Designation: D 4585 – 99

Standard Practice for Testing Water Resistance of Coatings Using Controlled Condensation[1]

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1. Scope

1.1 This practice covers basic principles and operating procedures for testing water resistance of coatings using controlled condensation. Condensation is produced by exposing one surface of a coated specimen to a heated, saturated mixture of air and water vapor, while the reverse side of the specimen is exposed to the cooling effect of room temperature air. This practice is derived from research of the Cleveland Society for Coatings Technology.[2]

1.2 This practice is limited to the methods of obtaining, measuring, and controlling conditions and procedures of controlled condensation tests. It does not specify specimen preparation, specific test conditions, or evaluation of results.

NOTE 1—Alternative practices for testing water resistance of coatings include Practices D 870, D 1735, and D 2247.

1.3 The values stated in inch-pound units are to be regarded as the standard. The values given 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 and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*

D 609 Practice for Preparation of Cold-Rolled Steel Panels for Testing Paint, Varnish, Conversion Coatings, and Related Coating Products[3]

D 610 Test Method for Evaluating Degree of Rusting on Painted Steel Surfaces[4]

D 714 Test Method for Evaluating Degree of Blistering Paints[3]

D 823 Practices for Producing Films of Uniform Thickness of Paint, Varnish, and Related Products on Test Panels[3]

D 870 Practice for Testing Water Resistance of Coatings Using Water Immersion[3]

D 1654 Test Method for Evaluation of Painted or Coated Specimens Subject to Corrosive Environment[3]

D 1730 Practices for Preparation of Aluminum and Aluminum-Alloy Surfaces for Painting[5]

D 1735 Practice for Testing Water Resistance of Coatings Using Water Fog Apparatus[3]

D 2247 Practice for Testing Water Resistance of Coatings In 100 % Relative Humidity[3]

D 2616 Test Method for Evaluation of Visual Color Difference With a Gray Scale[3]

D 3359 Test Methods for Measuring Adhesion by Tape Test[3]

D 3363 Test Method for Film Hardness by Pencil Test[3]

D 4541 Test Method for Pull-Off Strength of Coatings Using Portable Adhesion-Testers[4]

G 53 Practice for Operating Light- and Water-Exposure Apparatus (Fluorescent UV-Condensation Type) for Exposure of Nonmetallic Materials[6]

3. Summary of Practice

3.1 Water vapor is generated by heating a pan of water at the bottom of the test chamber. The specimens form the roof or walls of the test chamber so that the back sides of the specimens are exposed to the cooling effects of room temperature air. The resulting heat transfer causes vapor to condense on the test specimens as liquid water saturated with air.

3.2 The temperature and amount of condensate forming on the specimens is controlled by the test temperature and the room temperature. The test specimens are inclined so that condensate runs off the test surface by gravity and is replaced by fresh condensate in a continuous process during the condensate cycle.

[1] This practice is under the jurisdiction of ASTM Committee D-1 on Paint and Related Coatings, Materials, and Applications and is the direct responsibility of Subcommittee D01.27 on Accelerated Testing.

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[2] Foecking, N. J., "Cleveland Condensing Type Humidity Cabinet," *Official Digest*, December 1963, Vol 35, No. 467, pp. 1318–1327; and Higgins, W. A., "Cleveland Condensing Type Humidity Cabinet: II," *Official Digest*, November 1965, Vol 37, No. 490, pp. 1392–1404.

[3] *Annual Book of ASTM Standards*, Vol 06.01.

[4] *Annual Book of ASTM Standards*, Vol 06.02.

[5] *Annual Book of ASTM Standards*, Vol 02.05.

[6] *Annual Book of ASTM Standards*, Vol 14.02.