

ASTM D 357 - 67
NOTICE
20 June 1968

ACCEPTANCE NOTICE

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Title of Document: Knock Characteristics of Motor Fuels of 100 Octane Number and Below by the Motor Method

Document No: ASTM D 357 - 67

Date of Specific Issue Adopted: 8 September 1967

Releasing Industry Group: American Society for Testing and Materials

This test method is referenced in the indexes of Fed. Test Method Std. No. 791 as a part of the standard.

Custodians:
Army - MR
Navy - SH
Air Force - 11

Military Coordinating Activity:
Army - MR
Project No. 91GP-0016

Review Interest:
Army - MU, WC
Navy - AS
Air Force - 68

FSC 91GP

CHANGES

D 357 Standard Method of Test for Knock Characteristics of Motor Fuels of 100 Octane Number and Below by the Motor Method:

Change the year of latest revision to "67" with the addition of the following paragraph to Footnote 2:

In 1965, requirements were added for the equivalent Celsius thermometers, and the tolerance on Intake Air Temperature was reduced. In 1966, the additions were: requirements for a strip chart recorder, tolerances for additional toluene and leaded primary reference fuel standardization fuel blends, and an additional supplier of tetraethyllead. In 1967, Table A, Basic Toluene Standardization Fuels, was added, and changes were made in Sections 202 and 214 and Table 28 of Appendix II.

Change the year of approval as USA Standard to 1968.

Section 4—Add a sentence to read: "A strip-chart type of recorder may be used with the knockmeter to obtain a chart record of knock intensity."

Revised 1966

Section 5—ASTM Knock Test Reference Fuels—Delete Paragraph (d) reading "Such other blends of (a) and (b) as may be adopted."

Revised 1965

Section 6(k)—Change the tolerance for Intake Air Temperature from ± 25 F (± 14 C) to ± 5 F (± 2.8 C).

Revised 1965

Section 8—In Paragraph (a), add a sentence to read: "If a strip-chart recorder is being used, zero it according to the manufacturer's instructions."

Add a new Paragraph (e) to read as follows:

(e) *Adjustment of Strip Chart Recorder*—If a recorder is being used, it must be adjusted to follow the knockmeter. Turn off the engine fuel and, when the knockmeter reaches zero, adjust the recorder controls to get a zero reading on the recorder. Turn fuel on again with the carburetor selector valve and observe the rise of the knockmeter and recorder to around a mid-scale reading.

Adjust the recorder gain and shunt potentiometer controls as needed to get the recorder into agreement with the knockmeter. Raise the engine compression ratio to a knockmeter reading of 95 to 100 and repeat this procedure. Check and readjust as necessary until the recorder agrees with the knockmeter within $\pm \frac{1}{2}$ division of the knockmeter scale over the full scale range so that the terms "knockmeter reading" and "recorder reading" are synonymous.

Revised 1966

Section 9(a)—In Note 2 change "Centigrade" to "Celsius."

Revised 1965

Section 10(a)—Revise to read as follows:

10. (a) From Table A, select and rate a fuel whose calibrated rating is close to the anticipated octane level of the fuel being tested. The engine is not in satisfactory

TABLE A—BASIC TOLUENE STANDARDIZATION FUELS.^a

Calibrated Octane No.	Rating Tolerances	Composition, vol per cent		
		Toluene	Isooctane	n-Heptane
81.1	± 0.3	74	0	26
84.9	± 0.3	74	5	21
88.5	± 0.3	74	10	16
92.5	± 0.3	74	15	11
96.8	± 0.4	74	20	6

^a The above requirements are minimal. Other standardization fuels are available (refer to Appendix II, Section 202) for more extensive checking of engine rating characteristics.

rating condition unless it rates the basic toluene standardization fuel, whose calibrated rating is closest to the rating of the test fuel, within the tolerances specified in Table A when the engine is operated under standard conditions. If this match cannot be obtained, check the mechanical condition of the engine.

Revised 1967

Section 12—Add the following sentence as the first sentence of Section 12:

All samples should be bracketed (1) by ASTM isooctane and a blend of ASTM isooctane with the ASTM 80 octane number blend, or (2) between two different blends of ASTM isooctane and ASTM 80 octane number blend, or (3) between two different blends of ASTM 80 octane number blend and ASTM n-heptane.

Revised 1965

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APPROVED AS
AMERICAN STANDARD Z11.37-1964
BY AMERICAN STANDARDS ASSOCIATION
UDC 662.753: 620.1
METHOD 6001.12—FEDERAL TEST
METHOD STANDARD NO. 791

Standard Method of Test for

KNOCK CHARACTERISTICS OF MOTOR FUELS OF 100 OCTANE NUMBER AND BELOW BY THE MOTOR METHOD¹



ASTM Designation: D 357 - 64

ADOPTED, 1944; REVISED, 1945, 1946, 1947, 1948, 1949, 1953,
1956, 1958, 1959, 1960, 1961, 1962, 1963, 1964.²

This Standard of the American Society for Testing and Materials is issued under the fixed designation D 357; the final number indicates the year of original adoption as standard or, in the case of revision, the year of last revision.

Scope

1. This method covers the determination of the knock characteristics of fuels for use in spark-ignition en-

¹ Under the standardization procedure of the Society, this method is under the jurisdiction of the ASTM Committee D-2 on Petroleum Products and Lubricants.

² Latest revision accepted August 31, 1964, by action of the Society at the Annual Meeting and confirming letter ballot.

Prior to adoption as standard, this method was published as tentative from 1933 to 1939, being revised in 1934, 1936, 1937, 1938, and 1939. It was adopted in 1939, published as standard from 1939 to 1941, being revised in 1940, but was withdrawn, revised and republished as tentative from 1941 to 1944, being revised in 1942, 1943, and 1944.

In 1964, Sections 6(o), 208, 211, 214(d), 305(d), 312(a), 439(b), and Tables 27 and 30 were revised to reflect change in carburetor horizontal jet position, to include specifications for tetraethyllead, to change scale of thermometer 86 F, and to provide revised ratings for leaded primary standardization fuels.

gines in terms of ASTM Motor octane numbers of *100 and below*.

NOTE 1.—Identical equipment is used for this method and ASTM Method D 1948, Test for Knock Characteristics of Motor Fuels Above 100 Octane Number by the Motor Method.³

Definition

2. ASTM Motor Octane Number of a fuel of *100 and below* is the whole number nearest the percentage by volume of *isooctane* (equals 100) in a blend with normal heptane (equals 0) that matches the knock characteristics of the fuel when compared by this method.

Outline of Method

3. The ASTM Motor octane number of a fuel is determined by comparing its knocking tendency with those for blends of the reference fuels of known octane number at 900 rpm

³ ASTM Motor and Research Manual.