



Designation: D 2699 – 01a

An American National Standard



Designation: 237/87

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

This standard is issued under the fixed designation D 2699; the number immediately following the designation indicates the year of original adoption or, in the case of revisions, the year of last revision. A number in parentheses indicates the year of last approval. A superscript sign (a) indicates an editorial change since the last revision or approval.

1. Scope

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., except that this test method may not be applicable to fuel and fuel components that are primarily oxygenates.² 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 100 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 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 and health practices and determine the applicability of regulatory limitations prior to use. For specific hazard statements, see Sections 8, 13.4.1, 14.5.1, 15.6.1, Annex A1, A2.3.9, A2.4.8, A3.2.7.2(7), A4.2.3.1, A4.2.3.3(6) and (9).

¹ This test method is under the jurisdiction of ASTM Committee D02 on Petroleum Products and Lubricants and is the direct responsibility of Subcommittee D02-01 on Combustion Characteristics.

Current edition approved Sept. 18, 2001. Published October 2001. Originally published as D 2699 – 89. Last previous edition D 2699 – 81.

² Motor O.N., determined using Test Method D 2700, is a comparative method to provide a similar but typically lower octane rating under more severe operating conditions.

A4.3.5, X2.3.7, X3.2.3.1, X3.3.4.1, X3.3.9.3, X3.3.11.4, and X3.5.1.8.

2. Referenced Documents

2.1 ASTM Standards:

- D 1193 Specification for Reagent Water³
- D 1744 Test Method for Water in Liquid Petroleum Products by Karl Fischer Reagent⁴
- D 2268 Test Method for Analysis of High-Purity *n*-Heptane and Isooctane by Capillary Gas Chromatography⁵
- D 2360 Test Method for Trace Impurities in Monocyclic Aromatic Hydrocarbons by Gas Chromatography⁶
- D 2700 Test Method for Motor Octane Number of Spark-Ignition Engine Fuel⁷
- D 2885 Test Method for Research and Motor Method Octane Ratings Using On-Line Analyzers⁸
- D 3116 Test Method for Trace Amounts of Lead in Gasoline⁹
- D 3257 Test Method for Lead in Gasoline by Atomic Absorption Spectrometry¹⁰
- D 3703 Test Method for Peroxide Number of Aviation Turbine Fuels¹¹
- D 4057 Practice for Manual Sampling of Petroleum and Petroleum Products¹²
- D 4173 Terminology Relating to Petroleum, Petroleum Products, and Lubricants¹³
- D 4177 Practice for Automatic Sampling of Petroleum and Petroleum Products¹⁴
- D 4814 Specification for Automotive Spark-Ignition Engine Fuel¹⁵
- E 1 Specification for ASTM Thermometers¹⁶
- E 456 Terminology Relating to Quality and Statistics¹⁷

³ Annual Book of ASTM Standards, Vol. 11.00.

⁴ Annual Book of ASTM Standards, Vol. 05.01.

⁵ Annual Book of ASTM Standards, Vol. 05.04.

⁶ Annual Book of ASTM Standards, Vol. 05.05.

⁷ Deleted, see 1999 Annual Book of ASTM Standards, Vol. 05.02.

⁸ Annual Book of ASTM Standards, Vol. 05.02.

⁹ Annual Book of ASTM Standards, Vol. 14.00.

¹⁰ Annual Book of ASTM Standards, Vol. 14.00.

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A Loxley



Astm D 2699 Engine:

Flow and Combustion in Reciprocating Engines C. Arcoumanis, Take Kamimoto, 2009-06-29 Optimization of combustion processes in automotive engines is a key factor in reducing fuel consumption in conventional and advanced gasoline and diesel engines This volume investigates and describes flow and combustion processes in diesel and gasoline engines It consists of eight chapters written by world experts from industry government laboratories and academia Each of the chapters is self contained and therefore independent from the other in that it covers its central theme in depth although prior knowledge of the fundamentals remains a prerequisite The book bridges a serious gap between conventional textbooks and the significant technological breakthroughs presented in worldwide conferences during the last ten years on direct injection gasoline engines advanced diesels and homogeneous charge compression ignition engines As such it is an essential reference text for engineers involved in research and development in global automotive and consultancy companies research engineers involved in fundamental and applied research on various aspects of the flow mixture preparation and combustion in reciprocating engines The authors are eminent researchers from universities and industry Index of Specifications and Standards ,2005 *Department Of Defense Index of Specifications and Standards Alphabetical Listing Part I July 2005* , *Internal Combustion Engine Fundamentals 2E* John Heywood, 2018-05-01 Publisher s Note Products purchased from Third Party sellers are not guaranteed by the publisher for quality authenticity or access to any online entitlements included with the product The long awaited revision of the most respected resource on Internal Combustion Engines covering the basics through advanced operation of spark ignition and diesel engines Written by one of the most recognized and highly regarded names in internal combustion engines this trusted educational resource and professional reference covers the key physical and chemical processes that govern internal combustion engine operation and design Internal Combustion Engine Fundamentals Second Edition has been thoroughly revised to cover recent advances including performance enhancement efficiency improvements and emission reduction technologies Highly illustrated and cross referenced the book includes discussions of these engines environmental impacts and requirements You will get complete explanations of spark ignition and compression ignition diesel engine operating characteristics as well as of engine flow and combustion phenomena and fuel requirements Coverage includes Engine types and their operation Engine design and operating parameters Thermochemistry of fuel air mixtures Properties of working fluids Ideal models of engine cycles Gas exchange processes Mixture preparation in spark ignition engines Charge motion within the cylinder Combustion in spark ignition engines Combustion in compression ignition engines Pollutant formation and control Engine heat transfer Engine friction and lubrication Modeling real engine flow and combustion processes Engine operating characteristics **Annual Book of ASTM Standards** American Society for Testing and Materials, 1978 HCCI and CAI Engines for the Automotive Industry Hua Zhao, 2007-09-10 Homogeneous charge compression ignition HCCI controlled auto ignition CAI has emerged as one of

the most promising engine technologies with the potential to combine fuel efficiency and improved emissions performance offering reduced nitrous oxides and particulate matter alongside efficiency comparable with modern diesel engines Despite the considerable advantages its operational range is rather limited and controlling the combustion timing of ignition and rate of energy release is still an area of on going research Commercial applications are however close to reality HCCI a

Petroleum Fuels Manufacturing Handbook: including Specialty Products and Sustainable Manufacturing Techniques Surinder Parkash,2009-10-22 Petroleum fuel manufacturing is a highly global topic **Quality Measuring Instruments in On-line Process Analysis** D. J. Huskins,1982 **Encyclopedia of Renewable Energy** James G. Speight,2021-12-23 Dieses Buch aus der Feder eines hoch angesehenen Ingenieurs und Verfassers zahlreicher Veröffentlichungen im Energiesektor ist das umfassendste gr ndlichste und aktuellste Nachschlagewerk ber erneuerbare Energien Die weltweite Energiewirtschaft ist und war schon immer unbest ndig und manchmal widerspr chlich mit erratischen Ausschl gen nach oben und unten Dies war in der Vergangenheit vor allem darauf zur ckzuf hren dass der Gro teil unserer Energie aus fossilen Brennstoffen stammt die eine begrenzt verf gbare Energiequelle darstellen Es kommt immer wieder vor dass eine Technologie wie das Fracking einen entscheidenden Wandel herbeif hrt Aber tut sie das wirklich Z gern wir mit diesen vor bergelenden Preiskorrekturen nicht nur das Unvermeidliche hinaus Den einzigen wirklichen Wandel bringen die erneuerbaren Energien Schon seit Jahrzehnten werden erneuerbare Energiequellen ausfindig gemacht weiterentwickelt und untersucht Manchmal steht die Windenergie im Vordergrund manchmal die Solarenergie und in den letzten rund zehn Jahren hat das Interesse an Biorohstoffen und Biokraftstoffen stark zugenommen Au erdem gibt es noch die Dauerbrenner Technologien der Kernenergie und Geothermie die beide schon seit sehr langer Zeit genutzt werden In diesem v llig neuen Werk sind die genannten Themen und Trends in Form einer Enzyklop die dargestellt die als schnelles Nachschlagewerk f r Ingenieure Wissenschaftler und Studierende dient und auch f r Laien geeignet ist die in der Branche arbeiten oder sich einfach f r das Thema interessieren Die Beitr ge wurden von einem der weltweit bekanntesten und angesehensten Energieingenieure zusammengestellt Damit ist dieses Buch die umfassendste und aktuellste Enzyklop die ber erneuerbare Energien die derzeit erh ltlich ist und geh rt in jede Bibliothek Die Encyclopedia of Renewable Energy Ist im Stil einer Enzyklop die geschrieben und befasst sich mit s mtlichen Aspekten der erneuerbaren Energien darunter Windkraft Solarenergie und vielen anderen Themen Bietet einen umfassenden berblick ber die Branche von den chemischen Prozessen zur Gewinnung von Biorohstoffen und Biokraftstoffen bis zu den Maschinen und Anlagen die zur Kraftstoffproduktion und in der Stromerzeugung eingesetzt werden Enth lt zahlreiche praxistaugliche Beispiele und Designs die bei der praktischen Anwendung helfen Ist auf dem aktuellen Stand der Technik und damit ein wichtiges Referenzwerk f r jeden Ingenieur

New Strategies for Detecting Knock in Spark Ignition Engines T. A. Fauzi Soelaiman,1992 **AIAA Aerospace Sciences Meeting and Exhibit, 42nd** ,2004 **Automotive Engines and Powertrains (Autotech '97)** ,1997-03-13 The

Autotech Congress brings together manufacturers researchers designers users industry groups and academics to create a forum for the exchange of information and innovations The papers included here examine the major advances and technological breakthroughs of today which shall become standard practice for tomorrow This text looks at the important areas of the total powertrain system as well as outlining new projects Code of Laws of South Carolina, 1976, Annotated South Carolina,1977 **Internal Combustion Engines** Constantine Arcoumanis,1988 *Proceedings of the 42nd Annual ISA Analysis Division Symposium* Instrument Society of America,1997-12 *Encyclopedia of Energy Technology and the Environment* Attilio Bisio,Sharon Boots,1995 This award winning four volume set examines the impact of energy production technologies on the environment In 235 articles the A to Z work covers such topics as acid rain air pollution aircraft fuel building systems coal combustion computer applications for energy efficient systems risk assessment solar heating waste management planning water power and more This first in the Wiley Encyclopedia Series in Environmental Science this valuable resource features extensive illustration photographs tables and a list of environmental and conversion organizations *ASME Technical Papers* ,1985 **Automotive Electronics and Engine Performance** Davis N. Dales,F. J. Thiessen,1995 This new edition is designed for moderately experienced students taking courses in Automotive Engine Performance Automotive Engine Diagnosis and Tune Up Automotive Electronics and Engine Performance Automotive Engine Electronics and Emission Control in two year and proprietary schools This new edition reorganizes the text to reflect the new emphasis on diagnosis and service procedures The goal is to provide a thorough up to date coverage of the function design operation diagnosis service and repair of vehicles and systems **Journal of Engineering for Gas Turbines and Power** ,1992 **Strategic Plan and Budget Request** Colorado. Department of Labor and Employment,2008

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