



Standard Test Method for Evaluating Unleaded Automotive Spark-Ignition Engine Fuel for Electronic Port Fuel Injector Fouling¹

This standard is issued under the fixed designation D 5598; 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.

INTRODUCTION

This test method is based on a test procedure developed by the Coordinating Research Council (CRC) and maintains as much commonality as possible with the original test. A similar test method is described in the California Air Resource Board (CARB) report, “Test Method for Evaluating Port Fuel Injector Deposits in Vehicle Engines.”

Driveability problems in PFI automobiles were first reported in 1984. These driveability problems were caused by deposits in the tips of pintle-type fuel injectors. In response to this problem, the CRC developed a program to evaluate a method of testing PFI deposit-forming tendencies in gasolines. The test cycle consisting of 15 min of operation at 88 kph (55 mph) followed by a 45-min soak period was used for the program. This test cycle showed statistically significant differences in deposit-forming tendencies of the test fuels on the vehicles’ fuel injectors. The results of the CRC program are discussed in CRC Report No. 565,² and SAE Paper 890213.³

1. Scope

1.1 This test method covers a vehicle test procedure to evaluate the tendency of an unleaded spark-ignition engine fuel to foul electronic port fuel injectors (PFI).

1.2 The test method is applicable to unleaded spark-ignition engine fuels which may contain antioxidants, corrosion inhibitors, metal deactivators, dyes, deposit control additives, and oxygenates.

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

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 and health practices and determine the applicability of regulatory limitations prior to use.* Specific precautionary statements are given throughout this test method.

NOTE 1—If there is any doubt as to the latest edition of Test Method D 5598, contact ASTM Headquarters. Other properties of significance to spark-ignition engine fuel are described in Specification D 4814.

2. Referenced Documents

2.1 ASTM Standards:

D 235 Specification for Mineral Spirits (Petroleum Spirits) (Hydrocarbon Dry Cleaning Solvent)⁴

D 4814 Specification for Automotive Spark-Ignition Engine Fuel⁵

2.2 ANSI Standard:

MC 96.1 Temperature Measurement Thermocouples⁶

2.3 Other Standards:

“Test Method for Evaluating Port Fuel Injector (PFI) Deposits In Vehicle Engines,” State of California—Air Resources Board (CARB), Stationary Source Div., March 1, 1991 (incorporated by reference in California Code of Regulations, Title 13, Section 2257).⁷

Title 1—Provisions for Attainment and Maintenance of National Air Quality Standards, Clean Air Act Amendments of 1990 Public Law 101-549, Nov. 15, 1990.⁸

3. Terminology

3.1 Definitions of Terms Specific to This Standard:

⁴ Annual Book of ASTM Standards, Vol 06.04.

⁵ Annual Book of ASTM Standards, Vol 05.03.

⁶ Available from American National Standards Institute, 11 W. 42nd St., 13th Floor, New York, NY 10036.

⁷ Available from California Air Resources Board, P.O. Box 2815, Sacramento, CA 95812.

⁸ Clean Air Act Amendments of 1990, Available from Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

¹ This test method is under the jurisdiction of ASTM Committee D-2 on Petroleum Products and Lubricants and is the direct responsibility of Subcommittee D02.A on Gasoline and Oxygenated Fuels.

Current edition approved Aug. 15, 1995. Published October 1995. Originally published as D 5598 – 94. Last previous edition D 5598 – 95.

² CRC Report No. 565 “A Program to Evaluate a Vehicle Test Method for Port Fuel Injector Deposit-Forming Tendencies of Unleaded Base Gasolines,” February 1989. Available from Coordinating Research Council, Inc., 219 Perimeter Ctr. Pkwy., Atlanta, GA 30346.

³ Tupa, Taniguchi, Benson, “A Vehicle Test Technique for Studying Port Fuel Injector Deposits—A Coordinating Research Council Program,” Society of Automotive Engineers (SAE) Technical Paper Series: Paper No. 890213, 1989, Available from Society of Automotive Engineers International, 400 Commonwealth Dr., Warrendale, PA 15096.