



**NSAI**  
Standards

Irish Standard  
I.S. EN ISO 5659-2:2017

## Plastics - Smoke generation - Part 2: Determination of optical density by a single- chamber test (ISO 5659-2:2017)

**I.S. EN ISO 5659-2:2017**

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## National Foreword

I.S. EN ISO 5659-2:2017 is the adopted Irish version of the European Document EN ISO 5659-2:2017, Plastics - Smoke generation - Part 2: Determination of optical density by a single-chamber test (ISO 5659-2:2017)

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EUROPEAN STANDARD

**EN ISO 5659-2**

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Supersedes EN ISO 5659-2:2012

English Version

## Plastics - Smoke generation - Part 2: Determination of optical density by a single-chamber test (ISO 5659-2:2017)

Plastiques - Production de fumée - Partie 2:  
Détermination de la densité optique par un essai en  
enceinte unique (ISO 5659-2:2017)

Kunststoffe - Rauchentwicklung - Teil 2: Bestimmung  
der optischen Dichte durch Einkammerprüfung (ISO  
5659-2:2017)

This European Standard was approved by CEN on 9 May 2017.

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**EN ISO 5659-2:2017 (E)**

<b>Contents</b>	<b>Page</b>
<b>European foreword.....</b>	<b>3</b>

## **European foreword**

This document (EN ISO 5659-2:2017) has been prepared by Technical Committee ISO/TC 61 “Plastics” in collaboration with Technical Committee CEN/TC 249 “Plastics” the secretariat of which is held by NBN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by December 2017, and conflicting national standards shall be withdrawn at the latest by December 2017.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN ISO 5659-2:2012.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

### **Endorsement notice**

The text of ISO 5659-2:2017 has been approved by CEN as EN ISO 5659-2:2017 without any modification.

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# INTERNATIONAL STANDARD

# ISO 5659-2

Fourth edition  
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## Plastics — Smoke generation —

Part 2:

## Determination of optical density by a single-chamber test

*Plastiques — Production de fumée —*

*Partie 2: Détermination de la densité optique par un essai en  
enceinte unique*



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**ISO 5659-2:2017(E)**



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# Contents

	Page
<b>Foreword</b> .....	<b>v</b>
<b>Introduction</b> .....	<b>vi</b>
<b>1 Scope</b> .....	<b>1</b>
<b>2 Normative references</b> .....	<b>1</b>
<b>3 Terms and definitions</b> .....	<b>1</b>
<b>4 Principles of the test</b> .....	<b>3</b>
<b>5 Suitability of a material or product for testing</b> .....	<b>3</b>
5.1 Material or product geometry.....	3
5.2 Surface characteristics.....	3
5.3 Asymmetrical products.....	3
<b>6 Specimen construction and preparation</b> .....	<b>4</b>
6.1 Number of specimens.....	4
6.2 Size of specimens.....	4
6.3 Specimen preparation.....	4
6.4 Conditioning.....	5
6.5 Wrapping of specimens.....	5
<b>7 Apparatus and ancillary equipment</b> .....	<b>5</b>
7.1 General.....	5
7.2 Test chamber.....	6
7.2.1 Construction.....	6
7.2.2 Chamber pressure control facilities.....	6
7.2.3 Chamber wall temperature.....	9
7.3 Specimen support and heating arrangements.....	10
7.3.1 Radiator cone.....	10
7.3.2 Framework for support of the radiator cone, specimen holder and heat flux meter.....	10
7.3.3 Radiator shield.....	13
7.3.4 Heat flux meter.....	13
7.3.5 Specimen holder.....	14
7.3.6 Pilot burner.....	14
7.4 Gas supply.....	15
7.5 Photometric system.....	15
7.5.1 General.....	15
7.5.2 Light source.....	15
7.5.3 Photo detector.....	15
7.5.4 Additional equipment.....	17
7.6 Chamber leakage.....	17
7.7 Cleaning materials.....	18
7.8 Ancillary equipment.....	18
7.8.1 Balance.....	18
7.8.2 Timing device.....	18
7.8.3 Linear measuring devices.....	18
7.8.4 Auxiliary heater.....	18
7.8.5 Protective equipment.....	18
7.8.6 Recorder.....	18
7.8.7 Water-circulating device.....	18
<b>8 Test environment</b> .....	<b>18</b>
<b>9 Setting-up and calibration procedures</b> .....	<b>19</b>
9.1 General.....	19
9.2 Alignment of photometric system.....	19
9.2.1 General.....	19

## ISO 5659-2:2017(E)

9.2.2	Beam collimation.....	19
9.2.3	Beam focusing.....	19
9.3	Selection of compensating filter(s).....	19
9.4	Linearity check.....	20
9.5	Calibration of range-extension filter.....	20
9.6	Chamber leakage rate test.....	21
9.7	Burner calibration.....	21
9.8	Radiator cone calibration.....	21
9.9	Cleaning.....	22
9.10	Frequency of checking and calibrating procedure.....	22
<b>10</b>	<b>Test procedure.....</b>	<b>22</b>
10.1	General.....	22
10.2	Preparation of test chamber.....	22
10.3	Tests with pilot flame.....	23
10.4	Preparation of the photometric system.....	23
10.5	Loading the specimen.....	23
10.6	Recording of light transmission.....	23
10.7	Observations.....	24
10.8	Termination of test.....	24
10.9	Testing in different modes.....	25
<b>11</b>	<b>Expression of results.....</b>	<b>25</b>
11.1	Specific optical density, $D_S$ .....	25
11.2	Clear-beam correction factor, $D_C$ .....	26
<b>12</b>	<b>Precision.....</b>	<b>26</b>
<b>13</b>	<b>Test report.....</b>	<b>26</b>
<b>Annex A (normative) Calibration of heat flux meter.....</b>		<b>28</b>
<b>Annex B (informative) Variability in the specific optical density of smoke measured in the single-chamber test.....</b>		<b>29</b>
<b>Annex C (informative) Determination of mass optical density.....</b>		<b>31</b>
<b>Annex D (informative) Precision data from tests on intumescent materials.....</b>		<b>36</b>
<b>Annex E (informative) Guidance on optical density testing.....</b>		<b>38</b>
<b>Annex F (informative) Specific sample preparation.....</b>		<b>46</b>
<b>Bibliography.....</b>		<b>49</b>

## 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](http://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](http://www.iso.org/patents)).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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](http://www.iso.org/iso/foreword.html).

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

This fourth edition cancels and replaces the third edition (ISO 5659-2:2012), which has been technically revised. It details several technical points for sampling (essentially [Annex F](#)) and harmonizes sample preparation with other standards like ISO 5660-1.

A list of all parts in the ISO 5659 series can be found on the ISO website.

## ISO 5659-2:2017(E)

### Introduction

Fire is a complex phenomenon; its development and effects depend upon a number of interrelated factors. The behaviour of materials and products depends upon the characteristics of the fire, the method of use of the materials and the environment in which they are exposed to (see also ISO/TS 3814 and ISO 13943).

A test such as is specified in this document deals only with a simple representation of a particular aspect of the potential fire situation, typified by a radiant heat source, and it cannot alone provide any direct guidance on behaviour or safety in fire. A test of this type may, however, be used for comparative purposes or to ensure the existence of a certain quality of performance (in this case, smoke production) considered to have a bearing on fire behaviour generally. It would be wrong to attach any other meaning to results from this test.

The term “smoke” is defined in ISO 13943 as a visible suspension of solid and/or liquid particles in gases resulting from incomplete combustion. It is one of the first response characteristics to be manifested and should almost always be taken into account in any assessment of fire hazard as it represents one of the greatest threats to occupants of a building or other enclosure, such as a ship or train, on fire.

The responsibility for the preparation of ISO 5659 was transferred during 1987 from ISO/TC 92 to ISO/TC 61 on the understanding that the scope and applicability of the standard for the testing of materials should not be restricted to plastics but should also be relevant to other materials where possible, including building materials.

# Plastics — Smoke generation —

## Part 2:

# Determination of optical density by a single-chamber test

## 1 Scope

This document specifies a method of measuring smoke production from the exposed surface of specimens of materials or composites. It is applicable to specimens that have an essentially flat surface and do not exceed 25 mm in thickness when placed in a horizontal orientation and subjected to specified levels of thermal irradiance in a closed cabinet with or without the application of a pilot flame. This method of test is applicable to all plastics.

It is intended that the values of optical density determined by this test be taken as specific to the specimen or assembly material in the form and thickness tested and are not to be considered inherent, fundamental properties.

The test is intended primarily for use in research and development and fire safety engineering in buildings, trains, ships, etc. and not as a basis for ratings for building codes or other purposes. No basis is provided for predicting the density of smoke that can be generated by the materials upon exposure to heat and flame under other (actual) exposure conditions. This test procedure excludes the effect of irritants on the eye.

**NOTE** This test procedure addresses the loss of visibility due to smoke density, which generally is not related to irritancy potency (see [Annex E](#)).

It is emphasized that smoke production from a material varies according to the irradiance level to which the specimen is exposed. The results yielded from the method specified in this document are based on exposure to the specific irradiance levels of 25 kW/m<sup>2</sup> and 50 kW/m<sup>2</sup>.

## 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 291, *Plastics — Standard atmospheres for conditioning and testing*

ISO 13943, *Fire safety — Vocabulary*

ISO 14934-3, *Fire tests — Calibration and use of heat flux meters — Part 3: Secondary calibration method*

## 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>

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