



Designation: D8396 – 22

Standard Test Method for Group Types Quantification of Hydrocarbons in Hydrocarbon Liquids with a Boiling Point between 36 °C and 343 °C by Flow Modulated GCxGC – FID¹

This standard is issued under the fixed designation D8396; 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 quantitative determination of total n-paraffins, total i-paraffins, total naphthenes (cycloparaffins), total one ring (1R) and total two ring plus (2R+) aromatic hydrocarbons in hydrocarbon liquids having a boiling point between 36 °C and 343 °C by GCxGC (flow modulated comprehensive two-dimensional gas chromatography). The method has been applied to aviation turbine fuels and is applicable to other low olefinic fuels in the stated boiling point range.

1.2 This test method has an interim precision. An expanded full interlaboratory study is to be completed in <5 years. The test method working concentration ranges in mass percent for which the interim precision has been determined are as follows:

Hydrocarbon Type	Lower limit (mass percent)	Upper limit (mass percent)
Total i-paraffins	22.0	24.3
Total n-paraffins	19.0	21.9
Total naphthenes (cycloparaffins)	34.3	36.7
Total one ring aromatics	18.7	21.8
Total two ring plus aromatics	0.5	1.9

1.3 This test method is applicable to other group type concentration ranges, to other hydrocarbon types such as selected individual components, for example, benzene, toluene, or n-paraffins by carbon number, or to other hydrocarbon streams; however, precision has not been determined at this time. A future ILS will include a variety of sample types and extend the reporting.

1.4 This test method is not intended to determine unsaturated hydrocarbons, such as olefins, content which may interfere with the cycloparaffins; this test method is applicable to samples with < 1% by mass total olefins as determined by [D1319](#).

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 [D02.04.01](#) on Gas Chromatography Methods.

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1.5 This test method is not intended to determine FAME (fatty acid methyl esters). For such applications, Test Method [D7797](#), IP 585, or equivalent test methods are available.

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

1.7 This standard test method does not mandate or describe a specific software package for data processing and display. Any commercially available GCxGC software used for data processing and display shall meet the requirements for the calculation of the results. [Appendix X1](#) provides some guidelines.

1.8 *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.*

1.9 *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.*

2. Referenced Documents

2.1 ASTM Standards:

- [D1319](#) Test Method for Hydrocarbon Types in Liquid Petroleum Products by Fluorescent Indicator Adsorption
- [D4175](#) Terminology Relating to Petroleum Products, Liquid Fuels, and Lubricants
- [D4307](#) Practice for Preparation of Liquid Blends for Use as Analytical Standards
- [D6299](#) Practice for Applying Statistical Quality Assurance and Control Charting Techniques to Evaluate Analytical Measurement System Performance
- [D6300](#) Practice for Determination of Precision and Bias Data for Use in Test Methods for Petroleum Products, Liquid Fuels, and Lubricants
- [D6730](#) Test Method for Determination of Individual Components in Spark Ignition Engine Fuels by 100-Metre