



Designation: D 1122 – 97a

Standard Test Method for Density or Relative Density of Engine Coolant Concentrates and Engine Coolants By The Hydrometer¹

This standard is issued under the fixed designation D 1122; 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.

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 relative density of engine coolant concentrates and engine coolants.

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:*

D 1176 Test Method for Sampling and Preparing Aqueous Solutions of Engine Coolants or Antirusts for Testing Purposes²

E 1 Specification for ASTM Thermometers³

E 100 Specification for ASTM Hydrometers³

3. Terminology

3.1 *Definition:*

3.1.1 *relative density, n*—the ratio of the density of a material at a stated temperature to the density of water at the same stated temperature.

4. Significance and Use

4.1 The relative density of an engine coolant may be used to determine the approximate percent glycol, freezing point, and boiling point, provided the glycol type is known.

4.2 The relative density of an engine coolant concentrate can be used as a production control test.

5. Apparatus

5.1 *Hydrometers*— Hydrometers shall be of glass, gradu-

ated in specific gravity range as listed in Table 1, and shall conform to Specification E 100.

5.2 *Hydrometer Cylinder*—The hydrometer cylinder in which the sample for the relative density test is confined shall be made of clear glass and shall be cylindrical in shape. For convenience in pouring, it may have a lip on the rim. The inside diameter of the cylinder shall be at least 25.4 mm (1.0 in.) greater than the outside diameter of the hydrometer. The height of the cylinder shall be such that the length of the column of sample it contains is greater by at least 25.4 mm (1.0 in.) than the portion of the hydrometer which is immersed beneath the surface of the sample after a state of equilibrium has been reached.

5.3 *Thermometer*— An ASTM Gravity Thermometer 12C, having a range from -20 to $+120^{\circ}\text{C}$ (or 12F having a range from -5 to $+215^{\circ}\text{F}$) and conforming to Specification E 1.

5.4 *Water Bath*—A water bath capable of maintaining a sample temperature of $15.5 \pm 0.3^{\circ}\text{C}$ ($60 \pm 0.5^{\circ}\text{F}$) during the test.

6. Sampling

6.1 Sample the coolant in accordance with Test Method D 1176, except as specified in this test method.

7. Procedure

7.1 If the coolant has a small amount of separated upper layer, remove it before determining the relative density of the lower layer. To separate, pour the sample into a 500-mL separatory funnel, allow to stand for 3 h at room temperature but not below 20°C (68°F), and then draw off the lower layer.

7.2 If the original coolant is homogeneous, no separation will be required.

7.3 Cool the homogeneous sample or the separated lower layer sample to about 14°C (57°F). Pour the sample into the clean, dry hydrometer cylinder without splashing, so as to reduce to a minimum the formation of air bubbles (see Note 1). Place the cylinder vertically in the water bath and let the temperature of the sample reach $15.0 \pm 0.3^{\circ}\text{C}$ ($59 \pm 0.5^{\circ}\text{F}$). Slowly and carefully lower the hydrometer into the sample to a level two smallest scale divisions below that at which it will float and then release the hydrometer. When the hydrometer has come to rest and floats freely away from the walls of the

¹ This test method is under the jurisdiction of ASTM Committee D-15 on Engine Coolants and is the direct responsibility of Subcommittee D15.03 on Physical Properties.

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

³ *Annual Book of ASTM Standards*, Vol 14.03.