

Designation: D4921 - 95 (Reapproved 2012)

Standard Test Method for Foaming Tendencies of Engine Coolants at Room Temperature¹

This standard is issued under the fixed designation D4921; 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:²
- D1176 Practice for Sampling and Preparing Aqueous Solutions of Engine Coolants or Antirusts for Testing Purposes

3. Summary of Test Method

3.1 A30 % 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 D1176.

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

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 D15.06 on Glassware Performance Tests.

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 $20 \pm 1^{\circ}$ 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 $20 \pm 1^{\circ}$ 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.

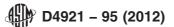
9. Report

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

Current edition approved Oct. 1, 2012. Published November 2012. Originally approved in 1989. Last previous edition approved in 2006 as D4921 – 95(2006). DOI: 10.1520/D4921-95R12.

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 Kimax or Pyrex brands have been found to be suitable.



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.

11. Keywords

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

ASTM International takes no position respecting the validity of any patent rights asserted in connection with any item mentioned in this standard. Users of this standard are expressly advised that determination of the validity of any such patent rights, and the risk of infringement of such rights, are entirely their own responsibility.

This standard is subject to revision at any time by the responsible technical committee and must be reviewed every five years and if not revised, either reapproved or withdrawn. Your comments are invited either for revision of this standard or for additional standards and should be addressed to ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee, which you may attend. If you feel that your comments have not received a fair hearing you should make your views known to the ASTM Committee on Standards, at the address shown below.

This standard is copyrighted by ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959, United States. Individual reprints (single or multiple copies) of this standard may be obtained by contacting ASTM at the above address or at 610-832-9585 (phone), 610-832-9555 (fax), or service@astm.org (e-mail); or through the ASTM website (www.astm.org). Permission rights to photocopy the standard may also be secured from the ASTM website (www.astm.org/COPYRIGHT/).