

SEMI C19-0514 (Reapproved 1119) SPECIFICATION FOR ACETONE

This Standard was technically approved by the Liquid Chemicals Global Technical Committee. This edition was approved for publication by the global Audits and Reviews Subcommittee on August 19, 2019. Available at www.semiviews.org and www.semi.org in November 2019; originally published in 1978; previously published May 2014.

1 Purpose

1.1 The purpose of this Document is to standardize requirements for acetone used in the semiconductor industry and testing procedures to support those standards. Test methods have been shown to give statistically valid results. Alternative methods may be used as long as they comply with SEMI C1 requirements for method validation.

2 Scope

2.1 The scope of this Document is all grades of acetone used in the semiconductor industry.

NOTICE: SEMI Standards and Safety Guidelines do not purport to address all safety issues associated with their use. It is the responsibility of the users of the Documents to establish appropriate safety and health practices, and determine the applicability of regulatory or other limitations prior to use.

3 Limitations

3.1 None.

4 Referenced Standards and Documents

4.1 SEMI Standards and Safety Guidelines

SEMI C1 — Guide for the Analysis of Liquid Chemicals

SEMI C27 — Specification and Guide for Hydrochloric Acid

SEMI C35 — Specification and Guide for Nitric Acid

SEMI C44 — Specification and Guide for Sulfuric Acid

4.2 ASTM Standard¹

ASTM D5127 — Standard Guide for Ultra Pure Water Used in the Electronics and Semiconductor Industry

NOTICE: Unless otherwise indicated, all documents cited shall be the latest published versions.

5 Terminology

5.1 None.

6 Properties

Table 1 Properties of Acetone

Chemical Formula	(CH ₃) ₂ CO
CAS Number	67-64-1
Density at 25°C	0.79 g/mL
Boiling Point	56.3°C

¹ ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959, USA; Telephone: +1.610.832.9585, Fax: +1.610.832.9555, <http://www.astm.org>

7 Requirements

7.1 The requirements for acetone for Grade 1 are listed in Table 2.

8 Grade 1 Procedures

NOTE 1: Alternative methods may be used as long as they comply with SEMI C1 requirements for method validation.

8.1 Special Reagents

8.1.1 *Hydrochloric Acid (SEMI C27, Grade 2)*

8.1.2 *Nitric Acid (SEMI C35, Grade 2)*

8.1.3 *Sulfuric Acid (SEMI C44, Grade 2)*

8.2 *Assay* — Analyze the sample by gas chromatography (see SEMI C1, Assay by Wide Bore Column Gas Chromatography). The parameters cited have given satisfactory results.

8.2.1 Column: 30 meter × 530 micron I.D.-fused silica capillary, coated with 1 mm film of DB-1701 or equivalent (14% cyanopropylphenyl which has been surface bonded and crosslinked).

8.2.2 Column Temperature: 40°C isothermal for 5 minutes, then programmed to 200°C at 10°C/min.

Injector Temperature:	150°C
Detector Temperature:	250°C
Sample Size:	1 µL split
Carrier Gas:	Helium at 3 mL/min.
Detector:	Flame Ionization
Approximate Retention Times (min.):	
Methanol	1.1
Acetaldehyde	2.3
Acetone	2.9
Isopropanol	3.3
Cumene	10.0
Mesityl Oxide	11.8
Diacetone Alcohol	12.0

8.3 *Color* — Dilute 2.0 mL of platinum-cobalt stock solution (APHA No. 500, see SEMI C1) to 100 mL with water. Compare this standard (APHA No. 10) with 100 mL of sample in Nessler tubes. View vertically over white background. The sample shall be no darker than the standard.

8.4 *Acidity* — To 25 mL of water in a glass-stoppered flask, add 10 mL of sample and 0.1 mL of phenolphthalein indicator solution. Add 0.01 N sodium hydroxide until a slight, pink color persists after shaking for one-half minute. Add 42 mL (33 g) of the sample, mix well, and titrate with 0.01 N sodium hydroxide until the pink color is reproduced. Not more than 1.0 mL of the sodium hydroxide solution shall be required.

8.5 *Alkalinity* — Add 25 mL (20 g) of sample to 25 mL of water and mix well. Add 0.05 mL of methyl red indicator solution. Titrate with 0.01 N hydrochloric acid until a slight pink color is produced. Not more than 1.0 mL of the hydrochloric acid shall be required.

8.6 *Residue After Evaporation* — Evaporate 253 mL (200 g) of sample to dryness. Dry at 105°C for 30 minutes, cool in a desiccator, and weigh (see SEMI C1, Determination of Residue After Evaporation).

8.7 *Water* — Add 25 mL of pyridine to a dry titration flask and add Karl Fischer (KF) reagent to a visually or electrometrically determined endpoint that persists for 30 seconds. Add 25 mL (20 g) of sample, taking care to protect the sample and contents of the flask from moisture. Stir vigorously and titrate with Karl Fischer reagent to the same endpoint.