



Designation: D 2982 – 98

Standard Test Methods for Detecting Glycol-Base Antifreeze in Used Lubricating Oils¹

This standard is issued under the fixed designation D 2982; 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 These test methods describe the qualitative determination of glycol-base antifreeze in used lubricating oils (mineral base) by two procedures, one using reagents in tablet form and the other using laboratory shelf reagents. Principally the test methods detect ethylene glycol but will also detect other 1,2-glycols that may be present.

1.1.1 When a positive result is obtained and a sample of the unused oil is available, the unused oil is also tested and used as a reference.

NOTE 1—Since the inception of this test method (1971), there have been many changes in base stock technology and additive technology. Therefore, when available, the new, unused oil, or a sample of the same used oil, known to not contain antifreeze, is tested as a reference.

1.2 The tablet procedure (Procedure A) is sensitive to about 100 mg/kg and the shelf reagent procedure (Procedure B) to about 300 mg/kg of ethylene glycol.

1.3 Carbohydrates such as sugars and sugar-containing substances are sometimes used for sabotage purposes. If the presence of these substances is suspected, Procedure A contains a modification to remove these interferences.

1.4 Both procedures are adaptable to field kit use, and brief descriptions for converting to field kit form are given in Annex A1.

1.4.1 Commercial field testing kits are available.²

1.5 The results obtained by this method are qualitative expressions. However, for the preparation of reagents and in the procedures, acceptable SI units are to be regarded as the standard.

1.6 *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:

¹ These test methods are under the jurisdiction of ASTM Committee D-2 on Petroleum Products and Lubricants and are the direct responsibility of Subcommittee D02.06 on Analysis of Lubricants.

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² The Gly-Tek Test Kit is available from the Nelco Co., 1047 McKnight Rd., S., St. Paul, MN 55119, and in Canada, it is available from Metro Tech Preventative Maintenance Ltd., 112-5621, 11th St., N.E., Calgary, AB, Canada T2E 6Z7. Test instructions are provided with the kit.

D 95 Test Method for Water in Petroleum Products and Bituminous Materials by Distillation³

D 1193 Specification for Reagent Water⁴

D 4057 Practice for Manual Sampling of Petroleum and Petroleum Products⁵

D 4175 Terminology Relating to Petroleum, Petroleum Products, and Lubricants⁵

D 4177 Practice for Automatic Sampling of Petroleum⁵

3. Terminology

3.1 Definitions:

3.1.1 *glycol-base antifreeze, n*— in engine coolants, ethylene or propylene glycol commonly used in admixture with water and additives to lower the coolant freezing point.

3.1.2 *used oil, n*—any oil that has been in a piece of equipment (for example, an engine, gear box, transformer, or turbine) whether operated or not.

3.1.2.1 *Discussion*—In the development of this test method, the used oil is a mineral lubricating oil from an engine crankcase.

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4. Summary of Test Methods

4.1 The ethylene glycol is extracted from the sample with an acid solution and oxidized to formaldehyde with periodic acid which is detected colorimetrically with decolorized fuchsin.

5. Significance and Use

5.1 Leakage of glycol-base antifreeze into the crankcase is serious because the coolant tends to interfere with the lubricant and its ability to lubricate; it also promotes sludging. Ethylene glycol present in the coolant can increase varnish deposit formation in the crankcase as a result of glycol oxidation and the interaction between glycol and lubricant. Furthermore, because glycol is a higher boiling material than water, it will tend to stay longer in the crankcase oil than water. Lubricant displacement, sludging, and deposit formation all lead to engine malfunction and possible seizure.

5.2 These tests are designed to detect glycol-base coolant contamination even at low levels because early detection enables corrective measures to be taken to prevent leaking coolant from accumulating and seriously damaging the engine.

5.3 These test methods are also significant because the

³ *Annual Book of ASTM Standards*, Vol 05.01.

⁴ *Annual Book of ASTM Standards*, Vol 11.01.

⁵ *Annual Book of ASTM Standards*, Vol 05.02.