Designation: D 4921 – 95 (Reapproved 2000)

An American National Standard

Standard Test Method for Foaming Tendencies of Engine Coolants at Room Temperature[1]

This standard is issued under the fixed designation D 4921; 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 applies to a simple shake test for evaluating the tendency of an aqueous solution of engine coolant to foam at room temperature.

1.2 *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 1176 Test Method for Sampling and Preparing Aqueous Solutions of Engine Coolants or Antirusts for Testing Purposes[2]

3. Summary of Test Method

3.1 A 30 % by volume coolant concentrate solution is prepared in deionized water and shaken in a stoppered graduated cylinder for 30 s. The volume of foam formed in the cylinder is read in millilitres. Preparation of the sample is done in accordance with Test Method D 1176.

4. Significance and Use

4.1 The test method will generally identify coolants that have a tendency to foam excessively at room temperature.

NOTE 1—In use, the foaming tendency of a coolant solution may be increased by service aging or contamination.

5. Apparatus

5.1 *Graduated Cylinders*—100-mL graduated cylinders with plastic stoppers are preferred for ease of handling.[3]

5.2 *Water Bath*—A water bath or equivalent device capable of maintaining temperature at 20 ± 1°C.

6. Reagents

6.1 *Deionized Water*.

7. Test Conditions

7.1 *Test Temperature*— The test solution shall be maintained at 20 ± 1°C for 30 min before shaking.

7.2 *Shake Rate*—The graduated cylinder containing the test solution should be shaken vigorously for 30 s before a reading of the foam volume is taken.

7.3 *Number of Tests*— Each test solution should be tested in triplicate, using a freshly prepared test solution for each test.

8. Test Procedure

8.1 Prepare three 50-mL samples of a 30 % by volume (15-mL) coolant solution in deionized water. Use 100-mL graduated cylinders.

8.2 The graduated cylinders should be stoppered and placed in the constant 20 ± 1°C temperature water bath. Ensure that the test solution is submerged below the water level. Allow the test solutions to equilibrate in the bath for 30 min.

8.3 Remove the graduated cylinder from the bath and shake vigorously (using forearm), making a 90° arc for approximately 30 s (use a stopwatch or timing device). To avoid leakage of test contents from the cylinder, the stopper should be held or locked in place.

NOTE 2—Secure the stopper on the graduated cylinder using thumb, index finger, or suitable locking device.

8.4 Place cylinder on a level surface and allow it to stand undisturbed for 10 s.

8.5 Record the foam volume to the nearest millilitre by reading the top level of foam and subtracting 50 mL to account for the liquid level.

9. Report

9.1 Report foam volumes (to the nearest 1.0 mL) for each test as well as the average of the tests.

10. Precision and Bias

10.1 *Precision*:

10.1.1 Repeatability of the results within a given laboratory is normally within 15 % of the mean.

10.1.2 Reproducibility among different laboratories is normally within 30 % of the mean.

10.2 *Bias*—Since there is no accepted reference material suitable for determining the bias for the procedure in this test method, no statement of bias is being made.

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[1] This specification is under the jurisdiction of ASTM Committee D15 on Engine Coolants and is the direct responsibility of Subcommittee D15.06 on Glassware Performance Tests.

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[2] *Annual Book of ASTM Standards*, Vol 15.05.

[3] Kimax or Pyrex brands have been found to be suitable.

11. Keywords

11.1 aqueous solutions; engine coolant; foam; foam test; foaming tendencies