



Designation: D2243 – 20

Standard Test Method for Freeze-Thaw Resistance of Water-Borne Coatings¹

This standard is issued under the fixed designation D2243; 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.

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

1. Scope

1.1 This test method covers a procedure for evaluating the effect of freeze/thaw cycling on the viscosity and visual film properties of water-borne coatings.

1.2 The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.

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

D523 Test Method for Specular Gloss

D562 Test Method for Consistency of Paints Measuring Krebs Unit (KU) Viscosity Using a Stormer-Type Viscometer

D714 Test Method for Evaluating Degree of Blistering of Paints

D2196 Test Methods for Rheological Properties of Non-Newtonian Materials by Rotational Viscometer

D2244 Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates

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 D01.42 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.

D2805 Test Method for Hiding Power of Paints by Reflectometry

3. Summary of Test Method

3.1 The water-borne coating is put into at least two pint-size (500-mL) resin-lined cans. One can is stored at room temperature, while the other cans are subjected to cycles of freezing and thawing. After cycling, the paint samples are examined for changes in viscosity and visual film properties.

3.2 It is critical that the test cans be undisturbed until they reach the number of freeze-thaw cycles at which they are to be tested. This condition simulates actual freeze-thaw behavior of paints in the field.

4. Significance and Use

4.1 When water-borne coatings are shipped during cold weather, they may experience cycles of freezing and thawing. Cycles of freezing and thawing cause more damage to water-borne coatings than when the coatings are subjected to steady freezing.

5. Apparatus

5.1 *Test Chamber*—A suitable cabinet, room, or enclosure space large enough to contain the specimens to be tested permitting at least 25 mm (1 in.) of air space between the sides of adjacent cans and capable of being maintained continuously at a temperature of -18°C (0°F).

NOTE 1—Although a variation of the test chamber temperature of $\pm 2^{\circ}\text{C}$ ($\pm 3.5^{\circ}\text{F}$) is allowed, the test chamber temperature should be maintained as near -18°C (0°F) as practicable and the amount of variation should be recorded and reported.

5.2 *Viscometer*—A Stormer viscometer with paddle type rotor as described in Test Method D562 or a Brookfield viscometer as described in Test Methods D2196.

5.3 *Test Charts*—Smooth surface paper charts having adjacent black and white areas, and coated with a suitable varnish or lacquer to render the surface impermeable to paint liquids.

5.4 *Paint Brush*, 25 mm (1 in.).

5.5 *Bar Applicator*, with a 0.18-mm (7-mil) clearance.