Designation: D 4054 – 93 (Reapproved 1998)

An American National Standard

Standard Practice for Evaluating the Compatibility of Additives with Aviation-Turbine Fuels and Aircraft Fuel System Materials[1]

This standard is issued under the fixed designation D 4054; 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 practice describes procedures required to determine the compatibility of additives proposed for aviation turbine fuels with both standardized fuels and the materials commonly used in commercial aircraft fuel system construction.

1.2 Satisfactory evidence of compatibility using this practice is required by the ASTM Guidelines for Additive Approval (Research Report D02-1125)[2] for additives specified in Specification D 1655 and also by individual aircraft and engine manufacturers as well as government agencies.

1.3 Compatibility data resulting from these procedures represent only part of the performance information required for additive approval.

1.4 The actual level of acceptance is established by the individual approving groups.

1.5 While efforts are made to maintain the list of fuel system materials to be tested and to keep it current, users of this practice must recognize that these lists are subject to continuing revision to meet the needs of equipment manufacturers.

1.6 *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.*

2. Referenced Documents

2.1 *ASTM Standards:*

D 156 Test Method for Saybolt Color of Petroleum Products (Saybolt Chromometer Method)[3]

D 1266 Test Method for Sulfur in Petroleum Products (Lamp Method)[3]

D 1655 Specification for Aviation Turbine Fuels[3]

D 2624 Test Methods for Electrical Conductivity of Aviation and Distillate Fuels Containing a Static Dissipator Additive[3]

D 3227 Test Method for Mercaptan Sulfur in Gasoline, Kerosine, Aviation Turbine, and Distillate Fuels (Potentiometric Method)[3]

D 3602 Field Test Method for Water Separation Characteristics of Aviation Turbine Fuels[4]

D 3948 Test Methods for Determining Water Separation Characteristics of Aviation Turbine Fuels by Portable Separometer[4]

D 4308 Test Method for Electrical Conductivity of Liquid Hydrocarbons by Precision Meter[4]

D 4952 Test Method for Qualitative Analysis of Active Sulfur Species in Fuels and Solvents (Doctor Test)[4]

3. Summary of Practice

3.1 These procedures are laboratory techniques for establishing additive compatibility with commercial aviation turbine fuels, with additives previously approved in standard fuels and with the fuel system components used in commercial aircraft, including tank coatings, sealants, and elastomers. Tests are conducted with Jet A/A-1 fuel at four times the maximum additive concentration as recommended by the additive supplier. Immersion tests, with fuel system components only, are conducted in the more severe Reference Test Fluids, TT-S-735, Types III and VII. The time and temperature of immersion tests are representative of aircraft use conditions and immersed components are evaluated after exposure, using industry standard methods. Comparisons are made with representative components exposed to the base fluid with and without additive.

NOTE 1—Data obtained with Jet A/A-1 fuels can be applicable to Jet B fuel or to aviation fuels specified by other organizations, with the agreement of the approving air frame/engine manufacturer.

4. Significance and Use

4.1 Additives are generally used to enhance a fuel property such as oxidation stability or to improve fuel performance by providing corrosion inhibition, protection against icing, metal deactivation, and so forth. However, their use can adversely affect other fuel properties or the ground-handling systems for fuels. Application of the procedures of this practice is intended to disclose these adverse effects.

[1] This practice is under the jurisdiction of ASTM Committee D-2 on Petroleum Products and Lubricants and is the direct responsibility of Subcommittee D02.J0.09 on Additive-Related Properties.

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[2] Copies of ASTM Guidelines for additive approval (D02-1125) and the Research Report (D02-1137) are available from ASTM Headquarters.

[3] *Annual Book of ASTM Standards*, Vol 05.01.

[4] *Annual Book of ASTM Standards*, Vol 05.02.