.9 *Fire testing is inherently hazardous. Adequate safeguards for personnel and property shall be employed in conducting these tests.*

1.10 *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:²

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

D150 Test Methods for AC Loss Characteristics and Permittivity (Dielectric Constant) of Solid Electrical Insulation

¹ These test methods are under the jurisdiction of ASTM Committee **D09** on Electrical and Electronic Insulating Materials and are the direct responsibility of Subcommittee **D09.07** on Electrical Insulating Materials.

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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.

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