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: D8221 – 18a$^{\varepsilon 1}$

Standard Practice for Determining the Calculated Methane Number (MN_C) of Gaseous Fuels Used in Internal Combustion Engines[1]

This standard is issued under the fixed designation D8221; 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.

ε[1] NOTE—The Excel filenames in 2.4, A1.1.1, and A1.1.4.5 were updated editorially in August 2019.

1. Scope

1.1 This practice covers the method to determine the calculated methane number (MN_C) of a gaseous fuel used in internal combustion engines. The basis for the method is a dynamic link library (DLL) suitable for running on computers with Microsoft Windows operating systems.

1.2 This practice pertains to commercially available natural gas products that have been processed and are suitable for use in internal combustion engines. These fuels can be from traditional geological or renewable sources and include pipeline gas, compressed natural gas (CNG), liquefied natural gas (LNG), liquefied petroleum gas (LPG), and renewable natural gas (RNG) as defined in Section 3.

1.3 The calculation method within this practice is based on the MWM Method as defined in EN 16726, Annex A.[2] The calculation method is an optimization algorithm that uses varying sequences of ternary and binary gas component tables generated from the composition of a gaseous fuel sample.[3] Both the source code and a Microsoft Excel-based calculator are available for this method.

1.4 This calculation method applies to gaseous fuels comprising of hydrocarbons from methane to hexane and greater (C6+); carbon monoxide; hydrogen; hydrogen sulfide; nitrogen; and carbon dioxide. The calculation method addresses pentanes (C5) and higher hydrocarbons and limits the individual volume fraction of C5 and C6+ to 3 % each and a combined total of 5 %. (See EN 16726, Annex A.) The calculation method is performed on a dry, oxygen-free basis.

1.5 *Units*—The values stated in SI units are to be regarded as standard. Other units of measurement included in this standard are provided for information only and are not considered 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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.7 *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:*[4]

E29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications

2.2 *CEN Standard:*[5]

EN 16726 Gas infrastructure—Quality of gas—Group H, Annex A—Calculation of methane number of gaseous fuels for engines

2.3 *ISO Standard:*[6]

ISO 14912 Gas analysis—Conversion of gas mixture composition data

[1] This practice is under the jurisdiction of ASTM Committee D03 on Gaseous Fuels and is the direct responsibility of Subcommittee D03.03 on Determination of Heating Value and Relative Density of Gaseous Fuels.

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[2] European Standards (ENs) are documents that have been ratified by one of the three European Standardization Organizations (ESOs), CEN, CENELEC or ETSI; recognized as competent in the area of voluntary technical standardization as for the EU Regulation 1025/2012. EN16726 was developed by the Technical Committee CEN/TC 234.

[3] Leiker, M., Christoph, K., Rankl, M., Cartellieri, W., and Pfeifer, U., "Evaluation of Antiknocking Property of Gaseous Fuels by Means of Methane Number and its Practical Application to Gas Engines," ASME, 72-DGP-4, 1972.

[4] 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.

[5] Available from European Committee for Standardization (CEN), Avenue Marnix 17, B-1000, Brussels, Belgium, http://www.cen.eu.

[6] Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, http://www.ansi.org.

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