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.

Designation: D3606 – 24

Standard Test Method for Determination of Benzene and Toluene in Spark Ignition Fuels by Gas Chromatography[1]

This standard is issued under the fixed designation D3606; 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 covers the quantitation in liquid volume percent of benzene and toluene in finished motor and aviation spark ignition fuels by gas chromatography. This test method has two procedures: Procedure A uses capillary column gas chromatography and Procedure B uses packed column gas chromatography. Procedures A and B have separate precisions.

1.2 The method has been evaluated for benzene using a D6300-compliant Interlaboratory Study (ILS), with the lowest and highest ILS sample concentration means as follows: (*1*) Procedure A between 0.12 % and 5.2 % by volume and (*2*) Procedure B between 0.10 % and 5.0 % by volume.

1.3 The method has been evaluated for toluene using a D6300-compliant Interlaboratory Study (ILS), with the lowest and highest ILS sample concentration means as follows: (*1*) Procedure A between 0.4 % and 19.7 % by volume, and (*2*) Procedure B between 2.0 % and 20.0 % by volume.

1.4 For reporting, the lowest and highest concentration ranges for benzene and toluene for Procedure A of this test method per Practice D6300 see 13.2.

1.5 For reporting, the lowest and highest concentration ranges for benzene and toluene for Procedure B of this test method per Practice D6300 see 25.2.

1.6 For benzene by Procedure A, the following oxygenated fuels are included in the working range: (*1*) ethanol up to 20 % by volume (E20); (*2*) methanol up to 10 % by volume (M10). Fuels M85 and E85 were excluded.

1.7 For benzene by Procedure B the following oxygenated fuels are included in the working range: (*1*) ethanol up to 20 % by volume (E20); (*2*) methanol up to 10 % by volume (M10). Fuels M85 and E85 were excluded.

1.8 For toluene by Procedure A the following oxygenated fuels were included in the working range: (*1*) ethanol up to 20 % by volume (E20); (*2*) M85 and E85.

1.9 For toluene by Procedure B the following oxygenated fuels are included in the working range: (*1*) ethanol up to 20 % by volume (E20); (*2*) M85 and E85.

1.10 Procedure A uses MIBK as the internal standard. Procedure B uses *sec*-butanol as the internal standard. The use of Procedure B for fuels containing blended butanols requires that *sec*-butanol be below the detection limit in the fuels as *sec*-butanol is an internal standard. For Procedure B, an alternative separation column set described in the annex (A2.3, Annex Approach B) uses MEK as the internal standard when butanols may be blended into gasolines.

1.11 This test method includes a between method bias section for benzene based on Practice D6708 bias assessment between Test Method D3606 Procedure B and Test Method D5769. It is intended to allow Test Method D3606 Procedure B to be used as a possible alternative to Test Method D5769. The Practice D6708 derived benzene correlation equation is applicable for benzene measurements in the reportable range from 0.06 % to 2.76 % by volume as reported by Test Method D3606 Procedure B (see 27.2.1). The correlation complies with EPA's Performance Based Measurement System (PBMS).

1.12 Correlation equations are included in the between test methods bias section 14.2.1 of Procedure A to convert Procedure A to the Procedure B volume percent values for benzene and toluene. The correlations are applicable in the concentration ranges of 0.07 % to 5.96 % by volume for benzene and 0.36 % to 20.64 % by volume for toluene as reported by Procedure A.

1.13 The values stated in SI units are to be regarded as standard. The values given in parentheses are for information only.

1.14 *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.*

1.15 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the*

[1] This test method is under the jurisdiction of ASTM Committee D02 on Petroleum Products, Liquid Fuels, and Lubricants and is the direct responsibility of Subcommittee D02.04.0L on Gas Chromatography Methods.

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*A Summary of Changes section appears at the end of this standard

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