



Standard Specification for Denatured Fuel Ethanol for Blending with Gasolines for Use as Automotive Spark-Ignition Engine Fuel¹

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1. Scope

1.1 This specification covers nominally anhydrous denatured fuel ethanol intended to be blended with unleaded or leaded gasolines at 1 to 10 volume % for use as a spark-ignition automotive engine fuel. The significance of this specification is shown in Appendix X1.

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

2. Referenced Documents

2.1 ASTM Standards:

- D 86 Test Method for Distillation of Petroleum Products²
- D 381 Test Method for Existent Gum in Fuels by Jet Evaporation²
- D 512 Test Methods for Chloride Ion in Water³
- D 891 Test Methods for Specific Gravity, Apparent, of Liquid Industrial Chemicals⁴
- D 1152 Specification for Methanol (Methyl Alcohol)⁵
- D 1193 Specification for Reagent Water³
- D 1613 Test Method for Acidity in Volatile Solvents and Chemical Intermediates Used in Paint, Varnish, Lacquer, and Related Products⁵
- D 1688 Test Methods for Copper in Water³
- D 3505 Test Method for Density or Relative Density of Pure Liquid Chemicals⁵
- D 4052 Test Method for Density and Relative Density of Liquids by Digital Density Meter⁶
- D 4057 Practice for Manual Sampling of Petroleum and Petroleum Products⁶
- D 4814 Specification for Automotive Spark-Ignition Engine Fuel⁷
- D 5501 Test Method for the Determination of Ethanol

Content of Denatured Fuel Ethanol by Gas Chromatography⁷

D 6423 Test Method for Determination of pH_E of Ethanol,

Denatured Fuel Ethanol, and Fuel Ethanol (Ed75–Ed85)⁸

E 203 Test Method for Water Using Karl Fischer Reagent⁴

E 300 Practice for Sampling Industrial Chemicals⁴

E 1064 Test Method for Water in Organic Liquids by Coulometric Karl Fischer Titration⁴

2.2 Other Standards:

United States Code of Federal Regulations, Title 27, Parts 20 and 21⁹

United States Federal Specification O-E-760b Ethyl Alcohol (Ethanol): Denatured Alcohol: and Proprietary Solvent¹⁰

3. Terminology

3.1 Definitions:

3.1.1 *ethanol*, *n*—ethyl alcohol, the chemical compound C₂H₅OH.

3.1.2 *gasoline*, *n*—a volatile mixture of liquid hydrocarbons, generally containing small amounts of additives, suitable for use as a fuel in spark-ignition, internal combustion engines.

3.1.3 *gasoline-ethanol blend*, *n*—a fuel consisting primarily of gasoline along with a substantial amount (more than 0.35 mass % oxygen) of denatured fuel ethanol.

3.1.4 *oxygenate*, *n*—an oxygen-containing ashless, organic compound, such as an alcohol or ether, which may be used as a fuel or fuel supplement.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *denaturants*—natural gasoline, gasoline components, unleaded gasoline, or toxic or noxious materials added to fuel ethanol to make it unsuitable for beverage use but not unsuitable for automotive use.

3.2.2 *denatured fuel ethanol*—fuel ethanol made unfit for beverage use by the addition of denaturants.

3.2.3 *fuel ethanol*—ethanol with impurities common to its production (including water but excluding denaturants).

3.2.4 *impurities*—in commercially produced fuel ethanol compounds other than ethanol or denaturants present such as

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² *Annual Book of ASTM Standards*, Vol 05.01.

³ *Annual Book of ASTM Standards*, Vol 11.01.

⁴ *Annual Book of ASTM Standards*, Vol 15.05.

⁵ *Annual Book of ASTM Standards*, Vol 06.04.

⁶ *Annual Book of ASTM Standards*, Vol 05.02.

⁷ *Annual Book of ASTM Standards*, Vol 05.03.

⁸ *Annual Book of ASTM Standards*, Vol 05.04.

⁹ Order as Code of Federal Regulations Title 27 Parts 200-End: from Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

¹⁰ Order from Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.