Designation: D4143 – 16 (Reapproved 2022)

Standard Guide for Testing Latex Vehicles[1]

This standard is issued under the fixed designation D4143; 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 guide covers methods suitable for testing latex vehicles. Certain of these methods were developed expressly for testing latex vehicles (Table 1). Others were developed for testing or analyzing formulated water- or solvent-based coatings but would be equally applicable for testing latices.

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]

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

D1417 Test Methods for Rubber Latices—Synthetic

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

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

D2354 Test Method for Minimum Film Formation Temperature (MFFT) of Emulsion Vehicles

D2369 Test Method for Volatile Content of Coatings

D3168 Practice for Qualitative Identification of Polymers in Emulsion Paints

D3792 Test Method for Water Content of Coatings by Direct Injection Into a Gas Chromatograph

D3925 Practice for Sampling Liquid Paints and Related Pigmented Coatings

D4017 Test Method for Water in Paints and Paint Materials by Karl Fischer Method

D4758 Test Method for Nonvolatile Content of Latexes (Withdrawn 2007)[3]

E70 Test Method for pH of Aqueous Solutions With the Glass Electrode

3. Latex Sampling Methods

3.1 Practice D3925 describes sampling procedures for formulated (pigmented) coatings that are equally applicable to latex vehicles.

4. Nonvolatile Content

4.1 Test Method D2369 has been found suitable for the determination of the volatile content of many latex vehicles. Nonvolatile content is obtained by subtracting the results from 100.

NOTE 1—Determinations of the volatile content using a shorter bake time than the 60 min recommended in Test Method D2369 should be noted in the report of the results.

4.2 The nonvolatile content of latexes may also be determined for quality control purposes with Test Method D4758 which specifies baking at 180 °C for 20 min, conditions selected to allow completion of testing in 1 h or less. For latex vehicles used in certain air-dry or low temperature bake coatings, as well as for those that contain temperature-sensitive materials, the use of the milder test conditions of Test Method D2369 (see 4.1) will more accurately reflect the effective nonvolatile content.

4.2.1 Test Method D4758 is not intended to be employed for determining the volatile organic content (VOC) of formulated coatings.

[1] This guide is under the jurisdiction of ASTM Committee D01 on Paint and Related Coatings, Materials, and Applications and is the direct responsibility of Subcommittee D01.33 on Polymers and Resins.

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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] The last approved version of this historical standard is referenced on www.astm.org.

TABLE 1 Methods for Testing Latex Vehicles

Test Method	Section	ASTM Designation
Latex sampling methods	3	D3925
Nonvolatile content	3.1	D2369, D4758
Minimum film formation temperature (MFT)	5	D2354
Qualitative polymeric analysis	6	D3168
Density	7	D1475
Viscosity	8	D2196
Consistency	9	D562
Water content	10	D3792, D4017
pH	11	E70
Surface tension	12	D1417

5. Minimum Film Formation Temperature (MFT)

5.1 The MFT is the lowest temperature at which a latex will form a continuous film. Test Method D2354 employs drawdown application of the test latex on a substrate over which a temperature gradient has been established. The lowest temperature at which the latex is converted into a clear, continuous film corresponds to the minimum film formation temperature.

6. Qualitative Polymer Analysis

6.1 Chemical identification of the polymeric material contained in a latex is readily determined by a method that was developed for polymer analysis of formulated latex paints. Practice D3168 employs a sequence of drying and subsequent extraction and solution procedures that remove volatile and nonvolatile nonpolymeric materials and isolate the polymeric solids of the latex. The major components of the isolated polymeric material are qualitatively identified by infrared absorption or pyrolysis-gas chromatographic techniques, or both.

7. Density

7.1 The density of a latex is its weight (mass) per unit volume and is usually expressed as weight per gallon or grams per millilitre at a specified temperature. At constant latex nonvolatile content, the density of various latex materials can vary depending on the density of the contained polymer solids. Test Method D1475 is a general method for determining the density of fluid formulated coatings and components thereof and is therefore equally applicable for determination of the density of latices.

8. Viscosity

8.1 Latices are non-Newtonian materials having rheological properties that can be characterized by apparent viscosity measurements made using rotational-type viscometers. Test Methods D2196 describes techniques using a rotational viscometer by which apparent viscosity can be measured and relative shear rate and time dependence of apparent viscosity can be assessed.

9. Consistency

9.1 Consistency of formulated fluid paints, lacquers, varnishes, and their individual fluid components, including high-viscosity latices, are frequently measured using the Stormer viscometer. Test Method D562 describes operation of the Stormer viscometer for measuring the consistency of such materials either with or without a stroboscopic timer.

10. Water Content

10.1 Although the major component of the volatile material in a latex is usually water, other volatile components may be present. Test Method D3792 was developed for determining the water content of liquid latex coatings by direct injection into a gas chromatograph. This method is equally suitable for determining water content of latices. Test Method D4017 is based on the Karl Fischer method and is also applicable for determining the water content of latices.

11. pH

11.1 The pH of a latex can be measured by the general procedure described for aqueous solutions in Test Method E70.

12. Surface Tension

12.1 The surface tension of latex may be determined by the technique given in Test Methods D1417. It is useful as a quality control/assurance test, and as an indicator of the wetting characteristics.

13. Keywords

13.1 latex vehicles; latices; viscometer; viscosity