



Designation: **D2699 – 21** **D2699 – 22**

Standard Test Method for Research Octane Number of Spark-Ignition Engine Fuel¹

This standard is issued under the fixed designation D2699; 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 approval. A superscript symbol (1) indicates an editorial change since the last revision or approval.

This standard has been approved for use by agencies of the U.S. Department of Defense.

1. Scope²

1.1 This laboratory test method covers the quantitative determination of the knock rating of liquid spark-ignition engine fuel in terms of Research O.N., including fuels that contain up to 25 % v/v of ethanol. However, this test method may not be applicable to fuel and fuel components that are primarily oxygenates.³ The sample fuel is tested using a standardized single cylinder, four-stroke cycle, variable compression ratio, carbureted, CFR engine run in accordance with a defined set of operating conditions. The O.N. scale is defined by the volumetric composition of PRF blends. The sample fuel knock intensity is compared to that of one or more PRF blends. The O.N. of the PRF blend that matches the K.I. of the sample fuel establishes the Research O.N.

1.2 The O.N. scale covers the range from 0 to 120 octane number but this test method has a working range from 40 to 120 Research O.N. Typical commercial fuels produced for spark-ignition engines rate in the 88 to 101 Research O.N. range. Testing of gasoline blend stocks or other process stream materials can produce ratings at various levels throughout the Research O.N. range.

1.3 The values of operating conditions are stated in SI units and are considered standard. The values in parentheses are the historical inch-pound units. The standardized CFR engine measurements continue to be in inch-pound units only because of the extensive and expensive tooling that has been created for this equipment.

1.4 For purposes of determining conformance with all specified limits in this standard, an observed value or a calculated value shall be rounded "to the nearest unit" in the last right-hand digit used in expressing the specified limit, in accordance with the rounding method of Practice E29.

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.* For specific warning statements, see Section 8, 14.4.1, 15.5.1, 16.6.1, Annex A1, A2.2.3.1, A2.2.3.3 (6) and (9), A2.3.5, X3.3.7, X4.2.3.1, X4.3.4.1, X4.3.9.3, X4.3.11.4, and X4.5.1.8.

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 ASTM Committee D02 on Petroleum Products, Liquid Fuels, and Lubricants and is the direct responsibility of Subcommittee D02.01 on Combustion Characteristics.

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² Motor O.N., determined using Test Method D0708, is a component method to provide a similar but typically lower octane rating under more severe operating conditions.

³ A Summary of Changes section appears at the end of this standard.

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Table of Contents Astm D2699

1. Understanding the eBook Astm D2699
 - The Rise of Digital Reading Astm D2699
 - Advantages of eBooks Over Traditional Books
2. Identifying Astm D2699
 - Exploring Different Genres
 - Considering Fiction vs. Non-Fiction
 - Determining Your Reading Goals
3. Choosing the Right eBook Platform
 - Popular eBook Platforms
 - Features to Look for in an Astm D2699
 - User-Friendly Interface
4. Exploring eBook Recommendations from Astm D2699
 - Personalized Recommendations
 - Astm D2699 User Reviews and Ratings
 - Astm D2699 and Bestseller Lists
5. Accessing Astm D2699 Free and Paid eBooks
 - Astm D2699 Public Domain eBooks
 - Astm D2699 eBook Subscription Services

-
- Astm D2699 Budget-Friendly Options
6. Navigating Astm D2699 eBook Formats
 - ePub, PDF, MOBI, and More
 - Astm D2699 Compatibility with Devices
 - Astm D2699 Enhanced eBook Features
 7. Enhancing Your Reading Experience
 - Adjustable Fonts and Text Sizes of Astm D2699
 - Highlighting and Note-Taking Astm D2699
 - Interactive Elements Astm D2699
 8. Staying Engaged with Astm D2699
 - Joining Online Reading Communities
 - Participating in Virtual Book Clubs
 - Following Authors and Publishers Astm D2699
 9. Balancing eBooks and Physical Books Astm D2699
 - Benefits of a Digital Library
 - Creating a Diverse Reading Collection Astm D2699
 10. Overcoming Reading Challenges
 - Dealing with Digital Eye Strain
 - Minimizing Distractions
 - Managing Screen Time
 11. Cultivating a Reading Routine Astm D2699
 - Setting Reading Goals Astm D2699
 - Carving Out Dedicated Reading Time
 12. Sourcing Reliable Information of Astm D2699
 - Fact-Checking eBook Content of Astm D2699
 - Distinguishing Credible Sources
 13. Promoting Lifelong Learning
 - Utilizing eBooks for Skill Development
 - Exploring Educational eBooks
 14. Embracing eBook Trends

- Integration of Multimedia Elements
- Interactive and Gamified eBooks

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