
**Plastics — Determination of burning
behaviour by oxygen index —**

**Part 1:
General requirements**

*Plastiques — Détermination du comportement au feu au moyen de
l'indice d'oxygène —*

Partie 1: Exigences générales





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Contents

	Page
Foreword	iv
Introduction	v
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Principles of the test	2
5 Applicability of the test	2
6 Specimen preparation	3
7 Apparatus	3
7.1 General.....	3
7.2 Measuring device.....	3
7.3 Column design.....	3
7.4 Sample holder.....	3
8 Operating conditions	3
8.1 Calibration.....	3
8.2 Flame application time.....	4
8.3 Gas flow.....	4
8.4 Elevated-temperature routine.....	4
8.5 Pass/fail criteria.....	4
9 Conclusions	5
Bibliography	6

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).

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For an explanation on 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 the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 61, *Plastics*, Subcommittee SC 4, *Burning behaviour*.

This second edition cancels and replaces the first edition (ISO 4589-1:1996), which has been technically revised.

A list of all parts in the ISO 4589 series can be found on the ISO website.

Introduction

The oxygen index (OI) test at ambient temperature was first described by Fenimore and Martin^[3] in 1966. The first use of the method in standards was ASTM D2863:1970^[2] and it has since been published in a wide range of national and international standards. It was published as ISO 4589 in 1984 and has now been revised as ISO 4589-2. The OI test at elevated temperatures is described in ISO 4589-3.

In the period since ASTM D2863 became a standard, a considerable number of papers have been published about this test. An example is the review in Reference ^[6] relating to the relevance of the test to real fire situations. Other papers have suggested empirical formulae relating OI to the amounts of added fire retardant, or describe practical investigations on the equipment performance (see Reference ^[7]). A clear consensus on the value of the two variants of the test has emerged, however, and it is the purpose of this document to discuss the use of the equipment and the applicability of both test methods.

Plastics — Determination of burning behaviour by oxygen index —

Part 1: General requirements

1 Scope

This document specifies the general requirements for the oxygen index (OI) test which are further described in ISO 4589-2 and ISO 4589-3 as follows:

- ISO 4589-2 describes a method for determining the minimum volume fraction of oxygen in a mixture of oxygen and nitrogen introduced at $23\text{ °C} \pm 2\text{ °C}$ that will just support combustion of a material under specified test conditions;
- ISO 4589-3 describes methods of carrying out the same determination over a range of temperatures typically between 25 °C and 150 °C (although temperatures up to 400 °C can be used).

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 4589-2:2017, *Plastics — Determination of burning behaviour by oxygen index — Part 2: Ambient-temperature test*

ISO 4589-3:2017, *Plastics — Determination of burning behaviour by oxygen index — Part 3: Elevated-temperature test*

ISO 13943, *Fire safety — Vocabulary*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 13943 and the following apply.

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

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

3.1

oxygen index

OI

limiting oxygen index

LOI

minimum volume fraction of oxygen in a mixture of oxygen and nitrogen, at $23\text{ °C} \pm 2\text{ °C}$, that just supports flaming combustion of a material under specified test conditions

Note 1 to entry: It is expressed as a percentage, e.g. OI = 34,6 %.

[SOURCE: ISO 13943:2008, 4.248, modified — Note 1 to entry has been revised.]