



Designation: D 233 – 02

Standard Test Methods of Sampling and Testing Turpentine¹

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

1. Scope

1.1 These test methods cover procedures for sampling and testing turpentine, as defined by the **Code of Federal Regulations** and Terminology **D 804**. These test methods are also used for the sampling and testing of pinenes, the major components of most turpentines.

1.2 These test methods primarily measure the physical rather than the chemical properties of turpentines and pinenes. As turpentines and pinenes are currently used chiefly as chemical raw materials for the production of resins and synthetic organic chemicals, chemical composition is also very important. Consequently, testing the chemical composition of turpentines and pinenes by gas chromatography has displaced these test methods to a large extent. (See for example Test Methods **D 6387**.)

1.3 The values stated in inch-pound 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 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:

- D 86** Test Method for Distillation of Petroleum Products at Atmospheric Pressure²
- D 270** Methods of Sampling Petroleum and Petroleum Products³
- D 804** Terminology Relating to Naval Stores, Including Tall

Oil and Related Products⁴

- D 1193** Specification for Reagent Water⁵
 - D 1209** Test Method for Color of Clear Liquids (Platinum-Cobalt Scale)⁶
 - D 6166** Test Method for Color of Naval Stores and Related Products (Instrumental Determination of Gardner Color)⁴
 - D 6387** Test Methods for Composition of Turpentine and Related Terpene Products by Capillary Gas Chromatography⁴
 - E 1** Specification for ASTM Thermometers⁷
- 2.2 *Other Document:*
Code of Federal Regulations, Title 7, Part 160, "Regulations and Standards for Naval Stores," 1999⁸

3. Significance and Use

3.1 The test procedures described in this standard were developed when the chief use for turpentine was as a solvent. Currently however, the chief use for turpentine (and pinenes) is as raw materials for the production of resins and synthetic organic chemicals. Thus the chemical composition of turpentines and pinenes is extremely important and tests, in addition to the ones described in these test methods, are required in order to fully characterize turpentines and pinenes. The most widely used technique for determining the chemical composition of turpentines (and pinenes) is gas chromatography (see Test Methods **D 6387**).

4. Purity of Reagents

4.1 Reagent grade chemicals shall be used in all tests. Unless otherwise indicated, it is intended that all reagents shall conform to the specifications of the Committee on Analytical Reagents of the American Chemical Society, where such

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 D01.34 on Naval Stores.

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² *Annual Book of ASTM Standards*, Vol 05.01.

³ Discontinued; see 1983 *Annual Book of ASTM Standards*, Vol 05.01.

⁴ *Annual Book of ASTM Standards*, Vol 06.03.

⁵ *Annual Book of ASTM Standards*, Vol 11.01.

⁶ *Annual Book of ASTM Standards*, Vol 06.04.

⁷ *Annual Book of ASTM Standards*, Vol 14.03.

⁸ Available from U.S. Government Printing Office, Superintendent of Documents, 732 North Capitol St., NW, Mail Stop: SDE, Washington, DC 20401

specifications are available.⁹ Other grades may be used, provided it is first ascertained that the reagent is of sufficiently high purity to permit its use without lessening the accuracy of the determination.

4.2 Unless otherwise indicated, references to water shall be understood to mean reagent water conforming to Specification **D 1193**.

SAMPLING

5. Sampling

5.1 The method of sampling specified in **5.2** or **5.3** shall be used, according to the special conditions that apply.

5.2 *From Loaded Tank Car or Other Large Vessel*—The composite sample taken shall be not less than ½ gal (1.9 L) and should consist of small samples of not more than 1 qt (0.9 L) each, taken from near the top and bottom by means of a metal or glass container with removable stopper or top.¹⁰ This device, attached to a suitable pole, shall be lowered to the desired depth, the stopper or top removed, and the container allowed to fill. If a sample from close to the bottom of a tank shows a decided difference in color or appearance from samples taken at other depths, an extra bottom sample shall be taken and examined separately from the composite sample. In such case, the composite sample shall not include any portion of such bottom sampling.

5.3 *From Barrels and Drums*—At least 5 % of the packages in any shipment shall be represented in the sample. The purchaser may increase the percentage of packages to be sampled at his direction, and it is recommended that every package be sampled in the case of expensive terpene hydrocarbons that are bought in small quantity. A portion shall be withdrawn from about the center of each package sampled by means of a “thief” or other sampling device. The composite sample thus obtained shall be not less than 1 qt (0.9 L) and shall consist of equal portions of not less than ½ pt (0.24 L) from each package sampled.

DETECTION AND REMOVAL OF SEPARATED WATER

6. Procedure

6.1 Draw a portion by means of a glass or metal container with a removable stopper or top,¹⁰ or with a “thief,” from the lowest part of the container, or by opening the bottom valve of the perfectly level tank car. If water is found in this sample, draw it all out, record the quantity, and deduct it from the total volume of liquid delivered.

⁹ *Reagent Chemicals, American Chemical Society Specifications*, American Chemical Society, Washington, DC. For suggestions on the testing of reagents not listed by the American Chemical Society, see *Analar Standards for Laboratory Chemicals*, BDH Ltd., Poole, Dorset, U.K., and the *United States Pharmacopeia and National Formulary*, U.S. Pharmacopeial Convention, Inc. (USPC), Rockville, MD.

¹⁰ Detailed description of equipment suitable for such sampling is given in Methods **D 270**.

APPEARANCE

7. Procedure

7.1 Examine a portion of the sample after agitation to determine whether its appearance conforms to specifications.

ODOR

8. Procedure

8.1 Compare the odor of the sample with an agreed-upon water-free reference sample kept in the dark in a completely filled, well-stoppered bottle. In the absence of such a sample, compare with samples of known purity similarly preserved.

SPECIFIC GRAVITY

9. Procedure

9.1 Determine the specific gravity at 15.6/15.6°C by any convenient method having a precision of 0.0005. Determinations made at any other temperature using apparatus standardized at 15.6°C shall be corrected by adding to or subtracting from the observed reading 0.00082 for each degree Celsius that the temperature of the liquid is above or below 15.6°C. If the determination is made with apparatus calibrated for a temperature other than 15.6°C, the observed reading shall first be calculated to density at the temperature of observation, then converted to density at 15.6°C by applying the above factor, and finally converted to specific gravity by dividing the calculated density by 0.999 (the density of water at 15.6°C).

REFRACTIVE INDEX

10. Procedure

10.1 Determine the refractive index with an accurate instrument, at 20°C if possible. If determined at any other temperature, correct the reading obtained to 20°C by adding or subtracting 0.00045 for each degree Celsius that the temperature at which the determination was made is, respectively, above or below 20°C.

DISTILLATION

11. Apparatus

11.1 Use the type of distillation apparatus described in Test Method **D 86**, with the following exceptions:

11.1.1 For testing turpentine or pinene use an ASTM Turpentine Distillation Thermometer, 3-in. (76-mm) partial immersion, having a range from 147 to 182°C, and conforming to the requirements for Thermometer 27C as prescribed in Specification **E 1**, or an ASTM Solvents Distillation Thermometer, 3.94-in. (100-mm) partial immersion, having a range from 95 to 255°C, and conforming to the requirements for Thermometer 42C as prescribed in Specification **E 1**.

11.1.2 Ice is not necessary in the condenser bath. It is permissible to use a glass Liebig condenser 22 in. (560 mm) in length with 16 in. (410 mm) in contact with the cooling water and filled with an adapter to extend 1 in. (51 mm) into the receiving graduate.