



Standard Test Method for Determining the Accelerated Iron Corrosion Rating of Denatured Fuel Ethanol and Ethanol Fuel Blends¹

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1. Scope

1.1 This test method measures the ability of inhibited and uninhibited Ethanol Fuel Blends defined by Specification [D5798](#) and Denatured Fuel Ethanol defined by Specification [D4806](#) to resist corrosion of iron should water become mixed with the fuel, using an accelerated laboratory test method. Corrosion ratings are reported based on a visual, numbered rating scale.

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

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 Sections [7](#) and [8](#).

2. Referenced Documents

2.1 ASTM Standards:²

- [A29/A29M](#) Specification for General Requirements for Steel Bars, Carbon and Alloy, Hot-Wrought
- [A108](#) Specification for Steel Bar, Carbon and Alloy, Cold-Finished
- [D665](#) Test Method for Rust-Preventing Characteristics of Inhibited Mineral Oil in the Presence of Water
- [D1193](#) Specification for Reagent Water
- [D2699](#) Test Method for Research Octane Number of Spark-Ignition Engine Fuel
- [D4175](#) Terminology Relating to Petroleum Products, Liquid Fuels, and Lubricants
- [D4806](#) Specification for Denatured Fuel Ethanol for Blending with Gasolines for Use as Automotive Spark-Ignition Engine Fuel

¹ This test method is under the jurisdiction of ASTM Committee [D02](#) on Petroleum Products, Liquid Fuels, and Lubricants and is the direct responsibility of Subcommittee [D02.14](#) on Stability and Cleanliness of Liquid Fuels.

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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.

- [D5798](#) Specification for Ethanol Fuel Blends for Flexible-Fuel Automotive Spark-Ignition Engines
- [E177](#) Practice for Use of the Terms Precision and Bias in ASTM Test Methods
- [E2251](#) Specification for Liquid-in-Glass ASTM Thermometers with Low-Hazard Precision Liquids

3. Terminology

3.1 Definitions:

3.1.1 For definitions of terms used in this test method, refer to Terminology [D4175](#).

3.1.2 *Fuel C, n*—a volumetric mixture of 50 volume percent reference fuel grade toluene and 50 volume percent reference fuel grade isooctane.

3.1.2.1 *Discussion*—Specifications for reference fuel grade toluene and reference fuel grade isooctane can be found in Test Method [D2699](#).

3.2 Abbreviations:

3.2.1 *HDPE, n*—high density polyethylene

3.2.2 *PTFE, n*—Polytetrafluoroethylene

4. Summary of Test Method

4.1 A polished steel test rod is immersed in a mixture of the test sample and water at a ratio of 10 parts fuel sample to 1 part water and held at a temperature of 37 °C to 39 °C (98 °F to 102 °F) for 1 h.

4.2 At the end of 1 h, the test rod is removed, rinsed and rated according to a numeric corrosion rating scale.

5. Significance and Use

5.1 This test is designed to be used as a rapid measure of the overall relative corrosivity of Ethanol Fuel Blends (Specification [D5798](#)) and Denatured Fuel Ethanol (Specification [D4806](#)) to iron (steel).

5.2 The test can be used to compare corrosion inhibitor dosage levels and effectiveness of various corrosion inhibitors as they pertain to protecting iron (steel) materials from corrosion.

6. Apparatus

6.1 *General*—Two test apparatus have been evaluated and found to give comparable results.