



Designation: D4921 – 20

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 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

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](#)

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 Practice [D1176](#).

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.

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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.

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.

5.2 *Water Bath*—A water bath or equivalent device capable of maintaining temperature at $22.5\text{ }^{\circ}\text{C} \pm 2.5\text{ }^{\circ}\text{C}$.

6. Reagents

6.1 *Deionized Water.*

7. Test Conditions

7.1 *Test Temperature*—The test solution shall be maintained at $22.5\text{ }^{\circ}\text{C} \pm 2.5\text{ }^{\circ}\text{C}$ 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 $22.5\text{ }^{\circ}\text{C} \pm 2.5\text{ }^{\circ}\text{C}$ 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.