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Standards

Irish Standard  
I.S. EN 60695-9-1:2013

# Fire hazard testing -- Part 9-1: Surface spread of flame - General guidance (IEC 60695-9-1:2013 (EQV))

## I.S. EN 60695-9-1:2013

*Incorporating amendments/corrigenda issued since publication:*

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EUROPEAN STANDARD  
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EUROPÄISCHE NORM

**EN 60695-9-1**

August 2013

ICS 13.220.40; 29.020

Supersedes EN 60695-9-1:2005

English version

**Fire hazard testing -  
Part 9-1: Surface spread of flame -  
General guidance  
(IEC 60695-9-1:2013)**

Essais relatifs aux risques du feu -  
Partie 9-1: Propagation des flammes en  
surface -  
Lignes directrices générales  
(CEI 60695-9-1:2013)

Prüfungen zur Beurteilung der  
Brandgefahr -  
Teil 9-1: Flammenausbreitung auf  
Oberflächen -  
Allgemeiner Leitfaden  
(IEC 60695-9-1:2013)

This European Standard was approved by CENELEC on 2013-06-03. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

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This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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# CENELEC

European Committee for Electrotechnical Standardization  
Comité Européen de Normalisation Electrotechnique  
Europäisches Komitee für Elektrotechnische Normung

**Management Centre: Avenue Marnix 17, B - 1000 Brussels**

## Foreword

The text of document 89/1159/FDIS, future edition 3 of IEC 60695-9-1, prepared by IEC/TC 89 "Fire hazard testing" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 60695-9-1:2013.

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) 2014-03-03
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2016-06-03

This document supersedes EN 60695-9-1:2005.

EN 60695-9-1:2013 includes the following significant technical changes with respect to EN 60695-9-1:2005:

- a) an expanded scope;
- b) updated references;
- c) updated terms and definitions.

This European Standard is to be used in conjunction with EN 60695-9-2.

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 60695-9-1:2013 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 series	NOTE	Harmonised in EN 60332 series.
IEC 61197	NOTE	Harmonised as EN 61197.
ISO 2719	NOTE	Harmonised as EN ISO 2719.

## Annex ZA

### (normative)

### Normative references to international publications with their corresponding European publications

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. 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 60695-4	-	Fire hazard testing - Part 4: Terminology concerning fire tests for electrotechnical products	EN 60695-4	-
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 2592	-	Determination of flash and fire points - Cleveland open cup method	EN ISO 2592	-
ISO 13943	2008	Fire safety - Vocabulary	EN ISO 13943	2010

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

## FIRE HAZARD TESTING –

**Part 9-1: Surface spread of flame –  
General guidance**

## 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 60695-9-1 has been prepared by IEC technical committee 89: Fire hazard testing.

The text of this standard is based on the following documents:

FDIS	Report on voting
89/1159/FDIS	89/1164/RVD

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

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

This third edition cancels and replaces the second edition of IEC 60695-9-1 published in 2005, and constitutes a technical revision.



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

- a) an expanded scope;
- b) updated references;
- c) updated terms and definitions.

It has the status of a basic safety publication in accordance with IEC Guide 104 and ISO/IEC Guide 51.

This international standard is to be used in conjunction with IEC 60695-9-2.

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

IEC 60695-9 consists of the following parts:

- Part 9-1: Surface spread of flame – General guidance
- Part 9-2: Surface spread of flame – Summary of test methods

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

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

## INTRODUCTION

Fires are responsible for creating hazards to life and property as a result of the generation of heat (thermal hazard), and also toxic effluent, corrosive effluent and smoke (non-thermal hazard). Fire hazard increases with the burning area leading in some cases to flashover and a fully developed fire. This is a typical fire scenario in buildings.

The surface spread of flame beyond the area of ignition occurs as a result of the creation of a pyrolysis front on the surface of the material, ahead of the flame front, arising from the heating by the flame and external heat sources. The pyrolysis front is the boundary between pyrolysed material and unpyrolysed material on the surface of the material. Combustible vapours are generated within the region of pyrolysed material, which mix with air and ignite, creating the flame front.

The surface spread of flame rate is the distance travelled by the flame front divided by the time required to travel that distance. The surface spread of flame rate depends on the heat supplied externally and/or by the flame of the burning material ahead of the burning zone and on the ease of ignition. The ease of ignition is a function of the minimum ignition temperature, thickness, density, specific heat, and thermal conductivity of the material. The heat supplied by the flame depends on the heat release rate, specimen orientation, air flow rate and air flow direction relative to the surface spread of flame direction. In general, materials show one of the following types of surface spread of flame behaviour:

- a) non-propagation: there is no flame propagation beyond the area of ignition;
- b) decelerating propagation: flame propagation stops before reaching the end of the surface of the material; and
- c) propagation: flame propagates beyond the area of ignition and eventually affects the entire surface of the material.

Properties of the materials that are used to describe the surface spread of flame behaviour are associated with surface preheating and pyrolysis, generation of vapours, mixing of the vapours with air, ignition, combustion of the mixture and generation of heat and combustion products. Flame retardants and surface treatments are used to modify the surface spread of flame behaviour. Factors that need to be considered for the assessment of the surface spread of flame behaviour of materials are:

- 1) the fire scenario (including such parameters as surface orientation, ventilation and the nature of the ignition source);
- 2) measurement techniques (see 5.5); and
- 3) the use and interpretation of results obtained (see 6).

## **FIRE HAZARD TESTING –**

### **Part 9-1: Surface spread of flame – General guidance**

#### **1 Scope**

This part of IEC 60695 provides guidance for the assessment of surface spread of flame for electrotechnical products and the materials from which they are formed. It provides:

- an explanation of the principles of flame spread for both liquids and solids,
- guidance for the selection of test methods,
- guidance on the use and interpretation of test results, and
- informative references

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, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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

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 13943:2008, *Fire safety – Vocabulary*

ISO 2592, *Determination of flash and fire points – Cleveland open cup method*

#### **3 Terms and definitions**

For the purposes of this document, terms and definitions given in IEC 60695-4 and in ISO 13943:2008, some of which are reproduced below for the user's convenience, apply.

##### **3.1**

##### **combustion**

exothermic reaction of a substance with an oxidizing agent

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