



Designation: D4399 – 05 (Reapproved 2023)

Standard Test Method for Measuring Electrical Conductivity of Electrocoat Baths¹

This standard is issued under the fixed designation D4399; 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 the determination of the electrical conductivity of electrocoat baths or ultrafiltrate samples using commercially available equipment.

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

1.3 *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.*

1.4 *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

D1125 Test Methods for Electrical Conductivity and Resistivity of Water

D1193 Specification for Reagent Water

3. Summary of Test Method

3.1 A specimen is placed in a conductivity cell, or conversely a conductivity cell is placed in an electrocoat material, and the cell is connected to a conductivity bridge. The electrical conductivity is read directly off the meter of the bridge as the instantaneous peak reading.

4. Significance and Use

4.1 The conductivity of electrocoat baths results from the presence of ionic species in the bath, which come from the

vehicle and from the presence of impurities present as ionizable acids, bases, salts, or combinations of these. The presence of excessive amounts of ionic impurities is detrimental to the application and performance properties of electrocoating paints. The test is suitable for use in research, production, quality control and electrocoat bath process control.

4.2 Other related methods for determining the electrical conductivity of water are described in Test Methods **D1125**.

5. Apparatus

5.1 *Conductivity Bridge*—Battery, or AC/DC line-operated, capable of providing a conductivity reading almost instantaneously.

5.2 *Conductivity Cell*—Dip or fill type, cell constant of 1.0.

5.3 *Thermometer*—Any type capable of 0.5 °C accuracy with a –2 °C to 32 °C range.

5.4 *Measuring Vessel*—Any suitable cylindrical container capable of holding sufficient electrocoat sample to cover the electrodes of the conductivity cell, and allowing at least 25 mm between the conductivity cell and the sides of the vessel.

6. Reagents and Materials

6.1 *Purity of Water*—References to water shall be understood to mean water conforming to Type II of Specification **D1193**.

6.2 *Cleaning Solvent*—An appropriate solvent for the electrocoat material under measurement.

7. Sampling and Sample Preparation

7.1 The sample should be obtained while the electrocoat bath is under proper circulation so that a uniform sample is obtained. In the case of an ultrafiltrate, the material should be thoroughly mixed or stirred prior to sampling to ensure uniformity.

7.2 After sampling and prior to removing a test specimen, it is mandatory that the samples be shaken or stirred until they are homogeneous and free of any settled material. This is particularly important if there is a delay between sampling the bath and performing the test on the bath materials. The absence of settled material can be ascertained visually (in a transparent container) or by inserting a spatula, scraping the bottom of the container and making sure that there is no settled matter. Shake

¹ This test method is under the jurisdiction of ASTM Committee **D01** on Paint and Related Coatings, Materials, and Applications and is the direct responsibility of Subcommittee **D01.21** on Chemical Analysis of Paints and Paint 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.