BSI Standards Publication

Fire hazard testing

Part 9-2: Surface spread of flame — Summary and relevance of test methods

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Full document details: BS EN IEC 60695-9-2:2021

National foreword

This British Standard is the UK implementation of EN IEC 60695-9-2:2021. It is identical to IEC 60695-9-2:2021. It supersedes BS EN 60695-9-2:2014, which is withdrawn.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 committee manager.

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NORME EUROPÉENNE

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EN IEC 60695-9-2

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Supersedes EN 60695-9-2:2014 and all of its amendments and corrigenda (if any)

English Version

Fire hazard testing - Part 9-2: Surface spread of flame - Summary and relevance of test methods (IEC 60695-9-2:2021)

Essais relatifs aux risques du feu - Partie 9-2: Propagation des flammes en surface - Résumé et pertinence des méthodes d'essai (IEC 60695-9-2:2021)

Prüfungen zur Beurteilung der Brandgefahr - Teil 9-2: Flammenausbreitung auf Oberflächen - Zusammenfassung und Anwendbarkeit der Prüfverfahren (IEC 60695-9-2:2021)

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European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
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European foreword

The text of document 89/1469/CDV, future edition 2 of IEC 60695-9-2, prepared by IEC/TC 89 “Fire hazard testing” was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 60695-9-2:2021.

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) 2022–06–29
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2024–09–29

This document supersedes EN 60695-9-2:2014 and all of its amendments and corrigenda (if any).

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

Any feedback and questions on this document should be directed to the users’ national committee. A complete listing of these bodies can be found on the CENELEC website.

Endorsement notice

The text of the International Standard IEC 60695-9-2:2021 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 60695-1-11	NOTE Harmonized as EN 60695-1-11
IEC 60695-1-12	NOTE Harmonized as EN IEC 60695-1-12
IEC 60695-11-10	NOTE Harmonized as EN 60695-11-10
IEC 60695-11-20	NOTE Harmonized as EN 60695-11-20
IEC 60695-11-3	NOTE Harmonized as EN 60695-11-3
IEC 60684-2:2011	NOTE Harmonized as EN 60684-2:2011 (not modified)
IEC 60332-1	NOTE Harmonized as HD 405.1 S1
IEC 60332-2	NOTE Harmonized as HD 405.2 S1
ISO 3582	NOTE Harmonized as EN ISO 3582
ISO 9773	NOTE Harmonized as EN ISO 9773
ISO 11925-2	NOTE Harmonized as EN ISO 11925-2
IEC 60695-8-1	NOTE Harmonized as EN 60695-8-1

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Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

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.

NOTE 1 Where an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cenelec.eu.

Publication	Year	Title	EN/HD	Year
IEC 60695-1-10	-	Fire hazard testing - Part 1–10: Guidance for assessing the fire hazard of electrotechnical products - General guidelines	EN 60695-1-10	-
IEC 60695-4	2012	Fire hazard testing - Part 4: Terminology concerning fire tests for electrotechnical products	EN 60695-4	2012
IEC 60695-9-1	-	Fire hazard testing - Part 9–1: Surface spread of flame - General guidance	EN 60695-9-1	-
IEC Guide 104	-	The preparation of safety publications and the use of basic safety publications and group safety publications		-
ISO/IEC Guide 51	-	Safety aspects - Guidelines for their inclusion in standards		
ISO 13943	2017	Fire Safety - Vocabulary	EN ISO 13943	2017
ISO 19706	2011	Guidelines for assessing the fire threat to people		-

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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FIRE HAZARD TESTING –

Part 9-2: Surface spread of flame – Summary and relevance of test methods

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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International Standard IEC 60695-9-2 has been prepared by IEC technical committee 89: Fire hazard testing.

It has the status of a basic safety publication in accordance with IEC Guide 104.

This second edition cancels and replaces the first edition of IEC 60695-9-2 published in 2014. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

a) Updated introduction
b) Updated normative references
c) Updated terms and definitions
d) New Subclauses 4.1 and 4.2

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e) Reference to *fire* stages as defined in ISO 19706 (Table 1)

f) New sub-division of tests into the following subclauses:

4.3 *Small-scale fire tests*

4.4 *Medium* and *intermediate-scale fire tests*

4.5 *Intermediate* and *large-scale fire tests* for cables

4.6 *Real-scale fire tests* for cables

g) Updated text in parts of Clause 4

h) Addition of the following test methods:

IEC TS 60695-11-21

IEC 60684-2:2011, Clause 26

ISO 3582

ISO 9772

ISO 9773

ISO 12992

ISO 21367

i) New Clause 5 and Table 4 giving an overview of test methods

j) Deletion of all the Annexes

k) Updated bibliography

The text of this International Standard is based on the following documents:

Draft	Report on voting
89/1469/CDV	89/1505/RVC

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/standardsdev/publications.

A list of all parts in the IEC 60695 series, published under the general title *Fire hazard testing*, can be found on the IEC website.

This International Standard is to be used in conjunction with IEC 60695-1.

In this standard, the following print types are used:

terms referred to in Clause 3: in italic type.

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The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

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INTRODUCTION

In the design of an electrotechnical product, the risk of *fire* and the potential hazards associated with *fire* need to be considered. In this respect the objective of component, circuit and equipment design, as well as the choice of materials, is to reduce the risk of *fire* to a tolerable level even in the event of reasonably foreseeable (mis)use, malfunction or failure.

IEC 60695-1-10, IEC 60695-1-11 [1][1], and IEC 60695-1-12 [2] provide guidance on how this is to be accomplished.

Fires involving electrotechnical products can also be initiated from external non-electrical sources. Considerations of this nature are dealt with in an overall *fire hazard* assessment.

The aim of the IEC 60695 series of standards is to save lives and property by reducing the number of *fires* or reducing the consequences of the *fire*. This can be accomplished by:

- trying to prevent *ignition* caused by an electrically energised component part and, in the event of *ignition*, to confine any resulting *fire* within the bounds of the enclosure of the electrotechnical product;
- trying to minimise *flame spread* beyond the product's enclosure and to minimise the harmful effects of *fire* effluents including heat, smoke, and toxic or corrosive combustion products.

Fire hazard increases as the burning area increases, leading in some cases to *flashover* and a *fully developed fire*. This is a typical *fire scenario* in buildings. It is therefore useful to measure the rate and extent of the *surface spread of flame*.

This part of IEC 60695-9 describes *surface spread of flame* test methods in common use to assess electrotechnical products or materials used in electrotechnical products. It forms part of the IEC 60695-9 series which gives guidance to product committees wishing to incorporate test methods for *surface spread of flame* in product standards.

[1] Numbers in square brackets refer to the bibliography.

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FIRE HAZARD TESTING –

Part 9-2: Surface spread of flame – Summary and relevance of test methods

1 Scope

This part of IEC 60695-9 presents a summary of published test methods that are used to determine the *surface spread of flame* of electrotechnical products or materials from which they are formed.

It represents the current state of the art of the test methods and, where available, includes special observations on their relevance and use.

The list of test methods is not to be considered exhaustive, and test methods that were not developed by the IEC are not to be considered as endorsed by the IEC unless this is specifically stated.

This summary cannot be used in place of published standards which are the only valid reference documents.

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 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.

IEC 60695-1-10, *Fire hazard testing – Part 1-10: Guidance for assessing the fire hazard of electrotechnical products – General guidelines*

IEC 60695-4:2012, *Fire hazard testing – Part 4: Terminology concerning fire tests for electrotechnical products*

IEC 60695-9-1, *Fire hazard testing – Part 9-1: Surface spread of flame – General guidance*

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

ISO/IEC Guide 51, *Safety aspects – Guidelines for their inclusion in standards*

ISO 13943:2017, *Fire Safety – Vocabulary*

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ISO 19706:2011, *Guidelines for assessing the fire threat to people.*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60695-4:2012 and ISO 13943:2017 (some of which are reproduced below) 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
burned length
maximum extent in a specified direction of the burned area

Note 1 to entry: The typical unit is m.

Note 2 to entry: Compare with the term *damaged length* (3.5).

[SOURCE: ISO 13943: 2017, definition 3.37]

3.2
char length
length of charred area

Note 1 to entry: Compare with the terms *burned length* (3.1) and *damaged length* (3.5).

Note 2 to entry: In some standards, *char length* is defined by a specific test method.

[SOURCE: ISO 13943: 2017, definition 3.49]

3.3
combustible, noun
item capable of combustion (3.4)

[SOURCE: ISO 13943: 2017, definition 3.53]

3.4
combustion
exothermic reaction of a substance with an oxidizing agent

Note 1 to entry: Combustion generally emits *fire* effluent accompanied by *flames* (3.11) and/or glowing.

[SOURCE: ISO 13943: 2017, definition 3.55]

3.5
damaged length
maximum extent in a specified direction of the damaged area

Note 1 to entry: Compare with the terms *char length* (3.2) and *burned length* (3.1)

[SOURCE: ISO 13943: 2017, definition 3.73]

3.6
fire
⟨general⟩ process of *combustion* (3.4) characterized by the emission of heat and *fire* effluent and usually accompanied by smoke, *flame* (3.11), glowing or a combination thereof

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Note 1 to entry: In the English language the term "*fire*" is used to designate three concepts, two of which relate to specific types of self-supporting combustion with different meanings. Of these three, two of them are designated using two different terms in both French and German.

[SOURCE: ISO 13943: 2017, definition 3.114]

3.7
fire
⟨controlled⟩ self-supporting *combustion* (3.4) that has been deliberately arranged to provide useful effects and is limited in its extent in time and space

[SOURCE: ISO 13943: 2017, definition 3.115]

3.8
fire
⟨uncontrolled⟩ self-supporting *combustion* (3.4) that has not been deliberately arranged to provide useful effects and is not limited in its extent in time and space

[SOURCE: ISO 13943: 2017, definition 3.116]

3.9
fire hazard
potential for harm associated with *fire* (3.8)

Note 1 to entry: Alternatively, *fire hazard* can be a physical object or condition with a potential for an undesirable consequence from *fire*.

[SOURCE: ISO 13943: 2017, definition 3.131]

3.10
fire scenario
qualitative description of the course of a *fire* (3.8) with respect to time, identifying key events that characterize the studied *fire* and differentiate it from other possible *fires*

Note 1 to entry: It typically defines the *ignition* (3.18) and *fire* growth processes, the *fully developed fire* (3.16) stage, the *fire* decay stage, and the environment and systems that impact on the course of the *fire*.

Note 2 to entry: Unlike deterministic *fire* analysis, where *fire scenarios* are individually selected and used as design *fire scenarios*, in *fire* risk assessment, *fire scenarios* are used as representative *fire scenarios* within *fire scenario* clusters.

[SOURCE: ISO 13943: 2017, definition 3.152, modified – Note 1 removed as not relevant]

3.11
flame, noun
zone in which there is rapid, self-sustaining, sub-sonic propagation of *combustion* (3.4) in a gaseous medium, usually with emission of light

[SOURCE: ISO 13943: 2017, definition 3.159 – modified by the addition of "zone in which there is"]

3.12
flame front
boundary of flaming combustion at the surface of a material or propagating through a gaseous mixture

[SOURCE: ISO 13943: 2017, definition 3.162]

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3.13
flame spread
propagation of a *flame front* (3.12)

[SOURCE: ISO 13943: 2017, definition 3.168]

3.14
flame-spread rate
DEPRECATED: burning rate
DEPRECATED: rate of burning
distance travelled by a *flame front* (3.12) during its propagation, divided by the time of travel, under specified conditions

Note 1 to entry: The typical unit is $m.s^{-1}$.

[SOURCE: ISO 13943: 2017, definition 3.169]

3.15
flashover
⟨stage of *fire*⟩ transition to a state of total surface involvement in a *fire* (3.8) of combustible materials within an enclosure

[SOURCE: ISO 13943: 2017, definition 3.184]

3.16
fully developed fire
state of total involvement of combustible materials in a *fire* (3.6)

[SOURCE: ISO 13943: 2017, definition 3.192]

3.17
heat release rate
DEPRECATED: burning rate
DEPRECATED: rate of burning
rate of thermal energy production generated by *combustion* (3.4)

Note 1 to entry: The typical unit is W.

[SOURCE: ISO 13943: 2017, definition 3.206]

3.18
ignition
DEPRECATED: sustained ignition
⟨general⟩ initiation of *combustion* (3.4)

[SOURCE: ISO 13943: 2017, definition 3.217]

3.19
ignition source
source of energy that initiates *combustion* (3.4)

[SOURCE: ISO 13943: 2017, definition 3.219]

3.20
intermediate-scale fire test
fire test performed on a test specimen of medium dimensions

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