



Designation: D4733 – 24

Standard Test Methods for Solventless Electrical Insulating Varnishes¹

This standard is issued under the fixed designation D4733; 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 These test methods cover solventless varnishes used primarily as electrical, mechanical, and environmental protection for electrical equipment.

1.2 These test methods are used on solventless varnishes that are applied by dipping (at atmospheric pressure conditions or under vacuum followed by pressure or under pressure only), spraying, or brushing for the purpose of impregnating or sealing electrical equipment. The following test methods are included:

Property Tests (Uncured):	Section
Density	7
Flash Point	8
Gel Time	9
Monomer Content	10
Rheological Properties (Non-Newtonian)	11
Rotational Viscosity	12
Performance Property Tests (cured):	
Bond Strength	13
Coating Thickness	14
Dielectric Strength	15
Dielectric Strength-Using Metal Panels	16
Permittivity and Dissipation Factor	17
Build	18

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

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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.* Specific hazard statements are given in 8.3, 15.5.1, and 15.5.2.

NOTE 1—This test method is related to IEC 60455. Since both methods contain multiple test procedures, many procedures are technically equivalent while others differ significantly.

1.5 *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

- D93 Test Methods for Flash Point by Pensky-Martens Closed Cup Tester
- D115 Test Methods for Testing Solvent Containing Varnishes Used for Electrical Insulation
- 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
- D374/D374M Test Methods for Thickness of Solid Electrical Insulation
- D923 Practices for Sampling Electrical Insulating Liquids
- D1475 Test Method for Density of Liquid Coatings, Inks, and Related Products
- D1711 Terminology Relating to Electrical Insulation
- D2196 Test Methods for Rheological Properties of Non-Newtonian Materials by Rotational Viscometer
- D2519 Test Method for Bond Strength of Electrical Insulating Varnishes by the Helical Coil Test
- D3056 Test Method for Gel Time of Solventless Varnishes
- D3278 Test Methods for Flash Point of Liquids by Small Scale Closed-Cup Apparatus
- D3312 Test Method for Percent Reactive Monomer in Solventless Varnishes
- D3487 Specification for Mineral Insulating Liquid Used in Electrical Apparatus
- D3636 Practice for Sampling and Judging Quality of Solid Electrical Insulating Materials
- D6054 Practice for Conditioning Electrical Insulating Materials for Testing (Withdrawn 2012)³
- D8561 Test Method for Gel Time of Solventless Varnishes by Plunger Method

¹ These test methods are 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 Products.

Current edition approved Dec. 1, 2024. Published December 2024. Originally approved in 1987. Last previous edition approved in 2017 as D4733 – 17. DOI: 10.1520/D4733-24.

² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at www.astm.org/contact. 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.

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