



Designation: D 1934 – 95 (Reapproved 2000)

## Standard Test Method for Oxidative Aging of Electrical Insulating Petroleum Oils by Open-Beaker Method<sup>1</sup>

This standard is issued under the fixed designation D 1934; 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.

### 1. Scope

1.1 This test method describes two procedures for subjecting electrical insulating oils to oxidative aging:

- 1.1.1 *Procedure A*, without a metal catalyst, and
- 1.1.2 *Procedure B*, with a metal catalyst.

1.2 This test method is applicable to oils used as impregnating or pressure media in electrical power transmission cables if less than 10 % of the oil evaporates during the aging procedures. It applies and is generally useful primarily in the evaluation and quality control of unused oils, either inhibited or uninhibited.

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 664 Test Method for Acid Number of Petroleum Products by Potentiometric Titration<sup>2</sup>
- D 923 Test Method for Sampling Electrical Insulating Liquids<sup>3</sup>
- D 924 Test Method for Dissipation Factor (or Power Factor) and Relative Permittivity (Dielectric Constant) of Electrical Insulating Liquids<sup>3</sup>
- D 1169 Test Method for Specific Resistance (Resistivity) of Electrical Insulating Liquids<sup>3</sup>
- E 145 Specification for Gravity-Convection and Forced-Ventilation Ovens<sup>4</sup>
- E 177 Practice for Use of the Terms Precision and Bias in ASTM Test Methods<sup>4</sup>

<sup>1</sup> This test method is under the jurisdiction of ASTM Committee D-27 on Electrical Insulating Liquids and Gases and is the direct responsibility of Subcommittee D27.06 on Chemical Test.

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<sup>2</sup> *Annual Book of ASTM Standards*, Vol 05.01.

<sup>3</sup> *Annual Book of ASTM Standards*, Vol 10.03.

<sup>4</sup> *Annual Book of ASTM Standards*, Vol 14.02.

### 3. Terminology

#### 3.1 Definitions of Terms Specific to This Standard:

3.1.1 *metal catalyst*—any metal (for example, copper) that either increases the rate of oxidation of the oil or reacts with the oxidation products to increase oil dielectric loss.

3.1.2 *oxidative aging*—exposure of oil to oxygen under certain specified conditions.

### 4. Summary of Test Method

4.1 A 300 mL volume of oil, contained in 400 mL beaker is aged for 96 h in a circulating-air oven controlled at 115°C, either with or without the presence of catalyst.

### 5. Significance and Use

5.1 Open-beaker oxidative aging methods have been used for many years in laboratories of oil companies, electrical equipment manufacturers, and electric utility companies interested in the stability of electrical insulating oils under oxidative conditions. They are particularly useful as a check on the continuity of production and shipment of insulating oils. They are also useful as process and product checks for applicable type oils.

5.2 Specification limits for oils subjected to open-beaker oxidative aging by this method are established by agreement between individual producers and consumers of applicable type oils. These properties of the oil involved in specification limits for aging stability may be measured after the oxidative aging (and sometimes before aging) by appropriate test methods such as Test Method D 924, Test Method D 1169, and Test Method D 664.

### 6. Apparatus

6.1 *Oven*, electrically heated, thermostatically controlled, capable of maintaining a constant temperature of  $115 \pm 1^\circ\text{C}$  ( $239 \pm 2^\circ\text{F}$ ). Use an oven with a testing chamber large enough to test the anticipated number of test specimens at one time. A uniformity of temperature within  $\pm 1\%$  of the differential between oven and ambient temperatures is required. (See Note 1.) Circulate air in the chamber with a low velocity fan during the aging period. The volume and condition of the circulated air is not considered to be critical. It is recommended that the