Designation: D1353 – 13 (Reapproved 2021)

Standard Test Method for Nonvolatile Matter in Volatile Solvents for Use in Paint, Varnish, Lacquer, and Related Products[1]

This standard is issued under the fixed designation D1353; 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 the determination of the nonvolatile matter in volatile solvents for use in paint, varnish, lacquer, and related products.

1.2 The following applies to all specified limits in this standard; for purposes of determining conformance with this standard, an observed value or a calculated value shall be rounded off "to the nearest unit" in the last right-hand digit used in expressing the specification limit, in accordance with the rounding-off method of Practice E29.

1.3 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.4 For hazard information and guidance, see the supplier's Material Safety Data Sheet for materials listed in this test method.

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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.* For specific hazard statements, see Section 5.

1.6 *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]

E29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications

E177 Practice for Use of the Terms Precision and Bias in ASTM Test Methods

E299 Test Method for Trace Amounts of Peroxides In Organic Solvents

E691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method

3. Significance and Use

3.1 This test method describes the analytical measurement of residual matter in solvents that are intended to be 100 % volatile at 105 °C ± 5 °C. Volatile solvents are used in the manufacture of paint, varnish, lacquer, and other related products, and the presence of any residue may affect the product quality or efficiency of the process. This test method is useful in manufacturing control and assessing compliance with specifications.

4. Apparatus

4.1 *Oven,* thermostatically controlled at 105 °C ± 5 °C.

4.2 *Dish,* evaporating, platinum, 125-mL. A platinum evaporating dish is preferred. Alternatively, an aluminum or porcelain dish may be used (see Note 1).

NOTE 1—Precision data were determined utilizing only platinum dishes.

4.3 *Cylinder,* graduated, 100-mL.

4.4 *Analytical Balance,* precision to ±0.1 mg.

[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 D01.35 on Solvents, Plasticizers, and Chemical Intermediates.

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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.

5. Hazards

5.1 **Warning—**Certain solvents and chemical intermediates, particularly, but not only ethers and unsaturated compounds, may form peroxides during storage. These peroxides may present a violent explosion hazard when the chemicals are evaporated. When peroxide formation is likely because of chemical type or length of storage time, analyze the material for peroxides (see Test Method E299). If they exist in hazardous concentrations, take appropriate precautions such as destroying the peroxides before evaporation, shielding, or disposal of the sample and not running the test.

6. Procedure

6.1 Dry a 125-mL platinum evaporating dish in an oven at 105 °C ± 5 °C, cool in a desiccator, and weigh. Repeat until the weight is within 0.1 mg of the previous weighing.

6.2 With the graduated cylinder, measure 100 mL of sample at room temperature into the conditioned platinum evaporating dish (see 4.2); place on a steam bath or a hot plate in a fume hood and evaporate. **Warning—**Since aliphatic hydrocarbons have low autoignition temperatures, only efficient hoods should be used.

NOTE 2—Precision data were obtained only with evaporation using steam bath.

6.3 Return the dish and contents to the oven for 15 to 30 min, cool, and reweigh. Repeat, if necessary, until the weight is constant to within 0.1 mg of the previous weighing.

7. Report

7.1 Report as nonvolatile matter the residue obtained from the specimen as milligrams of nonvolatile residue/100 mL.

8. Precision and Bias[3]

8.1 The precision of this test method is based on an interlaboratory study of ASTM D1353, Test Method for Nonvolatile Matter in Volatile Solvents for Use in Paint, Varnish, Lacquer, and Related Products, conducted in 2012. Eight laboratories participated in the study, testing a single material. Every analyst was instructed to report duplicate test results in this study. Practice E691 was followed for the study design; the details are given in ASTM Research Report No. RR:D01-1168.[4]

8.1.1 *Repeatability Limit (r)*—Two test results obtained within one laboratory shall be judged not equivalent if they differ by more than the "*r*" value for that material; "*r*" is the interval representing the critical difference between two test results for the same paint, obtained by the same operator using the same equipment on the same day in the same laboratory.

8.1.1.1 Repeatability limits are listed in Table 1.

8.1.2 *Reproducibility Limit (R)*—Two test results shall be judged not equivalent if they differ by more than the "*R*" value for that material; "*R*" is the interval representing the critical difference between two test results for the same paint obtained by different operators using different equipment in different laboratories.

8.1.2.1 Reproducibility limits are listed in Table 1.

8.1.3 The above terms (repeatability limit and reproducibility limit) are used as specified in Practice E177.

8.1.4 Any judgment in accordance with statements 8.1.1 and 8.1.2 would have an approximate 95 % probability of being correct.

8.2 *Bias*—At the time of the study, there was no accepted reference material suitable for determining the bias for this test method, therefore no statement on bias is being made.

8.3 The precision statement was determined through statistical examination of 16 test results, from eight laboratories, on a single material (Sample A), which was described as methyl ethyl ketone.

9. Keywords

9.1 nonvolatile matter; solvents; volatile solvents

[3] Supporting data have been filed at ASTM International Headquarters and may be obtained by requesting Research Report RR:D01-1044. Contact ASTM Customer Service at service@astm.org.

[4] Supporting data have been filed at ASTM International Headquarters and may be obtained by requesting Research Report RR:D01-1168. Contact ASTM Customer Service at service@astm.org.

TABLE 1 Repeatability and Reproducibility Limits

Material	Average[A] $\bar{X}$	Repeatability Standard Deviation s_r	Reproducibility Standard Deviation S_R	Repeatability Limit (g/100 mL) r	Reproducibility Limit (g/100 mL) R
Sample A	0.00489	0.00019	0.00075	0.00054	0.00211

[A] The average of the laboratories' calculated averages.