



Designation: D7840 – 12

Standard Test Method for Foaming Tendencies of Non-Aqueous Engine Coolants in Glassware¹

This standard is issued under the fixed designation D7840; 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 a simple glassware test for evaluating the tendency of non-aqueous engine coolants to foam under laboratory controlled conditions of aeration and temperature.

1.2 *Units*—The values stated in SI units are to be regarded as the 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 and health practices and determine the applicability of regulatory limitations prior to use. For specific warning statements, see 7.2 and 7.3.*

2. Referenced Documents

2.1 *ASTM Standards*:²

D1193 Specification for Reagent Water

E1 Specification for ASTM Liquid-in-Glass Thermometers

E128 Test Method for Maximum Pore Diameter and Permeability of Rigid Porous Filters for Laboratory Use

E230 Specification and Temperature-Electromotive Force (EMF) Tables for Standardized Thermocouples

3. Terminology

3.1 *Definitions of Terms Specific to This Standard*:

3.1.1 *break time, n*—time required for the foam to collapse (after the air supply has been shut off) to the first appearance of an “eye” on the surface of the test solution.

3.1.2 *eye, n*—appearance of foam-free area on the surface of the test coolant surrounded by a ring of foam clinging to the cylinder walls.

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 D15.22 on Non-Aqueous Coolants.

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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. Summary of Test Method

4.1 The non-aqueous coolant of interest is blown with air at a constant rate for 5 min while maintained at a constant temperature of $88 \pm 1^\circ\text{C}$ by means of a suitable temperature bath. The volume of foam and the time for such foam to break are measured.

5. Significance and Use

5.1 In the test method, coolants generally will be distinguished that have a tendency to foam excessively from those that are suitable for further evaluation to determine performance in actual service.

NOTE 1—In use, the foaming tendency of a coolant solution may be increased by service aging or contamination. A properly functioning pressure cap will tend to suppress foaming in coolant solutions.

6. Apparatus

6.1 *Container*, a 500-mL graduated container of heat-resistant glass having a diameter of 45 to 50 mm and a length of 380 mm.

6.2 *Temperature Bath*, a heat-resistant glass container large enough to permit immersion of the graduated container at least to the 350-mL graduation mark. A 4000-mL beaker is satisfactory.

6.3 *Heat Source*, any heating system capable of maintaining a uniform bath temperature of $\pm 1^\circ\text{C}$. A 750-W electric hot plate is satisfactory.

6.4 *Aerator Tube*, a 25.4-mm diameter spherical gas-diffuser stone³ made of fused crystalline alumina grain that meets the following specifications when tested in accordance with the method given in Annex A1:

Maximum pore diameter, μm	Not greater than 80
Permeability at a pressure of 2.45 kPa, mL of air/min	3000 to 6400

6.5 *Temperature Measuring Instrument (Environmentally Safe Thermometer or Thermocouple)*—An ASTM Partial Immersion Temperature Measuring Instrument having a range from 20 to 150°C (0 to 302°F) and conforming to the

³ For information on aerator supplier and specifications, contact ASTM Subcommittee D15.06 through ASTM International Headquarters.

requirements for Thermometer 1C (1F), as prescribed in Specification E1 or Thermocouple as summarized in Specification E230.

6.6 *Air Supply*, a clean and dry source, free from grease and other contaminants, capable of maintaining the prescribed flow rate through the diffuser stone.

6.7 *Timer*, a stop watch or suitable timing device accurate to ± 0.2 s.

6.8 *Vent*, a three-way stopcock inserted in the metered air supply line immediately ahead of the aerator tube.

6.9 *Typical Assembly Setup*, A typical apparatus using a hot-plate heat source is shown in Fig. 1.

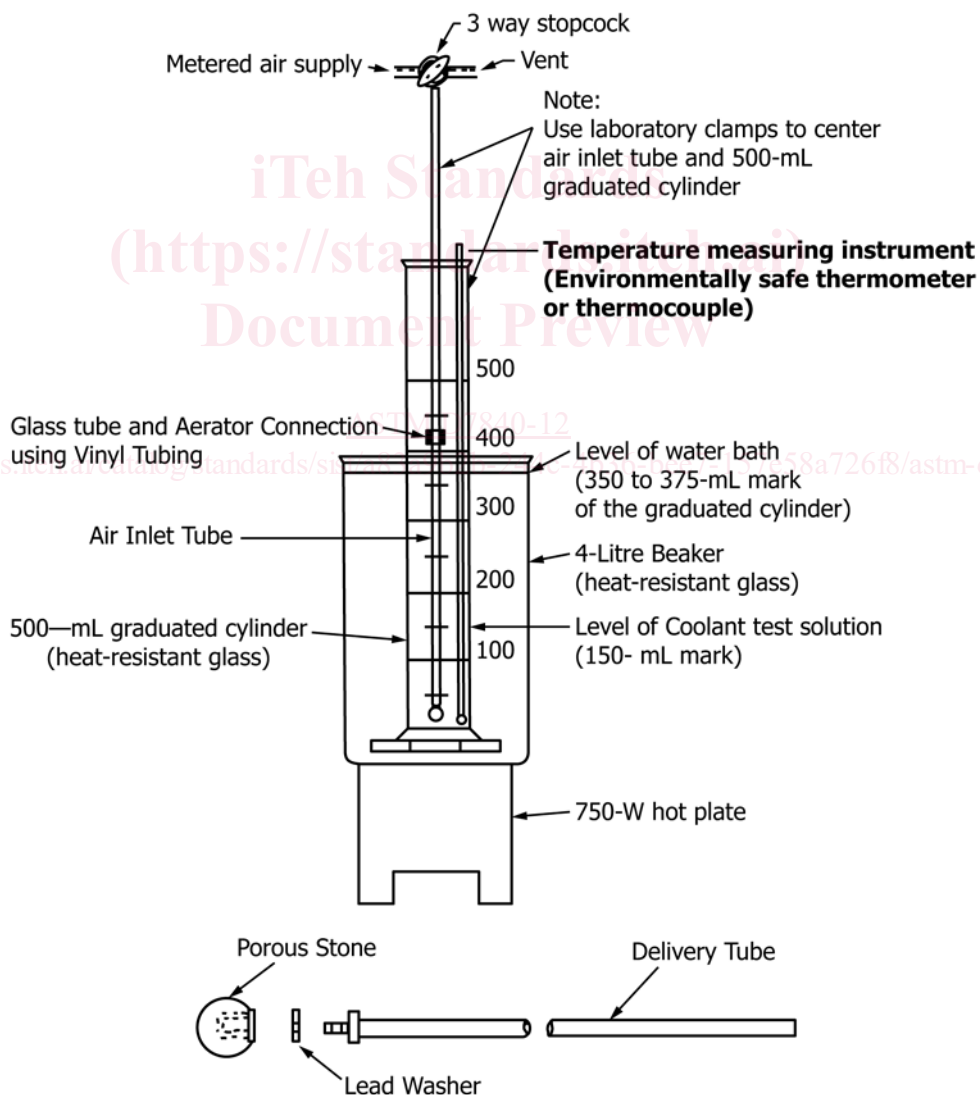
7. Reagents and Materials

7.1 *Purity of Water*—Unless otherwise indicated, references to water means reagent water as defined by Type II of Specification D1193.

7.2 *Acetone*, for flushing and drying the test equipment. (**Warning**—Acetone is extremely flammable.)

7.3 *Cleaning Bath*—Refers to an acid or base cleaning solution used to clean glassware between tests. The choice of cleaning baths depends on individual needs. For example, Nochromix® and alcoholic sodium (potassium) hydroxide are common acid and base cleaning baths, respectively.⁴ (**Warning**—The cleaning baths are strong oxidants and strong acid and base, respectively. Avoid contact with skin, eyes, and clothing. Do not breathe vapor. Handle in a fume hood.)

⁴ Nochromix® is an inorganic oxidizer that contains no metallic ions. The white powder is dissolved in water and mixed with concentrated sulfuric acid, giving a solution that reportedly is more strongly oxidizing than chromic acid. The sole source of supply of Nochromix known to the committee at this time is Godax Laboratories Inc., PO box 422, Cabin John, MD 20818. If you are aware of alternative suppliers, please provide this information to ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee, which you may attend.



Attachment of Diffuser Stones to Air-Inlet Tubes
 FIG. 1 Schematic Drawing of Apparatus for Glassware Foam Test