Designation: D7072 – 04 (Reapproved 2019)

Standard Practice for Evaluating Accelerated Efflorescence of Latex Coatings[1]

This standard is issued under the fixed designation D7072; 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 practice covers the evaluation of the degree to which a latex paint resists the formation of efflorescence and alkali burnout on the exposed paint surface.

1.2 This practice is designed primarily to relate efflorescence originating in the substrate to the deposit appearing on the surface of latex paints. This practice relates chiefly to the painting of masonry-type substrates such as concrete block, brick, mortar, stucco, poured concrete, and similar materials.

1.3 The values in SI units are to be regarded as the standard. The values 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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.5 *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]

D1475 Test Method for Density of Liquid Coatings, Inks, and Related Products

D1734 Practice for Making Cementitious Panels for Testing Coatings

D4585 Practice for Testing Water Resistance of Coatings Using Controlled Condensation

D5068 Practice for Preparation of Paint Brushes for Evaluation

3. Terminology (Specific to This Practice)

3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 *alkali burnout, n*—the premature fading or decomposition of paints that are sensitive to the high pH of the substrate. The high alkaline content of the substrate can alter the color.

3.1.2 *efflorescence, n*—the deposition of soluble salts on the exposed paint surface. Efflorescence is characterized by a light-colored, nonuniform, powdery incrustation which detracts from the paint film appearance. The discoloration occurs when soluble salts in the substrate or paint migrate to the surface by the leaching and evaporating action of the water carrier. The efflorescence originating within the substrate is that with which this method is concerned.

4. Summary of Practice

4.1 Panels known to have a level of salts capable of being easily and quickly transported to the paint surface are used. Since tinted paints show the efflorescence most clearly, all white paints should be tinted before application. The panel is placed face down over the surface of the test chamber which contains heated water, so that moisture condenses and remains on the painted surface of the panel for a period of 48 h. After drying at ambient conditions, the panels are rated for the degree of efflorescence which has formed.

5. Significance and Use

5.1 Latex paints are sometimes applied over substrates that contain a high level of water-soluble salts that results in efflorescence. This practice evaluates a coating's vulnerability to efflorescence.

6. Apparatus

6.1 *Condensation Test Chamber*—As described in Practice D4585.

6.2 *Test Substrate*—Fiber-cement siding[3] or a substrate agreed upon by the purchaser and seller. The substrate size would depend on the number of test paints.

6.3 White Portland Cement and Graded Standard Sand (as described in Practice D1734).

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[1] This practice is under the jurisdiction of Committee D01 on Paint and Related Coatings, Materials, and Applications and is the direct responsibility of Subcommittee D01.42 on Architectural Coatings.

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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.

[3] Hardieplank, a registered trademark of James Hardie, was found to be acceptable but others may be used.

6.4 Trowel (as described in Practice D1734).

6.5 *Paint Brush*—Nylon/polyester brush of good quality.

6.6 Electronic scale capable of 0.1 g.

7. Reagents and Materials

7.1 *Control Paint(s) (preferably tinted)*—The use of two controls (a pass and fail) may help gage the performance of the test paints.

7.2 *Test Paints (preferably tinted)*—Since there are no standard panels, photographs, or paints for this test method, an agreed-upon control paint should be included as one of the test paints.

7.3 Using identical or similar tints for control(s) and test paints may aid in relative evaluation of different formulations.

7.4 If the goal is to evaluate alkali burnout, usually bright organic colors will be more susceptible.

8. Procedure

8.1 Mix the cement:sand:water in the ratio as described in Practice D1734. Apply the mix approximately 6 mm (¼ in.) thick over the fiber-cement siding using a trowel. Allow the panels to dry for 24 h or as agreed upon by the purchaser and seller. Divide substrate into strips at least 150 mm (6 in.) wide or as agreed upon by the purchaser and the seller and label the back of each test area with the paint designation. The control paint should be placed near the middle of the panel.

8.2 Prepare paint brush as described in Practice D5068.

8.3 Using a brush, apply sufficient weight of test paints to achieve the desired spreading rate. If a second coat (top coat) is to be applied, allow the first coat to dry in the conditioned room for 16 ± 1 h (dry time may affect results) or as agreed upon by the purchaser and seller. Results may be highly dependent on film thickness; therefore, it is essential that the test paints be weighed on accurately, particularly for small test areas. The amount of paint in grams required for a specific spread rate can be determined from the following equation:

$$g = ((A*W)/S)*3.15 \quad (1)$$

where:

A = area, square inches,
W = weight per gallon (Test Method D1475), lb/gal, and
S = spreading rate, square ft/gal.

Or the following metric equation:

$$g = ((Am*D)/Sm)*1000 \quad (2)$$

where:

Am = area, square meters,
D = density, g/mL or kg/L, and
Sm = spreading rate, square meters/L.

8.4 Allow the panels to dry at known conditions of temperature and relative humidity for 6 ± 1 h or as agreed upon by the purchaser and seller. Immediately place the panels on the chamber with the painted sides facing toward the humidity. Close all cracks between boards to prevent water vapor loss and temperature variation. Larger cracks may be closed with tape or metal strips.

8.5 Adjust the thermostat to maintain the desired temperature of the saturated air and water vapor mixture. Cabinet temperature of 39 °C (100 °F) is suggested. To ensure adequate condensation on the face of the panels, maintain at least a 11 °C (20 °F) temperature differential between the room and the inside of the chamber.

8.6 After 48 ± 1 h, or an exposure time agreed upon by the purchaser and seller, carefully remove the panels and allow to dry overnight.

9. Report

9.1 Substrates used, test paints, control paint(s), topcoat, spreading rates, dry time of first coat, dry time of topcoat, vapor temperature, and exposure time of topcoated panel for humidity.

9.2 Rate efflorescence of panels such as none, slight, moderate, or severe.

9.3 Report any alkali burnout or any other film defects.

10. Keywords

10.1 alkali burnout; efflorescence