



Designation: E3237 – 24

Standard Specification for Undenatured Ethanol from Biomass for Use in Industrial Applications¹

This standard is issued under the fixed designation E3237; 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 specification covers biomass derived, undenatured ethanol intended for use in industrial applications such as adhesives, detergents, inks, chemicals, plastics, paints, thinners, etc.

1.2 Nothing in this specification shall preclude observance of federal, state, or local regulations.

1.3 Undenatured ethanol has many regulatory limitations that cover the production, trading, transporting, distributing, wholesale and retail sale, and use of undenatured ethanol; this specification does not purport to address the regulatory compliance aspects of these activities.

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.*

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

D1209 Test Method for Color of Clear Liquids (Platinum-Cobalt Scale)

D1296 Test Method for Odor of Volatile Solvents and Diluents

D1353 Test Method for Nonvolatile Matter in Volatile Sol-

vents for Use in Paint, Varnish, Lacquer, and Related Products

D4052 Test Method for Density, Relative Density, and API Gravity of Liquids by Digital Density Meter

D4057 Practice for Manual Sampling of Petroleum and Petroleum Products

D4177 Practice for Automatic Sampling of Petroleum and Petroleum Products

D4306 Practice for Aviation Fuel Sample Containers for Tests Affected by Trace Contamination

D5501 Test Method for Determination of Ethanol and Methanol Content in Fuels Containing Greater than 20 % Ethanol by Gas Chromatography

D5854 Practice for Mixing and Handling of Liquid Samples of Petroleum and Petroleum Products

D7795 Test Method for Acidity in Ethanol and Ethanol Blends by Titration

D7923 Test Method for Water in Ethanol and Hydrocarbon Blends by Karl Fischer Titration

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

E300 Practice for Sampling Industrial Chemicals

E1064 Test Method for Water in Organic Liquids by Coulometric Karl Fischer Titration

E1705 Terminology Relating to Bioenergy and Industrial Chemicals from Biomass

3. Terminology

3.1 Definitions of Terms:

3.1.1 For definitions of terms used in this standard, refer to Terminology E1705.

NOTE 1—The user is advised that the definitions used by various industries, marketers, regulatory bodies, and other ASTM Committees can differ from those specific to this specification. When using this standard, it is critical to use terminology from Committee E48.

3.2 *biomass, n*—substance wholly comprised of living or recently living (non-fossil) material.

3.2.1 *Discussion*—Peat is not a biomass.

3.3 *ethanol, n*—ethyl alcohol, the chemical compound C_2H_5OH .

3.3.1 *Discussion*—Can be produced chemically from ethylene or biologically from the fermentation of various sugars

¹ This specification 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.

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

from the carbohydrates found in agricultural crops and cellulosic residues from crops or wood.

3.3.2 *Discussion*—The term grain alcohol can also be used for the product.

4. Ordering Information

4.1 This product may be used for applications beyond the scope of this specification if agreed upon by consenting parties. It is important to recognize that this specification may or may not reflect all of the necessary parameters for each application.

4.2 Various industrial applications may have different requirements for additives.

4.3 It is the responsibility of the purchaser to specify any required water limits.

4.4 It is the responsibility of the user of this standard to determine the applicability of regulatory limitations prior to use. This standard does not purport to address all aspects related to regulatory compliance.

4.5 Users of this specification are advised to consult with the applicable regulatory agency for specific requirements in their jurisdictions. The requirements can be covered by regulations specific to a jurisdiction or by multiple regulations due to overlapping jurisdictions.

5. Physical Properties

5.1 Undenatured ethanol used in many industrial applications must conform to the parameters and limits in [Table 1](#).

NOTE 2—Undenatured ethanol may contain additives, such as corrosion inhibitor, that can affect the titratable acidity (acidity as acetic acid) of the finished undenatured ethanol. Although the base undenatured ethanol may meet the acidity specification, the effect of these additives can produce an apparent high titratable acidity of the finished product. Contact the ethanol supplier if there is a question regarding the titratable acidity to verify that the base undenatured ethanol meets the acidity requirements in [Table 1](#).

5.2 *Other Properties*—Limits more restrictive than those specified above or the specification of additional properties may be agreed upon between the supplier and the purchaser.

5.3 For purposes of determining conformance with the specified limits in [Table 1](#), an observed value or a calculated value shall be rounded “to the nearest unit” in the last right hand digit used in expressing the specification limit, in accordance with the rounding method of Practice [E29](#), unless otherwise specified.

6. Workmanship

6.1 The product described by this standard shall be visually free of sediment and suspended matter.

6.2 The product described by this standard shall be free of any adulterant or contaminant that can render the material unacceptable for its commonly used applications.

7. Sampling, Containers, and Sample Handling

7.1 The user is strongly advised to review all intended test methods prior to sampling to understand the importance and effects of sampling technique, proper containers, and special handling required for each test method.

7.2 Correct sampling procedures are critical to obtain a sample representative of the lot intended to be tested. Use appropriate procedures in Practice [D4057](#) or Practice [E300](#) for manual method sampling and in Practice [D4177](#) for automatic method sampling, as applicable.

7.3 The correct sample volume and appropriate container selection are important decisions that can impact test results. Refer to Practice [D4306](#) for aviation fuel container selection for tests sensitive to trace contamination. Refer to Practice [D5854](#) for procedures on container selection and sample mixing and handling. All sampling and storage containers should be evaluated for durability, compatibility, and contamination of cooking and appliance fuel prior to use. If samples must be collected in metal containers, do not use soldered metal containers. Soldering flux in the containers and the lead in the solder can contaminate the sample.

7.4 *Sample Size*—A minimum of about 1 L is recommended.

7.5 *Lot Size*—A lot shall normally consist of the amount contained in a tanker compartment or other bulk container in which it is delivered. If this definition does not apply, the definition of a lot must be agreed upon between the supplier and purchaser.

8. Test Methods

8.1 Undenatured ethanol for use in industrial applications shall reference the test methods in [Table 1](#).

8.2 Determine the requirements of each applicable specification in accordance with the test methods listed in [Table 1](#).

8.3 *Specific Gravity*—Test Method [D4052](#).

8.4 *Ethanol*—Test Method [D5501](#).

8.5 *Water*—Test Methods [D7923](#) or [E1064](#).

8.5.1 Test Method [D7923](#) is the preferred method. In cases of differing results between the two test methods, Test Method [D7795](#) shall be the referee method.

8.6 *Acidity*—Test Method [D7795](#).

8.7 *Nonvolatile Residue*—Test Method [D1353](#).

TABLE 1 Undenatured Ethanol Requirements

Parameter	Limit	ASTM Test Method
Specific Gravity, 20C	Report	D4052
Ethanol, % by volume, min.	Report	D5501
Water, % by volume, max.	Report	D7923 or E1064
Acidity (as acetic acid, CH ₃ COOH), mg/kg (% by mass) [mg/L]	70 (0.0070)[56] (Note 2)	D7795
Nonvolatile Residue, mg/mL, max.	5	D1353
Odor	Typical, Characteristic	D1296
Color, Pt- Co, max.	10	D1209

