



Designation: D4059 – 00 (Reapproved 2018)

Standard Test Method for Analysis of Polychlorinated Biphenyls in Insulating Liquids by Gas Chromatography¹

This standard is issued under the fixed designation D4059; 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 This test method describes a quantitative determination of the concentration of polychlorinated biphenyls (PCBs) in electrical insulating liquids by gas chromatography. It also applies to the determination of PCB present in mixtures known as askarels, used as electrical insulating liquids.

1.2 The PCB mixtures known as Aroclors² were used in the formulation of the PCB-containing askarels manufactured in the United States. This test method may be applied to the determination of PCBs in insulating liquids contaminated by either individual Aroclors or mixtures of Aroclors. This technique may not be applicable to the determination of PCBs from other sources of contamination.

1.3 The precision and bias of this test method have been established only for PCB concentrations in electrical insulating mineral oils and silicones. The use of this test method has not been demonstrated for all insulating fluids. Some insulating liquids, such as halogenated hydrocarbons, interfere with the detection of PCBs and cannot be tested without pretreatment.

1.4 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.5 *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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.6 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

¹ This test method is under the jurisdiction of Committee D27 on Electrical Insulating Liquids and Gases and is the direct responsibility of Subcommittee D27.03 on Analytical Tests.

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² Registered trademark of Monsanto Co.

2. Referenced Documents

2.1 ASTM Standards:³

D923 Practices for Sampling Electrical Insulating Liquids

3. Symbols

3.1 The following symbols are used in this test method:

C	—concentration of PCB (ppm by weight) in the insulating test specimen.
C_i	—concentration of PCB (ppm by weight) found for the peak, i , in the chromatogram of the insulating liquid test specimen.
d	—density of the test specimen at 25°C, g/mL.
f_i	—relative content of the PCB species associated with each individual peak, i , in the chromatogram of the standard Aroclor solution, %.
M	—total amount of PCB in the standard test specimen injected into the chromatograph, g.
M_i	—amount of PCB represented by peak, i , in the chromatogram of the standard Aroclor test specimen, g.
R_i^s	—response of the detector to PCB components with relative retention time, i , in the chromatograms of the standard, s , solutions, response may be expressed as peak height, peak area, or integrator counts.
R_i^x	—response of the detector to PCB components with relative retention time, i , in the chromatogram of an unknown test specimen, may be expressed as peak height, peak area, or integrator counts.
R_p^s	—response of the detector to PCB components in the largest or most clearly separated peaks, p , in chromatograms of standard solutions; may be expressed as peak height, peak area, or integrator counts.
R_p^x	—response of the detector to PCB components in the largest or most clearly separated peaks, p , in the chromatogram of an unknown test specimen contaminated by a single Aroclor; may be expressed in peak height, peak area, or integrator counts.
v^s	—volume of the standard test specimen injected into the chromatograph, μL .
v^x	—volume of the unknown test specimen injected into the chromatograph, μL .
V	—original volume of the test specimen to be analyzed, μL .
V^s	—total volume of the diluted standard, mL.
V^x	—total volume of the test specimen to be analyzed, μL .
W^x	—weight of the test specimen to be analyzed, g.
W^s	—weight of the initial standard Aroclor test specimen, g.

4. Summary of Test Method

4.1 The test specimen is diluted with a suitable solvent. The resulting solution is treated by a procedure to remove interfering substances after which a small portion of the resulting solution is injected into a gas chromatographic column. The components are separated as they pass through the column with

³ 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.