



Standard Test Method for Volume Nonvolatile Matter in Clear or Pigmented Coatings¹

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

1. Scope

1.1 This test method is believed to be applicable to the determination of the volume of nonvolatile matter of a variety of coatings. An interlaboratory study to establish the precision of this test method included a water-reducible exterior latex paint and three automotive coatings that included a solvent-reducible primer surfacer, water reducible primer surfacer, water reducible enamel topcoat, and acrylic dispersion lacquer topcoat. Earlier collaborative studies included a gloss enamel, a flat wall paint, a gloss house enamel, an industrial baking enamel, an interior latex paint, and an exterior latex paint.

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

2. Referenced Documents

2.1 ASTM Standards:²

[D1475 Test Method For Density of Liquid Coatings, Inks, and Related Products](#)

[D2369 Test Method for Volatile Content of Coatings](#)

[D3925 Practice for Sampling Liquid Paints and Related Pigmented Coatings](#)

[D3980 Practice for Interlaboratory Testing of Paint and Related Materials \(Withdrawn 1998\)³](#)

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 D01.21 on Chemical Analysis of Paints and Paint Materials.

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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.

3. Summary of Test Method

3.1 The weight and volume of a stainless steel disk is to be determined; after the disk is coated with the material being tested. The weight and volume of the disk plus dried coating is determined by weighing in air and then by weighing in a liquid of known density. The volume being equal to the quotient of the weight loss of the coated disk (due to the Archimedes buoyancy effect) divided by the density of the liquid displaced. The liquid may be water, organic liquid such as low-solvency mineral spirits or kerosine, or with special modifications not covered specifically in this method, mercury. The choice of liquid depends upon the nature of the coating tested.

NOTE 1—Distilled water is suitable for most paints. Exceptions are coatings that contain ingredients that are readily leached out of the dry film by the water and low-gloss coatings, the surface of which is poorly wet by water even with surfactant added. (Note 2) Low-solvency hydrocarbon solvent (KB below 36) is also practical for most paints and is preferred by some workers.⁴ It is considered to be particularly good for paint films not readily wet by water. Analogously, organic solvents must not be used if the coating to be tested contains ingredients that will be dissolved readily by the solvent. Lacquers containing monomeric plasticizers would be examples where hydrocarbon solvents should definitely not be used. Coatings formulated much above the CPVC present a special problem, where mercury might be the desired “suspending” liquid (Note 3), and for solvent-reducible paints hydrocarbon solvent might be considered the poorest (unless it is the objective to obtain values closer to “theoretical” spaces between pigment particles not filled with binder, becoming partially filled with solvent during the test).

NOTE 2—Concentration of surfactant must be kept very low or literature values for the density of the water cannot be used.

NOTE 3—Details of the mercury displacement techniques can be found in the literature.⁵

3.2 From the measured weights and volumes of the disk before and after coating, the weight and volume of the dried coating film are calculated. Based on the density of the liquid coating and the weight percent nonvolatile matter, the volume of the liquid coating deposited on the coated disk is calculated. The volume of the dried coating divided by the volume of liquid coating, multiplied by 100, provides the volume percent nonvolatile matter in the total liquid coating.

⁴ Bissey, J. E., *Official Digest*, Federation of Paint and Varnish Production Clubs, Vol 35, 1963, p. 1072, and Ashton, H. E., *Materials Research and Standards*, Vol 1, 1961, p. 549.

⁵ Cole, R. J., *Journal*, Oil Colour Chemists' Assn., Vol. 45, 1962, p. 776.