



Designation: D235 – 22

# Standard Specification for Mineral Spirits (Petroleum Spirits) (Hydrocarbon Dry Cleaning Solvent)<sup>1</sup>

This standard is issued under the fixed designation D235; 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 ( $\epsilon$ ) 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 specification covers four types of hydrocarbon solvents, normally petroleum distillates, used primarily in the coatings and dry-cleaning industries. “Mineral spirits” is the most common name for these solvents. They are also called “Stoddard Solvents” when used for dry cleaning.

1.2 For specific hazard information and guidance, see the supplier’s Material Safety Data Sheet for materials listed in this specification.

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

1.4 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.

1.5 The following hazard caveat pertains only to the test method portion, 6.1.10, of this specification. *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.*

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:*<sup>2</sup>

- D56 Test Method for Flash Point by Tag Closed Cup Tester
- D86 Test Method for Distillation of Petroleum Products and Liquid Fuels at Atmospheric Pressure
- 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)
- D268 Guide for Sampling and Testing Volatile Solvents and Chemical Intermediates for Use in Paint and Related Coatings and Material (Withdrawn 2021)<sup>3</sup>
- D1133 Test Method for Kauri-Butanol Value of Hydrocarbon Solvents
- D1159 Test Method for Bromine Numbers of Petroleum Distillates and Commercial Aliphatic Olefins by Electrometric Titration
- D1209 Test Method for Color of Clear Liquids (Platinum-Cobalt Scale)
- D1296 Test Method for Odor of Volatile Solvents and Diluents (Withdrawn 2021)<sup>3</sup>
- D2710 Test Method for Bromine Index of Petroleum Hydrocarbons by Electrometric Titration
- D3227 Test Method for (Thiol Mercaptan) Sulfur in Gasoline, Kerosine, Aviation Turbine, and Distillate Fuels (Potentiometric Method)
- D3257 Test Methods for Aromatics in Mineral Spirits by Gas Chromatography (Withdrawn 2021)<sup>3</sup>
- D3278 Test Methods for Flash Point of Liquids by Small Scale Closed-Cup Apparatus
- E29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications
- E300 Practice for Sampling Industrial Chemicals

<sup>1</sup> This specification 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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<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard’s Document Summary page on the ASTM website.

<sup>3</sup> The last approved version of this historical standard is referenced on [www.astm.org](http://www.astm.org).

2.2 *U.S. Federal Specification*.<sup>4</sup>

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### 3. Classification

3.1 Mineral spirits shall be of the following types as specified:

- 3.1.1 *Type I*—Full Range.
- 3.1.2 *Type II*—High Flash Point.
- 3.1.3 *Type III*—Odorless.
- 3.1.4 *Type IV*—Low Dry Point.

3.2 Mineral spirits types may be further differentiated based on aromatics content as follows:

- 3.2.1 *Class A*—8 to 22 vol % aromatics.
- 3.2.2 *Class B*—2 to 8 max vol % aromatics.
- 3.2.3 *Class C*—less than 2 vol % aromatics.

### 4. Properties

4.1 The physical and chemical properties of the different types and classes of mineral spirits shall conform to the requirements specified in **Table 1**.

### 5. Sampling

5.1 The material shall be sampled in accordance with Practice **E300**.

### 6. Test Methods

6.1 The properties enumerated in this specification shall be determined in accordance with the following ASTM test methods:

6.1.1 *Bromine Number*—Test Method **D1159**. Bromine number is expressed as *g* bromine reacted per 100-g sample. For products having low olefin contents, Bromine Index (mg bromine reacted per 100-g sample) by Test Method **D2710** may be used.

6.1.2 *Color*—Test Method **D156** or Test Method **D1209**. In case of dispute, Test Method **D156** shall be the referee method.

6.1.3 *Corrosion*—Test Method **D130**. Perform test under the prescribed conditions for 3 h at 100°C.

6.1.4 *Distillation*—Test Method **D86**.

6.1.5 *Flash Point*—Test Method **D56** or Test Methods **D3278**. In case of dispute, Test Method **D56** shall be the referee method.

6.1.6 *Kauri-Butanol Value*—Test Method **D1133**.

6.1.7 *Odor*—Test Method **D1296**. Samples of particular types of products being tested, having odor characteristics satisfactory to consumer and producer, are to be used as reference standards for comparison.

6.1.8 *Mercaptan Sulfur*—Test Method **D3227**.

6.1.9 *Apparent Specific Gravity*—Determine the apparent specific gravity by any convenient method that is accurate to the third decimal place, the temperature of both specimen and water being 15.6°C. See Guide **D268**.

6.1.10 *Doctor Test*:

6.1.10.1 *Preparation of Doctor (Sodium Plumbite) Solution*—Dissolve approximately 125 g of sodium hydroxide (NaOH) in 1 L of reagent water. Add 60 g of lead monoxide (PbO) and shake vigorously for 15 min, or let stand with occasional shakings for at least a day. Allow to settle and decant or siphon off the clear liquid. If the solution does not settle clear, filter it through filter paper. Keep the solution in a tightly corked bottle and refilter before use if not perfectly clear.

6.1.10.2 *Procedure*—Shake vigorously together in a test tube 10 mL of the solvent being tested and 5 mL of sodium plumbite solution for about 15 s. Add a small amount of pure, dry flowers of sulfur so that practically all of it floats on the interface between the solvent and the sodium plumbite solution after shaking. Again shake for 15 s, allow to settle and observe within 2 min.

6.1.10.3 *Interpretation of Results*—If the solvent is discolored or if the yellow color of the sulfur film is noticeably masked, consider the test positive and the solvent as “sour.” If the sample remains unchanged in color and the sulfur film is bright yellow or only slightly discolored with gray or flecked with black, consider the test negative and the solvent as “sweet.”

6.1.10.4 If the doctor test result is positive, mercaptan content may be determined using Test Method **D3227** and reported.

6.1.11 *Aromatics*—Test Methods **D3257**.

### 7. Packaging and Package Marking

7.1 Package size shall be agreed upon by the purchaser and the supplier.

7.2 Packaging shall conform to applicable carrier rules and regulations or when specified shall conform to Fed. Spec. PPP-C-2020.

### 8. Keywords

8.1 Doctor test; hydrocarbon dry cleaning solvents; mineral spirits; solvents; Stoddard Solvent

<sup>4</sup> Available from Standardization Documents Order Desk, DODSSP, Bldg. 4, Section D, 700 Robbins Ave., Philadelphia, PA 19111-5098, <http://www.dodssp.daps.mil>.