



Designation: E3399 – 23

Standard Test Method for Non-volatile Residue in Ethanol and Ethanol Solutions¹

This standard is issued under the fixed designation E3399; 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.

1. Scope

1.1 This test method covers the determination of the non-volatile residue content of ethanol and ethanol solutions at the time of test.

1.2 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.2.1 The accepted SI unit of pressure is the Pascal (Pa); the accepted SI unit for temperature is degrees Celsius.

1.3 **Warning**—Mercury has been designated by many regulatory agencies as a hazardous substance that can cause serious medical issues. Mercury, or its vapor, has been demonstrated to be hazardous to health and corrosive to materials. Use caution when handling mercury and mercury-containing products. See the applicable product Safety Data Sheet (SDS) for additional information. The potential exists that selling mercury or mercury-containing products, or both, is prohibited by local or national law. Users must determine legality of sales in their location.

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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.* For specific warning statements, see 6.4, 7.4, and 9.1.

1.5 *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:²

¹ This test method is under the jurisdiction of ASTM Committee E48 on Bioenergy and Industrial Chemicals from Biomass and is the direct responsibility of Subcommittee E48.A0 on Product Specifications.

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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.

D4057 Practice for Manual Sampling of Petroleum and Petroleum Products

E1 Specification for ASTM Liquid-in-Glass Thermometers

E29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications

2.2 U.S. Federal Standards

United States Code of Federal Regulations, Title 27, Part 21 Formulas for Denatured Alcohol and Rum

United States Code of Federal Regulations, Title 27, Part 30.31 Determination of Proof

3. Terminology

3.1 Definitions of Terms Specific to This Standard:

3.1.1 *ethanol* (*ethyl alcohol*, *grain alcohol*), n — $\text{CH}_3\text{CH}_2\text{OH}$; can be produced chemically from ethylene or biologically from the fermentation of various sugars from carbohydrates found in agricultural crops and cellulosic residues from crops or wood.

3.1.2 *non-volatile residue*, n —the soluble, suspended, or particulate material remaining following the evaporation of a sample.

4. Summary of Test Method

4.1 When testing ethanol or ethanol solutions, a 100 mL $\pm$ 0.5 mL quantity of ethanol or ethanol solution is evaporated under controlled temperature conditions of minimum 100 °C, but not to exceed 180 °C.

5. Significance and Use

5.1 Manufacturers of ethanol are responsible for identifying and controlling impurities according to regulatory standards. Impurities in ethanol that are non-volatile are critical quality attributes for applications in the food, feed and pharmaceutical, personal care applications. Non-volatile residue is an attribute important to users of ethanol for these applications.

6. Apparatus/Materials

6.1 *Balance*, capable of weighing test specimens to the nearest 0.1 mg.

6.2 *Beakers*, of 100 mL capacity. Mark each beaker in the set, including the tare beaker, with an identifying number or letter.