



Designation: D1120 – 11

## Standard Test Method for Boiling Point of Engine Coolants<sup>1</sup>

This standard is issued under the fixed designation D1120; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

*This standard has been approved for use by agencies of the Department of Defense.*

### 1. Scope\*

1.1 This test method covers the determination of the equilibrium boiling point of engine coolants. The equilibrium boiling point indicates the temperature at which the sample will start to boil in a cooling system under equilibrium conditions at atmospheric pressure.

NOTE 1—Engine coolants may also be marketed in a ready-to-use form (prediluted). This test procedure is applicable to diluted solutions as well as to concentrates.

NOTE 2—The procedure for obtaining a representative test sample of a coolant solution that contains an antileak additive is found in Test Method D1176.

1.2 The values stated in SI units are to be regarded as 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.*

### 2. Referenced Documents

- 2.1 *ASTM Standards:*<sup>2</sup>
- D1176 Practice for Sampling and Preparing Aqueous Solutions of Engine Coolants or Antirusts for Testing Purposes
  - E1 Specification for ASTM Liquid-in-Glass Thermometers
  - E230 Specification and Temperature-Electromotive Force (EMF) Tables for Standardized Thermocouples

### 3. Summary of Test Method

3.1 Sixty millilitres (two ounces) of the sample are boiled under equilibrium conditions at atmospheric pressure in a 100-mL flask. The temperature of the liquid corrected for barometric pressure is the boiling point.

<sup>1</sup> This test method is under the jurisdiction of ASTM Committee D15 on Engine Coolants and is the direct responsibility of Subcommittee D15.03 on Physical Properties.

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<sup>2</sup> 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. Apparatus (see Fig. 1)

4.1 *Flask*—A 100-mL round-bottom, short-neck, heat-resistant glass flask having a neck with a  $19/38$  standard-taper, female ground-glass joint and a 10-mm (0.4-in) outside diameter side-entering tube, so located as to permit the end of the thermometer bulb to be directly centered in the flask 6.5 mm (0.26 in.) from the bottom.<sup>3</sup> The flask is shown in Fig. 2.

4.2 *Condenser*—The condenser shall be of the water-cooled, reflux, glass-tube type, having a condenser jacket 200 mm (7.9 in.) in length. The bottom end of the condenser shall have a  $19/38$  standard-taper, drip-tip, male ground-glass joint.

4.3 *Boiling Stones*—Three or four silicon carbide grains,<sup>4</sup> grit No. 8 or other suitable inert chips, shall be used for each determination. For samples exhibiting heavy foam, more boiling chips may be added.

4.4 *Temperature Measuring Instrument (Environmentally Safe Thermometer or Thermocouple)*—An ASTM Partial Immersion Thermometer, having a range from – 5 to 300°C (20 to 580°F) and conforming to the requirements for Thermometer 2C or 2F, as prescribed in Specification E1, or some other suitable non-mercury containing temperature measuring device, such as a thermocouple, capable of operating in the same temperature range and having equal or better accuracy as summarized in Specification E230. See Section 10, Precision and Bias. The data presented in this paragraph is derived using mercury-in-glass thermometers only.

4.5 *Heat Source*—A suitable electric heating mantle shall be used, such that sufficient heat can be obtained to comply with the heating and refluxing rates specified in Section 7.

### 5. Sample

5.1 To obtain a sample of unused concentrated coolant for boiling point determination, the following procedure is suggested:

5.1.1 Allow material as received in the original container to come to room temperature 20°C (68°F) but not below 20°C minimum).

<sup>3</sup> The short-neckflask shown in Fig. 2 can be purchased from S.G. & P. Inc., PO Box 2518, Freeport, TX 77541, Tel: (409) 233-7491, or Ace Glass Inc., 1430 Northwest Blvd., Vineland, NJ 08360, Tel: (800) 223-4524.

<sup>4</sup> Silicon carbide grains, grit No. 8, may be obtained from Electro Minerals Co. (US) Inc. P.O. Box 423 Niagara Falls, NY 14302. Product No: 1242-0008-3-8RA.

\*A Summary of Changes section appears at the end of this standard.