



Standard Test Methods for Solid Filling and Treating Compounds Used for Electrical Insulation¹

This standard is issued under the fixed designation D 176; 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 physical and electrical tests for solid filling and treating compounds used for electrical insulation which are fusible to a liquid without significant chemical reaction. Compounds that are converted to the solid state by polymerization, condensation, or other chemical reaction are not included in these test methods.

1.2 These test methods are designed primarily for asphaltic or bituminous compounds, waxes, and fusible resins, or mixtures thereof, although some of these methods are applicable to semisolid types such as petrolatums. Special methods more suitable for hydrocarbon waxes are contained in Test Methods D 1168.

1.3 Adequate ventilation must be provided when these tests involve heating.

1.4 The test methods appear in the following sections:

Test Method	Sections
<i>Electrical Tests:</i>	
A-C Loss Characteristics and Permittivity (Dielectric Constant)	51-54
Dielectric Strength	42-45
Volume Resistivity-Temperature Characteristics	46-49
<i>Physical Tests:</i>	
Coefficient of Expansion or Contraction	22-41
Flash and Fire Points	9 and 10
Loss on Heating	11 and 12
Melting Point	5 and 6
Penetration	15 and 16
Softening Point	7 and 8
Specific Gravity	17-21
Viscosity	13 and 14

1.5 The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.

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 and health practices and determine the applicability of regulatory limitations prior to use.* For specific hazard statements, see Note 4 and Note 7.

¹ These methods of testing are under the jurisdiction of ASTM Committee D09 on Electrical and Electronic Insulating Materials and are the direct responsibility of Subcommittee D09.01 on Electrical Insulating Varnishes, Powders, and Encapsulating Compounds.

Current edition approved Nov. 10, 2000. Published February 2001. Originally published as D 176 – 23 T. Last previous edition D 176 – 96.

NOTE 1—There is no similar or equivalent IEC or ISO standard.

2. Referenced Documents

2.1 ASTM Standards:

D 5 Test Method for Penetration of Bituminous Materials²

D 6 Test Method for Loss on Heating of Oil and Asphaltic Compounds³

D 70 Test Method for Specific Gravity of Semi-Solid Bituminous Materials²

D 71 Test Method for Relative Density of Solid Pitch and Asphalt (Displacement Method)⁴

D 88 Test Method for Saybolt Viscosity³

D 92 Test Method for Flash and Fire Points by Cleveland Open Cup⁴

D 127 Test Method for Drop Melting Point of Petroleum Wax, Including Petrolatum⁴

D 149 Test Method for Dielectric Breakdown Voltage and Dielectric Strength of Solid Electrical Insulating Materials at Commercial Power Frequencies⁵

D 150 Test Methods for AC Loss Characteristics and Permittivity (Dielectric Constant) of Solid Electrical Insulating Materials⁵

D 257 Test Methods for D-C Resistance or Conductance of Insulating Materials⁵

D 937 Test Method for Cone Penetration of Petrolatum⁴

D 1168 Test Methods for Hydrocarbon Waxes Used for Electrical Insulation⁵

D 1711 Terminology Relating to Electrical Insulation⁵

E 28 Test Method for Softening Point by Ring-and-Ball Apparatus⁶

E 102 Test Method for Saybolt Furol Viscosity of Bituminous Materials at High Temperatures³

3. Terminology

3.1 Definitions:

3.1.1 *dielectric strength, n*—the voltage gradient at which dielectric failure of the insulating material occurs under specific conditions of test.

² Annual Book of ASTM Standards, Vol 04.03.

³ Annual Book of ASTM Standards, Vol 04.04.

⁴ Annual Book of ASTM Standards, Vol 05.01.

⁵ Annual Book of ASTM Standards, Vol 10.01.

⁶ Annual Book of ASTM Standards, Vol 06.03.