



Standard Guide for Sampling and Testing Volatile Solvents and Chemical Intermediates for Use in Paint and Related Coatings and Material¹

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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 guide covers procedures for the sampling and testing of volatile solvents used in the manufacture of paint, lacquer, varnish, and related products. The test methods are listed in [Table 1](#).

1.2 For specific hazard information and guidance, see Suppliers' Material Safety Data Sheet for materials listed in this guide.

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

1.4 *This standard does not purport to address the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to consult and establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:²

- D13 Specification for Spirits of Turpentine
- D56 Test Method for Flash Point by Tag Closed Cup Tester
- D86 Test Method for Distillation of Petroleum Products at Atmospheric Pressure
- D93 Test Methods for Flash Point by Pensky-Martens Closed Cup Tester
- D130 Test Method for Corrosiveness to Copper from Petroleum Products by Copper Strip Test
- D156 Test Method for Saybolt Color of Petroleum Products (Saybolt Chromometer Method)

- D233 Test Methods of Sampling and Testing Turpentine
- D235 Specification for Mineral Spirits (Petroleum Spirits) (Hydrocarbon Dry Cleaning Solvent)
- D329 Specification for Acetone
- D611 Test Methods for Aniline Point and Mixed Aniline Point of Petroleum Products and Hydrocarbon Solvents
- D847 Test Method for Acidity of Benzene, Toluene, Xylenes, Solvent Naphthas, and Similar Industrial Aromatic Hydrocarbons
- D848 Test Method for Acid Wash Color of Industrial Aromatic Hydrocarbons
- D849 Test Method for Copper Strip Corrosion by Industrial Aromatic Hydrocarbons
- D850 Test Method for Distillation of Industrial Aromatic Hydrocarbons and Related Materials
- D853 Test Method for Hydrogen Sulfide and Sulfur Dioxide Content (Qualitative) of Industrial Aromatic Hydrocarbons (Withdrawn 2013)³
- D891 Test Methods for Specific Gravity, Apparent, of Liquid Industrial Chemicals
- D1078 Test Method for Distillation Range of Volatile Organic Liquids
- D1133 Test Method for Kauri-Butanol Value of Hydrocarbon Solvents
- D1209 Test Method for Color of Clear Liquids (Platinum-Cobalt Scale)
- D1296 Test Method for Odor of Volatile Solvents and Diluents
- D1310 Test Method for Flash Point and Fire Point of Liquids by Tag Open-Cup Apparatus
- D1353 Test Method for Nonvolatile Matter in Volatile Solvents for Use in Paint, Varnish, Lacquer, and Related Products
- D1363 Test Method for Permanganate Time of Acetone and Methanol
- D1364 Test Method for Water in Volatile Solvents (Karl Fischer Reagent Titration Method)

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 D01.35 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.

³ The last approved version of this historical standard is referenced on www.astm.org.

*A Summary of Changes section appears at the end of this standard

TABLE 1 List of Test Methods

Test Method	Section	ASTM Method
Acidity in:		
Aromatic hydrocarbons	11	D847
Volatile solvents	11	D1613
Acid wash color of aromatics	23	D848
Alcohols in ketones	18	D2804, D3329
Alkalinity in acetone	12	D1614
Aromatics in mineral spirits	25	D3257
Color, platinum cobalt scale	6	D1209
Copper corrosion test:		
Aromatic hydrocarbons	14	D849
Mineral spirits	14	D130
Distillation range:		
Aromatic hydrocarbons	7	D850
Mineral spirits, turpentine	7	D86
Volatile organic liquids	7	D1078
Ester value	13	D1617
Esters, purity	13	D3545
Flash point:		
Pensky-Martens closed cup	17	D93
Tag closed cup	17	D56
Tag open cup	17	D1310
Setaflash tester	17	D3278
Method surveys:		
Ethylene and propylene glycols	22	E202
Methanol	21	E346
Nonaromatics in aromatics	24	D2360
Nonvolatile matter	8	D1353
Odor	9	D1296
Paraffins in aromatics	24	D2360
Permanganate time for acetone and methanol	16	D1363
Purity of ketones	18	D2192, D2804, D3329, D3893
Sampling	4	E300
Solvent power evaluation:		
Aniline point and mixed aniline point of petroleum products and hydrocarbon solvents	19	D611
Kauri-butanol value of hydrocarbon solvents	19	D1133
Dilution ratio in cellulose nitrate solution for active solvents, hydrocarbon diluents, and cellulose nitrates	19	D1720
Specific gravity	5	D891, D2935, D3505, D1555, D853
Sulfur as hydrogen sulfide and sulfur dioxide	15	D853
Water:		
Fischer reagent titration method	10	D1364, E203
Turbidity method	10	D1476
Water miscibility of water-soluble solvents	20	D1722

[D1476 Test Method for Heptane Miscibility of Lacquer Solvents](#)

[D1555 Test Method for Calculation of Volume and Weight of Industrial Aromatic Hydrocarbons and Cyclohexane](#)

[D1613 Test Method for Acidity in Volatile Solvents and Chemical Intermediates Used in Paint, Varnish, Lacquer, and Related Products](#)

[D1614 Test Method for Alkalinity in Acetone](#)

[D1617 Test Method for Ester Value of Solvents and Thinners](#)

[D1720 Test Method for Dilution Ratio of Active Solvents in Cellulose Nitrate Solutions](#)

[D1722 Test Method for Water Miscibility of Water-Soluble Solvents](#)

[D2192 Test Method for Purity of Aldehydes and Ketones](#)

[D2360 Test Method for Trace Impurities in Monocyclic Aromatic Hydrocarbons by Gas Chromatography](#)

[D2804 Test Method for Purity of Methyl Ethyl Ketone By Gas Chromatography](#)

[D2935 Test Method for Apparent Density of Industrial Aromatic Hydrocarbons \(Withdrawn 2005\)³](#)

[D3257 Test Methods for Aromatics in Mineral Spirits by Gas Chromatography](#)

[D3278 Test Methods for Flash Point of Liquids by Small Scale Closed-Cup Apparatus](#)

[D3329 Test Method for Purity of Methyl Isobutyl Ketone by Gas Chromatography](#)

[D3505 Test Method for Density or Relative Density of Pure Liquid Chemicals](#)

[D3545 Test Method for Alcohol Content and Purity of Acetate Esters by Gas Chromatography](#)

[D3893 Test Method for Purity of Methyl Amyl Ketone and Methyl Isoamyl Ketone by Gas Chromatography](#)

[E12 Terminology Relating to Density and Specific Gravity of Solids, Liquids, and Gases \(Withdrawn 1996\)³](#)

[E201 Test Method for Calculation of Volume and Weight of Industrial Chemical Liquids \(Discontinued 2001\) \(Withdrawn 2001\)³](#)

[E202 Test Methods for Analysis of Ethylene Glycols and Propylene Glycols](#)

[E203 Test Method for Water Using Volumetric Karl Fischer Titration](#)

[E300 Practice for Sampling Industrial Chemicals](#)

[E346 Test Methods for Analysis of Methanol](#)

3. Significance and Use

3.1 A brief discussion of each test method is given with the intent of helping the user in the selection of the most applicable procedure where more than one is available.

4. Sampling

4.1 Representative samples are a prerequisite for the evaluation of any product. The directions for obtaining representative samples cannot be made explicit to cover all cases and must be supplemented by judgment, skill, and sampling experience. It is recommended that Practice E300 be employed in sampling liquid solvents.

5. Specific Gravity

5.1 Specific gravity of liquids is defined in Terminology E12 as “the ratio of the mass of a unit volume of a material to the mass of the same volume of gas-free distilled water at a stated temperature.” When the stated temperature of the water is 4.0°C, specific gravity and density are numerically equal.

5.2 The apparent specific gravity of liquid is defined in Terminology E12 as “the ratio of the weight in air of a unit volume of material at a stated temperature to the weight in air of equal density of an equal volume of gas-free, distilled water at a stated temperature.”

NOTE 1—Specific gravity or density is an intrinsic property of all substances and can to a degree be used to identify them. When such substances are of high purity, specific gravity may be used in support of other properties to define their degree of purity. The use of specific gravity for such purposes, however, is valid only when all components and their relative effects upon the specific gravity of the system are known.

5.3 The choice of test method for determining specific gravity is largely dependent on the degree of accuracy required.