



Standard Test Method for Engine Coolants by Engine Dynamometer¹

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1. Scope

1.1 This test method covers a full-scale clean engine test designed to evaluate corrosion protection and inhibitor stability of engine coolants under simulated heavy-duty driving conditions.

1.2 The values stated in SI units are to be regarded as the 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.* Specific hazards statements are given in Section 6.

2. Referenced Documents

2.1 ASTM Standards:

D 1121 Test Method for Reserve Alkalinity of Engine Coolants and Antirusts²

D 1287 Test Method for pH of Engine Coolants and Antirusts²

D 1384 Test Method for Corrosion Test for Engine Coolants in Glassware²

G 1 Practice for Preparing, Cleaning, and Evaluating Corrosion Test Specimens³

2.2 Federal Standard:⁴

CFR Title 29 OSHA Regulations

3. Summary of Test Method

3.1 This test method involves the operation of a standard passenger car engine on a dynamometer stand under constant speed, load, and coolant temperature conditions for a total of 700 h. The performance of the coolant is judged by examination of (1) coolant samples, (2) metal corrosion specimens, and (3) cooling system components.

4. Significance and Use

4.1 This test method provides a laboratory technique capable of reproducing the complex environmental stresses a coolant encounters under actual engine operating conditions. The test method provides improved discrimination over glassware and simulated service tests and improved correlation with field service. Although the test method is particularly valuable for developing coolants for increased service requirements, it remains that field testing is necessary to evaluate coolant performance completely.

5. Apparatus

5.1 *Test Engine*— The test engine shall be a volume production passenger car engine of cast iron or aluminum construction. Engine speed and brake horsepower should be calculated and adjusted to be equivalent to a 96.5 km/h (60 mph) level road load. Aluminum accessories, such as coolant pump and timing chain cover, are optional. The engine shall be equipped with a matching radiator and pressure cap. A coolant overflow reservoir and closed-system pressure cap are optional, except when specified by the manufacturer. Assemble the test components to provide a complete cooling system. The relative positioning of the radiator and engine should duplicate, as closely as practicable, the mounting in the automobile with the fan omitted. All radiator hose lengths should be held to a minimum. The radiator shall be cooled by forced air.

5.2 *Instrumentation and Control* (See Fig. 1)—Run the engine on a test stand coupled to an engine dynamometer with appropriate accessories for control of the designated operating conditions. Measure engine coolant temperature out of the engine at a point immediately adjacent to the coolant outlet. Measure manifold vacuum, oil pressure, and exhaust pressure at appropriate points and monitor them throughout the test in order to ensure proper engine performance. Install a pressure gage in the outlet tank of a crossflow radiator or the top tank of a downflow radiator to read the gage pressure.

5.3 Corrosion Measurements:

5.3.1 Evaluate corrosion protection using metal specimens. The specimen arrangement shall be basically that used in Test Method D 1384. The specimen bundle is shown in Fig. 2. Preparation, cleaning, and weighing of the metal specimens are described in Test Method D 1384 and Practice G 1. Each specimen bundle shall be held in a canvas-reinforced phenolic

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

³ *Annual Book of ASTM Standards*, Vol 03.02.

⁴ Available from the Occupational Safety and Health Administration, 200 Constitution Ave., N.W., Washington, DC 20008.