



Designation: D8085 – 17

Standard Specification for Non-Aqueous Engine Coolant for Automobile and Light-Duty Service¹

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1. Scope

1.1 This specification covers the requirements for non-aqueous engine coolants used in automobiles or other light-duty service cooling systems. Non-aqueous coolants that conform to the specification will function effectively to provide protection against freezing, boiling, and corrosion without any further dilution. This specification is based upon the knowledge of the performance of non-aqueous engine coolants prepared from new individual or mixtures of virgin industrial grade diols.

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 and health practices and determine the applicability of regulatory limitations prior to use. See X1.4 for a specific warning statement.*

2. Referenced Documents

2.1 *ASTM Standards:*²

- D93 Test Methods for Flash Point by Pensky-Martens Closed Cup Tester
- D1119 Test Method for Percent Ash Content of Engine Coolants
- D1120 Test Method for Boiling Point of Engine Coolants
- D1121 Test Method for Reserve Alkalinity of Engine Coolants and Antirusts
- D1122 Test Method for Density or Relative Density of

Engine Coolant Concentrates and Engine Coolants By The Hydrometer

- D1123 Test Methods for Water in Engine Coolant Concentrate by the Karl Fischer Reagent Method
- D1287 Test Method for pH of Engine Coolants and Antirusts
- D1882 Test Method for Effect of Cooling System Chemical Solutions on Organic Finishes for Automotive Vehicles
- D2983 Test Method for Low-Temperature Viscosity of Lubricants Measured by Brookfield Viscometer
- D3634 Test Method for Trace Chloride Ion in Engine Coolants
- D4725 Terminology for Engine Coolants and Related Fluids
- D5827 Test Method for Analysis of Engine Coolant for Chloride and Other Anions by Ion Chromatography
- D5931 Test Method for Density and Relative Density of Engine Coolant Concentrates and Aqueous Engine Coolants by Digital Density Meter
- D7840 Test Method for Foaming Tendencies of Non-Aqueous Engine Coolants in Glassware
- D7896 Test Method for Thermal Conductivity, Thermal Diffusivity and Volumetric Heat Capacity of Engine Coolants and Related Fluids by Transient Hot Wire Liquid Thermal Conductivity Method
- D7934/D7934M Test Method for Corrosion of Cast Aluminum Alloys in Non-Aqueous Engine Coolants Under Heat-Rejecting Conditions
- D7935/D7935M Test Method for Corrosion Test for Non-Aqueous Engine Coolants in Glassware
- D8034/D8034M Test Method for Simulated Service Corrosion Testing of Non-Aqueous Engine Coolants
- E29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications

¹ This specification 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.

3. Terminology

3.1 Definitions:

3.1.1 *non-aqueous coolant, n*—a glycol, diol, triol, or mixtures thereof, based heat transfer fluid containing less than 1.0 % water when formulated and intended for final use without dilution with water.

3.2 For definitions of other terms used in this specification, refer to Terminology [D4725](#).

4. General Requirements

4.1 Engine coolant consisting of a glycol, diol, triol, or mixtures thereof, and suitable corrosion inhibitors, dye, foam suppressor, if needed, bitterant, and less than 1.0 % water.

4.2 The engine coolant shall be in accordance with the general requirements given in [Table 1](#).

TABLE 1 General Requirements

| Property | Specified Values | ASTM Test Method |
|---------------------|-------------------|---------------------|
| Color | Distinctive | ... |
| Effect on nonmetals | No adverse effect | Under consideration |

4.3 When installed in accordance with the vehicle manufacturer's recommendations and those on the product label, non-aqueous engine coolants shall be suitable for use in a properly maintained cooling system ([Appendix X1](#)) in normal light-duty service for a minimum of one year without adversely affecting fluid flow and heat transfer.

5. Detailed Requirements

5.1 All non-aqueous engine coolants shall be in accordance with the physical and chemical requirements prescribed in [Table 2](#).

5.2 All non-aqueous engine coolants shall conform to the performance requirements listed in [Table 3](#).

TABLE 2 Physical and Chemical Requirements for Non-Aqueous Coolants

NOTE 1—Except as indicated in the Property column, any dilutions are part of the ASTM Test Methods indicated.

| Property | Limits | ASTM Test Method |
|---|---------------------|---|
| Relative density, 15.5/15.5 °C: | 1.035 to 1.125 | D1122 , D5931 |
| Dynamic viscosity at -40 °C, ^A Pa·s: | 2.0 max | D2983 |
| Boiling point, °C: | 177 min | D1120 |
| Thermal Conductivity at 20 °C, W/m·K: | 0.24 min | D7896 |
| Flash point, closed cup, °C: | 115 min | D93 |
| Ash content, mass %: | 5 max | D1119 |
| pH, 50 vol % in DI water: | 7.5 to 11 | D1287 |
| Chloride, µg: | 25 max | D3634 , D5827^B |
| Water, mass %: | 1.0 max | D1123 |
| Reserve alkalinity, mL: | report ^C | D1121 |
| Effect on automotive finish (use clear coat thermoset urethane or acrylic urethane finish): | no effect | D1882^D |

^A For purposes of determining conformance with this specification, an observed value shall be rounded "to the nearest unit" in the last right-hand digit used in expressing the specification limit, in accordance with the rounding method of Practice [E29](#).

^B In case of dispute, Test Method [D3634](#) shall be the preferred test method.

^C Value as agreed upon between the supplier and the customer.

^D Currently, many vehicle manufacturers prepare test panels using the specific paint finishes employed on their actual products. Coolant suppliers and vehicle manufacturers should agree on the exact test procedures and acceptance criteria on an individual basis.

TABLE 3 Performance Requirements for Non-Aqueous Coolants^A

| Property | Specific Values | ASTM Test Method | Test Solution Concentration vol % product |
|--|-----------------|------------------------------|---|
| Corrosion in glassware | | D7935/D7935M | 94 |
| Weight loss, mg/specimen: | | | |
| copper | 10 max | | |
| solder | 30 max | | |
| brass | 10 max | | |
| steel | 10 max | | |
| cast iron | 10 max | | |
| aluminum | 30 max | | |
| Simulated service test | | D8034/D8034M | 94 |
| Weight loss, mg/specimen: | | | |
| copper | 20 max | | |
| solder | 60 max | | |
| brass | 20 max | | |
| steel | 20 max | | |
| cast iron | 20 max | | |
| aluminum | 60 max | | |
| Corrosion of cast aluminum alloys at heat-rejecting surfaces, mg/cm ² /week | 1.0 max | D7934/D7934M | 94 |
| Foaming | | D7840 | 100 |
| Volume, mL | 150 max | | |
| Break time, s | 5 max | | |

^A All non-aqueous engine coolant test solutions in [Table 3](#) shall be prepared in accordance with the directions provided in the individual ASTM test methods noted.