



Standard Test Methods for Evaporation Rates of Volatile Liquids by Shell Thin-Film Evaporometer¹

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

1. Scope

1.1 These test methods cover the determination of the rate of evaporation of volatile liquids of low viscosity using the Shell thin-film evaporometer. These test methods have been applied to a wide range of volatile liquids, including paint, varnish, and lacquer solvents and thinners to various hydrocarbons and to insecticide spray-base oils.

1.2 The test methods for the determination of evaporation rate using the thin-film evaporometer are:

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1.3 These test methods are limited only by the viscosity of the volatile liquid which must be sufficiently low to permit the dispensing of an accurately measured specimen from a syringe.

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

1.5 *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. Specific hazard statements are given in 5.2 and 5.6.*

¹ These test methods are under the jurisdiction of ASTM Committee D01 on Paint and Related Coatings, Materials, and Applications and are the direct responsibility of Subcommittee D01.24 on Physical Properties of Liquid Paints and Paint Materials.

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² These test methods are essentially the same as the one developed by the New York Society for Paint Technology. The Precision section was added by ASTM Subcommittee D01.24 and is based upon the data of the New York Society for Paint Technology.

³ See “Comparative Evaporation Rates of Solvents: II,” New York Club, Technical Subcommittee No. 66, *Official Digest*, 28, No. 382, 1956, p. 1060.

2. Referenced Documents

2.1 ASTM Standards:⁴

D891 Test Methods for Specific Gravity, Apparent, of Liquid Industrial Chemicals

E1 Specification for ASTM Liquid-in-Glass Thermometers

3. Summary of Test Methods

3.1 A known volume of liquid is spread on a known area of filter paper that is suspended from a sensitive balance in a cabinet. Dried air or nitrogen at 25°C is passed through the cabinet at a known rate. The loss of weight of the filter paper/liquid is determined and plotted against time.

4. Significance and Use

4.1 The rate of evaporation of volatile liquids from a solution or dispersion is important because it affects the rate of deposition of a film and flow during deposition, and thereby controls the structure and appearance of the film. In the formulation of paints and related products, solvents are chosen based on the evaporation characteristics appropriate to the application technique and the curing temperature.

TEST METHOD A—EVAPORATION RATE USING THE MANUAL THIN-FILM EVAPOROMETER

5. Apparatus

5.1 *Evaporometer*, thin-film evaporometer⁵ as shown in Fig. 1 (see Annex A1).

5.2 *Constant-Temperature Cabinet* for evaporometer. (**Warning**—In instances with the solvents and other volatile materials normally tested using this apparatus and under the conditions specified in this test method, the concentration of

⁴ 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.

⁵ The manual Shell thin-film evaporometer is no longer available.