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.

Designation: D2809 – 09 (Reapproved 2017)

Standard Test Method for Cavitation Corrosion and Erosion-Corrosion Characteristics of Aluminum Pumps With Engine Coolants[1]

This standard is issued under the fixed designation D2809; 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 test method covers the evaluation of the cavitation corrosion and erosion-corrosion characteristics of aluminum automotive water pumps with coolants.

NOTE 1—During the development of this test method, it was found that results obtained when testing two-phase coolants did not correlate with results from field tests. Therefore, the test method cannot be recommended as being a significant test for determining cavitation effects of two-phase coolants.

1.2 The values stated in SI units are to be regarded as the standard. The values given 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 warning statements are given in 5.2.

1.4 *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]

D1176 Practice for Sampling and Preparing Aqueous Solutions of Engine Coolants or Antirusts for Testing Purposes

E177 Practice for Use of the Terms Precision and Bias in ASTM Test Methods

2.2 *ASTM Adjunct:*[3]

Pump test stand (7 drawings and Bill of Materials)

3. Summary of Test Method

3.1 This test method consists of pumping an aqueous coolant solution at 113°C (235°F) through a pressurized 103-kPa (15-psig) simulated automotive coolant system (Note 2). An aluminum automotive water pump, driven at 4600 r/min by an electric motor, is used to pump the solution and to serve as the object specimen in evaluating the cavitation erosion-corrosion effect of the coolant under test. The pump is examined to determine the extent of cavitation erosion-corrosion damage and is rated according to the system given in Table 1. Photographs of typical eroded pumps after testing appear in the Appendix.

NOTE 2—Tests run at other than 113 °C (235 °F) might show more or less cavitation depending upon the coolant formulation.

4. Significance and Use

4.1 This test method can be used to distinguish between coolants that contribute to cavitation corrosion and erosion-corrosion of aluminum automotive water pumps and those that do not. It is not intended that a particular rating number, as determined from this test, will be equivalent to a certain number of miles in a vehicle test; however, limited correlation between bench and field service tests has been observed with single-phase coolants. Field tests under severe operating conditions should be conducted as the final test if the actual effect of the coolant on cavitation corrosion and erosion-corrosion is to be appraised. It is also possible, with proper control of the test variables, to determine the effect of pump design, materials of construction, and pump operating conditions on cavitation corrosion and erosion-corrosion damage.

5. Apparatus

5.1 *Pump Test Stand*—Detailed drawings are available.[3] The copper, brass, and bronze flow circuit is illustrated in Fig. 1.

[1] This test method is under the jurisdiction of ASTM Committee D15 on Engine Coolants and Related Fluids and is the direct responsibility of Subcommittee D15.09 on Simulated Service Tests.

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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.

[3] Detail drawings of this apparatus and accompanying table of parts are available from ASTM International Headquarters. Order Adjunct No. ADJD2809. Original adjunct produced in 1985.

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