

BS EN 60695-6-2:2011



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Fire hazard testing

Part 6-2: Smoke obscuration —
Summary and relevance of test methods

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National foreword

This British Standard is the UK implementation of EN 60695-6-2:2011. It is identical to IEC 60695-6-2:2011. It supersedes DD IEC/TS 60695-6-2:2005 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee GEL/89, Fire hazard testing.

A list of organizations represented on this committee can be obtained on request to its secretary.

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EUROPEAN STANDARD
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English version

**Fire hazard testing -
Part 6-2: Smoke obscuration -
Summary and relevance of test methods
(IEC 60695-6-2:2011)**

Essais relatifs aux risques du feu -
Partie 6-2: Opacité des fumées -
Résumé et pertinence des méthodes
d'essais
(CEI 60695-6-2:2011)

Prüfungen zur Beurteilung der
Brandgefahr -
Teil 6-2: Sichtminderung durch Rauch -
Zusammenfassung und Anwendbarkeit
von Prüfverfahren
(IEC 60695-6-2:2011)

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European Committee for Electrotechnical Standardization
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Europäisches Komitee für Elektrotechnische Normung

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Foreword

The text of document 89/1057/FDIS, future edition 1 of IEC 60695-6-2, prepared by IEC/TC 89 "Fire hazard testing" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 60695-6-2:2011.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2012-06-29
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2014-09-29

This standard is to be used in conjunction with EN 60695-6-1.

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

Endorsement notice

The text of the International Standard IEC 60695-6-2:2011 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

IEC 60332-3-10	NOTE Harmonized as EN 60332-3-10.
IEC 61034-1	NOTE Harmonized as EN 61034-1.
IEC 61034-2	NOTE Harmonized as EN 61034-2.
ISO 5659-2	NOTE Harmonized as EN ISO 5659-2.

Annex ZA (normative)

Normative references to international publications with their corresponding European publications

The following referenced documents are indispensable for the application 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.

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60695-6-1	2005	Fire hazard testing - Part 6-1: Smoke obscuration - General guidance	EN 60695-6-1	2005
IEC Guide 104	-	The preparation of safety publications and the use of basic safety publications and group safety publications	-	-
ISO 5725-2	1994	Accuracy (trueness and precision) of measurement methods and results - Part 2: Basic method for the determination of repeatability and reproducibility of a standard measurement method	-	-
ISO 13943	2008	Fire safety - Vocabulary	EN ISO 13943	2010
ISO 19706	2007	Guidelines for assessing the fire threat to people	-	-

CONTENTS

INTRODUCTION.....	6
1 Scope.....	7
2 Normative references.....	7
3 Terms and definitions	7
4 Types of test method	11
4.1 General	11
4.2 Physical fire model	11
4.3 Static test methods	11
4.4 Dynamic test methods	11
5 Types of test specimen	13
6 Published static test methods.....	13
6.1 General	13
6.2 Determination of smoke opacity in a 0,51 m ³ chamber	13
6.2.1 Standards which use a vertically oriented test specimen.....	13
6.2.2 Standard which uses a horizontally oriented test specimen	15
6.3 Determination of smoke density in a 27 m ³ smoke chamber.....	17
6.3.1 Standards	17
6.3.2 Purpose and principle	17
6.3.3 Test specimen	17
6.3.4 Method	17
6.3.5 Repeatability and reproducibility	18
6.3.6 Relevance of test data and special observations	18
6.4 Determination of specific optical density using a dual-chamber test	18
6.4.1 Standards	18
6.4.2 Purpose and principle	18
6.4.3 Test specimen	18
6.4.4 Method	19
6.4.5 Repeatability and reproducibility	19
6.4.6 Relevance of test data and special observations	19
7 Published dynamic test methods	19
7.1 General	19
7.2 Determination of smoke density generated by electric cables mounted on a horizontal ladder	19
7.2.1 Standards	19
7.2.2 Purpose and principle	19
7.2.3 Test specimen	19
7.2.4 Method	19
7.2.5 Repeatability and reproducibility	19
7.2.6 Relevance of test data and special observations	20
7.3 Determination of smoke generated by electrical cables mounted on a vertical ladder.....	20
7.3.1 Standards	20
7.3.2 prEN 50399	21
7.4 Determination of smoke using a cone calorimeter	22
7.4.1 Standards	22

7.4.2	Purpose and principle	22
7.4.3	Test specimen	22
7.4.4	Method	22
7.4.5	Repeatability and reproducibility	23
7.4.6	Relevance of test data and special observations	23
8	Overview of methods and relevance of data	24
Annex A (informative) Repeatability and reproducibility data – NBS smoke chamber – Interlaboratory tests from the French standard NF C20-902-1 and NF C20-902-2.....		27
Annex B (informative) Repeatability and reproducibility data – ISO 5659-2		28
Annex C (informative) Repeatability and reproducibility data – "Three metre cube" smoke chamber – French interlaboratory tests according to IEC 61034-2.....		30
Annex D (informative) Repeatability and reproducibility data – NFPA 262.....		31
Annex E (informative) Precision data of smoke measurement in ISO 5660-2.....		32
Bibliography		33
Table 1 – Characteristics of fire stages (ISO 19706)		12
Table 2 – Overview of smoke test methods.....		25
Table A.1 – Measurement of D_m		27
Table B.1 – Measurement of D_s10		28
Table B.2 – Test results for poly-carbonate.....		28
Table B.3 – Test results for PVC flooring		29
Table C.1 – Measurement of transmission expressed as a percentage		30
Table E.1 – Combinations of materials of upholstered furniture		32
Table E.2 – Repeatability and Reproducibility of specific extinction area (m^2/kg).....		32

INTRODUCTION

The risk of fire needs to be considered in any electrical circuit, and the objective of component, circuit and equipment design, and the choice of materials, is to reduce the likelihood of fire, even in the event of foreseeable abnormal use, malfunction or failure.

Electrotechnical products, primarily as victims of fire, may nevertheless contribute to the fire. One of the contributing hazards is the release of smoke, which may cause loss of vision and/or disorientation which could impede escape from the building, or fire fighting.

This international standard describes smoke test methods in common use to assess the smoke release from electrotechnical products, or from materials used in electrotechnical products. It forms part of the IEC 60695-6 series which gives guidance to product committees wishing to incorporate test methods for smoke obscuration in product standards.

FIRE HAZARD TESTING –

Part 6-2: Smoke obscuration – Summary and relevance of test methods

1 Scope

This part of IEC 60695 provides a summary of the test methods that are used in the assessment of smoke obscuration. It presents a brief summary of static and dynamic test methods in common use, either as international standards or national or industry standards. It includes special observations on their relevance to electrotechnical products and their materials and to fire scenarios, and it gives recommendations on their use.

This basic safety publication is intended for use by technical committees in the preparation of standards in accordance with the principles laid down in IEC Guide 104 and ISO/IEC Guide 51.

One of the responsibilities of a technical committee is, wherever applicable, to make use of basic safety publications in the preparation of its publications. The requirements, test methods or test conditions of this basic safety publication will not apply unless specifically referred to or included in the relevant publications.

2 Normative references

The following referenced documents are indispensable for the application 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.

IEC 60695-6-1:2005, Fire hazard testing – Part 6-1: *Smoke obscuration – General guidance*

IEC Guide 104:, *The preparation of safety publications and the use of basic safety publications and group safety publications*

ISO/IEC 13943:2008, *Fire safety – Vocabulary*

ISO 5725-2:1994, *Accuracy (trueness and precision) of measurement methods and results – Part 2: Basic method for the determination of repeatability and reproducibility of a standard measurement method*

ISO 19706:2007¹, *Guidelines for assessing the fire threat to people*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/IEC 13943, some of which are reproduced below for users' convenience, apply.

3.1

combustion

exothermic reaction of a substance with an oxidising agent

¹ This publication cancels and replaces ISO 9122-1:1989, Toxicity testing of fire effluents – Part 1: General.

NOTE Combustion generally emits fire effluent accompanied by flames and/or glowing.

[ISO/IEC 13943, definition 4.46]

3.2

extinction area of smoke

product of the volume occupied by smoke and the extinction coefficient of the smoke

NOTE It is a measure of the amount of smoke, and the typical units are square metres (m^2).

[ISO/IEC 13943, definition 4.92]

3.3

extinction coefficient

natural logarithm of the ratio of incident light intensity to transmitted light intensity, per unit light path length

NOTE Typical units are reciprocal metres (m^{-1}).

[ISO/IEC 13943, definition 4.93]

3.4

fire

(general) process of combustion characterized by the emission of heat and fire effluent and usually accompanied by smoke, flame, glowing or a combination thereof

NOTE In the English language the term "fire" is used to designate three concepts, two of which, fire (3.5) and fire (3.6), relate to specific types of self-supporting combustion with different meanings and two of them are designated using two different terms in both French and German.

[ISO/IEC 13943, definition 4.96]

3.5

fire

(controlled) self-supporting combustion that has been deliberately arranged to provide useful effects and is limited in its extent in time and space

[ISO/IEC 13943 definition 4.97]

3.6

fire

(uncontrolled) self-supporting combustion that has not been deliberately arranged to provide useful effects and is not limited in its extent in time and space

[ISO/IEC 13943 definition 4.98]

3.7

fire effluent

totality of gases and aerosols, including suspended particles, created by combustion or pyrolysis in a fire

[ISO/IEC 13943, definition 4.105]

3.8

fire hazard

physical object or condition with a potential for an undesirable consequence from fire

[ISO/IEC 13943, definition 4.112]

3.9

fire model

fire simulation

calculation method that describes a system or process related to fire development, including fire dynamics and the effects of fire

[ISO/IEC 13943, definition 4.116]

3.10

fire scenario

qualitative description of the course of a fire with respect to time, identifying key events that characterise the studied fire and differentiate it from other possible fires

NOTE It typically defines the ignition and fire growth processes, the fully developed fire stage, the fire decay stage, and the environment and systems that impact on the course of the fire.

[ISO/IEC 13943 definition 4.129]

3.11

heat flux

amount of thermal energy emitted, transmitted or received per unit area and per unit time

NOTE The typical units are watts per square metre ($\text{W}\cdot\text{m}^{-2}$).

[ISO/IEC 13943, definition 4.173]

3.12

ignition

sustained ignition (deprecated)

(general) initiation of combustion

[ISO/IEC 13943, definition 4.187]

3.13

ignition

sustained ignition (deprecated)

(flaming combustion) initiation of sustained flame

[ISO/IEC 13943 definition 4.188]

3.14

mass optical density of smoke

optical density of smoke multiplied by a factor, $V/(\Delta m L)$, where V is the volume of the test chamber, Δm is the mass lost from the test specimen, and L is the light path length

NOTE The typical units are square metres per gram ($\text{m}^2 \times \text{g}^{-1}$).

[ISO/IEC 13943, definition 4.225]

3.15

obscuration by smoke

reduction in the intensity of light due to its passage through smoke

cf. **extinction area of smoke** (3.2) and **specific extinction area of smoke** (3.23).

NOTE 1 In practice, obscuration by smoke is usually measured as the transmittance, which is normally expressed as a percentage.

NOTE 2 Obscuration by smoke causes a reduction in visibility.

[ISO/IEC 13943 definition 4.242]

3.16

optical density of smoke

measure of the attenuation of a light beam passing through smoke expressed as the logarithm to the base 10 of the opacity of smoke

cf. **specific optical density of smoke** (3.24)

NOTE The optical density of smoke is dimensionless.

[ISO/IEC 13943, definition 4.244]

3.17

physical fire model

laboratory process, including the apparatus, the environment and the fire test procedure intended to represent a certain phase of a fire

[ISO/IEC 13943, definition 4.251]

3.18

real-scale fire test

fire test that simulates a given application, taking into account the real scale, the real way the item is installed and used, and the environment

NOTE Such a fire test normally assumes that the products are used in accordance with the conditions laid down by the specifier and/or in accordance with normal practice.

[ISO/IEC 13943, definition 4.273]

3.19

small-scale fire test

fire test performed on a test specimen of small dimensions

NOTE A fire test performed on a test specimen of which the maximum dimension is less than 1 m is usually called a small-scale fire test.

[ISO/IEC 13943, definition 4.292]

3.20

smoke

visible part of fire effluent

[ISO/IEC 13943, definition 4.293]

3.21

smoke production rate

amount of smoke produced per unit time in a fire or fire test

NOTE 1 It is calculated as the product of the volumetric flow rate of smoke and the extinction coefficient of the smoke at the point of measurement.

NOTE 2 The typical units are square metres per second ($\text{m}^2 \times \text{s}^{-1}$).

[ISO/IEC 13943 definition 4.295]

3.22

smoke release rate

see **smoke production rate** (3.21)

3.23

specific extinction area of smoke

extinction area of smoke produced by a test specimen in a given time period divided by the mass lost from the test specimen in the same time period