
INTERNATIONAL STANDARD



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Motor and aviation-type fuels – Determination of knock characteristics – Motor method

Carburants pour moteur automobile et aviation – Détermination des caractéristiques anti-détonantes – Méthode «Moteur»

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FOREWORD

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO member bodies). The work of developing International Standards is carried out through ISO technical committees. Every member body interested in a subject for which a technical committee has been set up has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 5163 was developed by Technical Committee ISO/TC 28, *Petroleum products*, and was circulated to the member bodies in June 1976.

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It has been approved by the member bodies of the following countries :

[ISO 5163:1977](#)

Australia	India	Portugal
Belgium	Iran	Romania
Brazil	Israel	South Africa, Rep. of
Canada	Italy	Spain
Chile	Japan	Sweden
Czechoslovakia	Korea, Rep. of	Turkey
Egypt, Arab Rep. of	Mexico	United Kingdom
France	Netherlands	U.S.A.
Germany	Philippines	
Hungary	Poland	

The member body of the following country expressed disapproval of the document on technical grounds :

U.S.S.R.

Motor and aviation-type fuels – Determination of knock characteristics – Motor method

0 INTRODUCTION

The purpose of this International Standard is to accord official ISO status to a test procedure which is already used in a standardized form all over the world. The procedure in question is published jointly by the American Society for Testing and Materials (ASTM) and the (UK) Institute of Petroleum (IP) as method ASTM D 2700/IP 236, *Standard method of test for knock characteristics of motor and aviation-type fuels by the motor method*.

By publishing this International Standard, ISO recognizes that this method is used in its original text in many member countries and that the standard equipment and many of the accessories and materials required for the method are obtainable only from specific manufacturers or suppliers. To carry out the procedure requires reference to the seven annexes to the ASTM Annual Book of Standards, Part 47, *Test methods for rating motor, diesel and aviation fuels*. These comprise over 100 pages of text and include many half-tone block illustrations which are essential to the installation, operation and maintenance of the ASTM-CFR engine.

From the accumulated experience in many countries of testing the knock characteristics of motor and aviation-type fuels using the ASTM-CFR engine, the conclusion has been drawn that initiation of work with a view to using a different engine for ISO purposes would represent unnecessary duplication of effort. Furthermore, the petroleum industry has world-wide demands for motor and aviation-type fuels meeting knock characteristic specification requirements based on the ASTM-CFR engine test and it is under the necessity, therefore, of having this test equipment standardized.

It is further recognized that this method for rating fuels constitutes an exceptional case in that "metrication" of operating conditions other than those already recognized would be extremely difficult. In a metricated engine, the dimensions and tolerances would be strict numerical conversions and would not reflect metric engineering practice. The engine and directly associated equipment

are currently manufactured only to non-metric dimensions and tolerances and inspection equipment to maintain these tolerances is also only available to non-metric dimensions. The essentials of the procedures for using the test engine and equipment must be strictly adhered to if comparable results are to be obtained in different laboratories.

For all these reasons, it has been considered desirable by Technical Committee ISO/TC 28, *Petroleum products*, under whose technical authority this International Standard is published, to adopt without change the method as published in the ASTM Annual Book of Standards, Part 47, rather than to attempt the conversion of the basic method and annexes into an International Standard.

1 SCOPE AND FIELD OF APPLICATION

1.1 This International Standard covers the determination of the knock characteristics of motor and aviation-type gasolines, intended for use in spark-ignition engines, in terms of motor octane number.

It specifies the use of the apparatus and procedure described in the ASTM Annual Book of Standards, Part 47.

1.2 The motor octane number of a fuel is determined by comparing its knocking tendency with those of blends of reference fuels of known octane number under standard operating conditions. This is done by varying the compression ratio of the engine for the sample to obtain standard knock intensity, as measured by an electronically controlled knockmeter. When the knockmeter reading for the sample is bracketed between those for two reference fuel blends, the rating of the sample in terms of octane number is calculated by interpolation.

1.3 The method provides for expressing motor octane numbers above 100 for aviation-type gasolines in terms of performance number.

2 REFERENCE

ASTM Annual Book of Standards, Part 47, *Test methods for rating motor, diesel and aviation fuels.*¹⁾

3 APPARATUS, ACCESSORIES AND MATERIALS

3.1 The ASTM-CFR engine²⁾ described in annex A1 to the ASTM Annual Book of Standards, Part 47, shall be employed for the conduct of the test.

3.2 The items of accessory equipment and materials listed in the annexes to the ASTM Annual Book of Standards, Part 47, that are directly associated with the ASTM-CFR

engine, shall be obtained solely from the sources specified therein. Other items may be available, however, in equivalent or suitable quality, from other sources of supply. Information on the availability of reference fuels and blending accessories and details of optional equipment are contained in annex A2 to the ASTM Annual Book of Standards, Part 47.

4 PROCEDURE

The procedure laid down in the ASTM Annual Book of Standards, Part 47, in relation to the test method designation ASTM D 2700/IP 236 shall be strictly followed.

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1) Copies may be purchased directly from the publishers, the American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pa. 19103, U.S.A., or from the Institute of Petroleum, 61 New Cavendish Street, London W1M 8AR, England. It may be ordered through any national standards organization or through the ISO Central Secretariat.

A new edition of the ASTM Book of Standards is issued annually incorporating all actions accepted at least six months before issue date. Users of the method should ensure that they have the most recent issue.

For the purpose of this International Standard, the corresponding French Standard NF 07-026, published by the Association française de normalisation, should be regarded as equivalent to the English text of the joint ASTM/IP method reference herein.

2) The sole authorized manufacturer of the ASTM-CFR engine is the Waukesha Motor Company, Fuel Research Division, Waukesha, Wisconsin, 53186, U.S.A.