



Standard Test Method for Specific Resistance (Resistivity) of Electrical Insulating Liquids¹

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

1. Scope

1.1 This test method covers the determination of specific resistance (resistivity) applied to new electrical insulating liquids, as well as to liquids in service, or subsequent to service, in cables, transformers, circuit breakers, and other electrical apparatus.

1.2 This test method covers a procedure for making referee tests with dc potential.

1.3 When it is desired to make routine determinations requiring less accuracy, certain modifications to this test method are permitted as described in Sections 19 – 26.

1.4 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.5 *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. See 17.6 for a specific warning statement.*

2. Referenced Documents

2.1 ASTM Standards:²

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

D257 Test Methods for DC Resistance or Conductance of Insulating Materials

D923 Practices for Sampling Electrical Insulating Liquids

D924 Test Method for Dissipation Factor (or Power Factor) and Relative Permittivity (Dielectric Constant) of Electrical Insulating Liquids

¹ This test method is under the jurisdiction of ASTM Committee D27 on Electrical Insulating Liquids and Gases and is the direct responsibility of Subcommittee D27.05 on Electrical Test.

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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.

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3. Terminology

3.1 Definitions of Terms Specific to This Standard:

3.1.1 *specific resistance (resistivity), n* —the ratio of the dc potential gradient in volts per centimetre paralleling the current flow within the specimen, to the current density in amperes per square centimetre at a given instant of time and under prescribed conditions. This is numerically equal to the resistance between opposite faces of a centimetre cube of the liquid. The units are ohm-centimetres.

4. Significance and Use

4.1 The resistivity of a liquid is a measure of its electrical insulating properties under conditions comparable to those of the test. High resistivity reflects low content of free ions and ion-forming particles, and normally indicates a low concentration of conductive contaminants.

5. General Considerations

5.1 Theory and measuring equipment pertaining to this method shall be in accordance with Test Methods D257.

5.2 Where both ac loss characteristic (dissipation factor or power factor) and resistivity measurements are to be made consecutively on the same specimen, make the ac measurement before applying the dc potential to the specimen, and short circuit the cell electrodes for 1 min immediately prior to making the resistivity measurements.

5.3 Make referee tests for resistivity in an atmosphere of less than 50 % relative humidity. For repeatable results make these tests under carefully controlled atmospheric conditions.

5.4 Aside from the adverse influence of contamination on results of the resistivity test, there are other factors that can contribute to variations in the test results as follows:

5.4.1 The use of an instrument not having an adequate range for accurately measuring the current flowing in the circuit. (See Section 6 for two types of recommended instruments.)

5.4.2 When the time of electrification is not exactly the same for every test. Upon the application of voltage, the current flow through the specimen decreases asymptotically