
**Petroleum products — Determination
of thermal oxidation stability of gas
turbine fuels**

*Produits pétroliers — Détermination de la stabilité à l'oxydation
thermique des carburéacteurs*

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Contents

Page

Foreword	iv
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
3.1 Generic terms	2
3.2 Rating procedure terms	2
4 Principle	3
5 Reagents and materials	3
6 Apparatus	4
7 Samples and sampling procedures	5
8 Preparation of apparatus	5
8.1 Cleaning and assembly of heater test section	5
8.2 Cleaning and assembly of the remainder of the test components	7
9 Calibration and standardization	7
10 Procedure	7
10.1 Preparation of fuel test sample	7
10.2 Final assembly	8
10.3 Power up and pressurization	8
10.4 Start up	8
10.5 Test	9
10.6 Heater tube profile	9
10.7 Shutdown	9
10.8 Disassembly	9
11 Heater tube deposit rating	10
12 Precision	10
13 Test report	10
Annex A (normative) Apparatus	11
Annex B (normative) Visual rating of used heater tubes	21
Annex C (normative) Interferometric method	24
Annex D (normative) Ellipsometric method	29
Annex E (normative) Multi-wavelength ellipsometric method	31
Annex F (informative) Calibrator and thermocouple maintenance	34
Bibliography	35

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established 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. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 28, *Petroleum and related products, fuels and lubricants from natural or synthetic sources*.

This third edition cancels and replaces the second edition (ISO 6249:1999), which has been technically revised. The main changes compared to the previous edition are that tube ratings ([Annexes C, D and E](#)) are included.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Petroleum products — Determination of thermal oxidation stability of gas turbine fuels

WARNING — The use of this document may involve hazardous materials, operations and equipment. This document does not purport to address all of the safety problems associated with its use. It is the responsibility of the user of this document to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

1 Scope

This document specifies a procedure for rating the tendencies of gas turbine fuels to deposit decomposition products within the fuel system. It is applicable to middle distillate and wide-cut fuels and is particularly specified for the performance of aviation gas turbine fuels.

The test results are indicative of fuel thermal oxidation stability during gas turbine operation and can be used to assess the level of deposits that form when liquid fuel contacts a heated surface at a specified temperature.

This method is also applicable to aviation turbine fuel that consists of conventional and synthetic blending components as defined in the scope of for instance ASTM D7566^[1] and Def Stan 91-091^[2].

NOTE For the benefit of those using older instruments, non-SI-units and recalculated numbers are given in between brackets where they are more suitable.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 3170, *Petroleum liquids — Manual sampling*

ISO 3171, *Petroleum liquids — Automatic pipeline sampling*

ISO 3274, *Geometrical Product Specifications (GPS) — Surface texture: Profile method — Nominal characteristics of contact (stylus) instruments*

ISO 4288, *Geometrical Product Specifications (GPS) — Surface texture: Profile method — Rules and procedures for the assessment of surface texture*

ASTM D4306, *Practice for Aviation Fuel Sample Containers for Tests Affected by Trace Contamination*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

3.1 Generic terms

3.1.1

heater tube

aluminium tube controlled at an elevated temperature, over which the test fuel is pumped, the tube being resistively heated and temperature controlled by a thermocouple positioned inside it

Note 1 to entry: The critical test area is the 60 mm thinner portion between the shoulders of the tube. The fuel inlet to the tube is at the 0 mm position, and the fuel exit is at 60 mm.

3.1.2

decomposition product

oxidative product laid down on the *heater tube* (3.1.1) in a relatively small area of the thinner portion of the tube, typically between the 30 mm and 50 mm position from the fuel inlet, and that trapped in the test filter

3.1.3

deposit

film of oxidized product deposited on the test area of the *heater tube* (3.1.1)

3.1.4

deposit thickness

thickness of *deposit* (3.1.3) present on the heater tube substrate surface

Note 1 to entry: It is expressed in nm.

3.1.5

maximum deposit thickness

maximum thickness of an average $2,5 \text{ mm}^2$ *deposit* (3.1.3) present on the *heater tube* (3.1.1) surface

Note 1 to entry: It is expressed in nm.

3.1.6

deposit volume

calculated total volume of *deposit* (3.1.3), deposited on the test section of the *heater tube* (3.1.1)

Note 1 to entry: It is expressed in mm^3 .

3.1.7

deposit profile

three-dimensional representation of *deposit thickness* (3.1.4) along and around the length of the heater tube test section

3.2 Rating procedure terms

3.2.1

tube rating

10-step discrete scale from 0 to >4, with intermediate levels for each number, starting with 1, described as less than the subsequent number

Note 1 to entry: The scale is taken from the five colours, 0, 1, 2, 3, 4, on the colour standard^[4]. The complete scale is: 0, < 1, 1, < 2, 2, < 3, 3, < 4, 4, > 4. Each step is not necessarily of the same absolute magnitude. The higher the number, the darker the deposit rating.

3.2.2

peacock

multi-colour, rainbow-like tube deposit

Note 1 to entry: This type of deposit is caused by interference phenomena where *deposit thickness* (3.1.4) is equal to multiples of a quarter wavelength of visible light.