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AMERICAN SOCIETY FOR TESTING AND MATERIALS
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Standard Test Methods for Electrical Resistivity of Liquid Paint and Related Materials¹

This standard is issued under the fixed designation D 5682; 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 the determination of specific resistance (resistivity) of liquid paints, solvents, and other fluids in the range of 0.6 to 2640 M Ω -cm.

1.2 Test Method A describes a procedure for making resistance tests with a commonly used paint application² test assembly (Fig. 1).

1.3 Test Method B describes a procedure for making resistance tests with a conductivity meter³ (Fig. 2).

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 and health practices and determine the applicability of regulatory limitations prior to use.*

2. Terminology

2.1 Definitions:

2.1.1 *specific resistance (resistivity)*—The ratio of the d-c potential gradient in volts per centimeter paralleling the current flow within the specimen to the current density in amperes per square centimeter at a given instant of time and under prescribed conditions.

2.1.1.1 *Discussion*—This is numerically equal to the resistance between opposite faces of a centimeter cube of the liquid. The units are ohm centimeters (or megohm centimeters).

2.2 Definitions of Terms Specific to This Standard:

2.2.1 *kilohms (K Ω)*—resistance value equal to 1000 Ω (10^3).

2.2.2 *megohms (M Ω)*—resistance value equal to 1 000 000 Ω (10^6).

2.2.3 *ohm-centimeters (or megohm-centimeters)*—unit of specific resistance (resistivity).



FIG. 1 Paint Application Test Assembly

3. Summary of Test Methods

3.1 Test Methods A and B measure direct current through concentric cylinder electrodes immersed in a liquid paint specimen.

4. Significance and Use

4.1 These tests are suitable for testing paints adjusted for compatibility with various electrostatic spray coating applications, and by their use, spray performance can be optimized.

5. Interferences

5.1 Contamination of the specimen is the most likely cause of error. Very small amounts of water, acids, or polar solvents will lower the resistance of high resistivity solvents and paints.

5.2 High humidity is not known to interfere with the test itself but can lead to water pickup by the specimen. For repeatable results, tests should be made under the same atmospheric conditions and specimens should be stored and handled so as to keep water pickup to a minimum.

5.3 Resistivity varies with temperature. A standard test temperature of 25°C is recommended. Other temperatures are possible on agreement between the producer and the user.

5.4 Electrification time must be the same for every test due to ion migrations that cause current flow to decrease with time. Variations with time of electrification can result in appreciable variation in the test results.

5.5 Equipment outlined in Test Methods A and B apply

¹ These test methods are under the jurisdiction of ASTM Committee D-1 on Paint and Related Coatings, Materials, and Applications and is the direct responsibility of Subcommittee D01.24 on Physical Properties of Liquid Paints and Paint Materials. Current edition approved March 15, 1995. Published May 1995.

² Paint application test assembly such as the Ransburg 70408-00 Tester or equivalent may be obtained from ITW Ransburg Electrostatic Systems, P.O. Box 913, Toledo, OH 43697-0913.

³ Conductivity meter such as the Byk-Gardner LC2 conductivity meter, Model 1722/1710 or equivalent may be obtained from Byk-Gardner, Inc., 2435 Linden Lane, Silver Spring, MD 20910.