



Standard Specification for Acetone^{1,2}

This standard is issued under the fixed designation D 329; 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 Department of Defense.

1. Scope *

1.1 This specification covers acetone (99.5 % grade).

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 E 29.

1.3 *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 1.4 and 4.1.

1.4 This specification specifies the use of a U.S. Occupational Safety and Health Administration (OSHA)-designated hazardous chemical, acetone. For hazard information and guidance see the supplier’s Material Safety Data Sheet.

2. Referenced Documents

2.1 ASTM Standards:

- D 268 Guide for Sampling and Testing Volatile Solvents and Chemical Intermediates for Use in Paint and Related Coatings and Material³
- D 1078 Test Method for Distillation Range of Volatile Organic Liquids³
- D 1209 Test Method for Color of Clear Liquids (Platinum-Cobalt Scale)³
- D 1296 Test Method for Odor of Volatile Solvents and Diluents³
- D 1353 Test Method for Nonvolatile Matter in Volatile Solvents for Use in Paint, Varnish, Lacquer, and Related Products³
- D 1363 Test Method for Permanganate Time of Acetone and Methanol³

D 1364 Test Method for Water in Volatile Solvents (Karl Fischer Reagent Titration Method)³

D 1476 Test Method for Heptane Miscibility of Lacquer Solvents³

D 1613 Test Method for Acidity in Volatile Solvents and Chemical Intermediates Used in Paint, Varnish, Lacquer, and Related Products³

D 1614 Test Method for Alkalinity in Acetone³

D 1722 Test Method for Water Miscibility of Water-Soluble Solvents³

D 4052 Test Method for Density and Relative Density of Liquids by Digital Density Meter⁴

E 1 Specification for ASTM Thermometers⁵

E 29 Practice for Using Significant Digits in Test Data To Determine Conformance with Specifications⁶

E 300 Practice for Sampling Industrial Chemicals⁷

2.2 *U.S. Federal Specification:*⁸

PPP-C-2020 Chemicals, Liquid, Dry, and Paste: Packaging of

3. Properties

3.1 Acetone (99.5 % grade) shall conform to the following requirements:

Acidity (free acid as acetic wt %, max)	0.002 (equivalent to 0.019 mg of KOH/g of sample)
Aldehydes	passes test
Alkalinity (as ammonia) wt %, max	0.001
Apparent specific gravity: 20/20°C	0.7910 to 0.7930 or
25/25°C	0.7865 to 0.7885
Assay wt %, min	99.5
Color Pt-Co, max	5
Distillation range 760 mmHg (Note 2)	shall distill entirely within a 1.0°C range which shall include 56.1°C
Nonvolatile matter mg/100 mL, max	5
Odor (Note 2)	nonresidual
Permanganate time	color of added KMnO ₄ must be retained for at least 30 minutes at 25°C in the dark
Water wt %, max	0.5 (Note 1)

¹ 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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² The compound is also known under the names dimethyl ketone and 2-propanone.

³ *Annual Book of ASTM Standards*, Vol 06.04.

⁴ *Annual Book of ASTM Standards*, Vol 05.02.

⁵ *Annual Book of ASTM Standards*, Vol 14.03.

⁶ *Annual Book of ASTM Standards*, Vol 14.02.

⁷ *Annual Book of ASTM Standards*, Vol 15.05.

⁸ Available from Standardization Documents Order Desk, DODSSP, Bldg. 4, Section D, 700 Robbins Ave., Philadelphia, PA 19111-5098.

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

Water miscibility passes test

NOTE 1— This quantitative water limit ensures that the material is miscible without turbidity with 19 volumes of 99 % heptane at 20°C. Test Method D 1476 may serve as a useful alternative method to determine the presence of water. Because it is a qualitative test, its use would require agreement between user and supplier.

NOTE 2—Optional: Test only when agreed upon as necessary between the purchaser and the supplier.

4. Sampling

4.1 The material shall be sampled in accordance with Practice E 300. **Warning:** Acetone is highly flammable.

5. Test Methods

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

5.1.1 *Acidity*—Test Method D 1613.

5.1.2 *Aldehydes*—Dilute 2.5 mL of the specimen with water to 10 mL. Prepare a control containing 0.04 mg of formaldehyde in 10 mL of water. To both the specimen solution and the control, add 0.15 mL of a 5 % solution of 5,5-dimethyl-1,3-cyclohexanedione in alcohol. Evaporate each on a steam bath until the acetone is volatilized. Dilute each to 10 mL and cool quickly in an ice bath with vigorous stirring. Any turbidity produced in the specimen solution shall be no greater than that produced in the control.

5.1.3 *Alkalinity*—Test Method D 1614.

5.1.4 *Apparent Specific Gravity*—Determine the apparent specific gravity by any convenient method that is accurate to

the fourth decimal place, the temperature of both specimen and water being 20 or 25°C. See Guide D 268 and Test Method D 4052.

5.1.5 *Assay*—Assay is determined by difference; 100 % minus (% water + % acidity), assuming that no other impurities are present.

5.1.6 *Color*—Test Method D 1209.

5.1.7 *Distillation Range*—Test Method D 1078 using an ASTM Solvents Distillation Thermometer 39C having a range from 48 to 102°C in 0.2°C subdivisions or Thermometer 14 C having a range from 38 to 82°C in 0.1°C subdivisions, and conforming to the requirements in Specification E 1.

5.1.8 *Nonvolatile Matter*—Test Method D 1353.

5.1.9 *Odor*—Test Method D 1296.

5.1.10 *Permanganate Time*—Test Method D 1363.

5.1.11 *Water*—Test Methods D 1364.

5.1.12 *Water Miscibility*—Test Method D 1722.

6. Packaging and Package Marking

6.1 Package size shall be agreed upon between the purchaser and the supplier.

6.2 Packaging shall conform to applicable carrier rules and regulations or when specified shall conform to Federal Specification PPP-C-2020.

7. Keywords

7.1 acetone; aldehydes test; dimethyl ketone; 2-propanone; solvents

SUMMARY OF CHANGES

Committee D01.35 has identified the location of selected changes to this standard since the last issue (D 329 - 99) that may impact the use of this standard.

- (1) Added Practice E 29 on significant digits to the Scope.
- (2) Added Practice E 29 to the Referenced Documents section.
- (3) Changed Note 2 so it relates to both odor and distillation.
- (4) Added the word “or” to the table in the Properties section to allow choice of running Specific Gravity at either stated temperature.
- (5) Modified Section 5.1.11 to reference only Test Method D 1364 for quantitative water determination.
- (6) Referenced Test Method D 1476 for qualitative water determination in Note 1.

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