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Standards

Irish Standard  
I.S. EN 60695-7-1:2010

# Fire hazard testing -- Part 7-1: Toxicity of fire effluent - General guidance (IEC 60695-7-1:2010 (EQV))

## I.S. EN 60695-7-1:2010

*Incorporating amendments/corrigenda issued since publication:*

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I.S. xxx: Irish Standard – national specification based on the consensus of an expert panel and subject to public consultation.

S.R. xxx: Standard Recommendation - recommendation based on the consensus of an expert panel and subject to public consultation.

SWiFT xxx: A rapidly developed recommendatory document based on the consensus of the participants of an NSAI workshop.

<p><i>This document replaces:</i> EN 60695-7-1:2004</p>	<p><i>This document is based on:</i> EN 60695-7-1:2010 EN 60695-7-1:2004</p>	<p><i>Published:</i> 16 July, 2010 18 August, 2004</p>
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<p><b>NSAI</b> 1 Swift Square, Northwood, Santry Dublin 9</p>	<p>T +353 1 807 3800 F +353 1 807 3838 E standards@nsai.ie  W NSAI.ie</p>	<p><b>Sales:</b> T +353 1 857 6730 F +353 1 857 6729 W standards.ie</p>
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English version

**Fire hazard testing -  
Part 7-1: Toxicity of fire effluent -  
General guidance  
(IEC 60695-7-1:2010)**

Essais relatifs aux risques du feu -  
Partie 7-1: Toxicité des effluents du feu -  
Lignes directrices générales  
(CEI 60695-7-1:2010)

Prüfungen zur Beurteilung  
der Brandgefahr -  
Teil 7-1: Toxizität von Rauch  
und/oder Brandgasen -  
Allgemeiner Leitfaden  
(IEC 60695-7-1:2010)

This European Standard was approved by CENELEC on 2010-07-01. 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.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

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 Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

**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 89/990/FDIS, future edition 3 of IEC 60695-7-1, prepared by IEC TC 89, Fire hazard testing, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 60695-7-1 on 2010-07-01.

This European Standard supersedes EN 60695-7-1:2004.

The main changes with respect to the previous edition are listed below:

- minor editorial and technical changes throughout;
- Introduction – text referring to IEC 60695-7-50 and ISO/TS 19700 has been updated;
- references to the ISO 9122 series have been deleted (other than an historical reference to ISO 9122-1 in the Introduction) and the text throughout has been updated;
- definitions have been updated in accordance with ISO/IEC 13943:2008;
- dispersal volume is stated to be an important parameter in the assessment of toxic hazard;
- Table 2 has been updated;
- Figures 1 and 2 have both been updated.

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

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

The following dates were fixed:

- latest date by which the EN has to be implemented  
at national level by publication of an identical  
national standard or by endorsement (dop) 2011-04-01
- latest date by which the national standards conflicting  
with the EN have to be withdrawn (dow) 2013-07-01

Annex ZA has been added by CENELEC.

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## Endorsement notice

The text of the International Standard IEC 60695-7-1:2010 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:

- [2] IEC 60695-6-1:2005 NOTE Harmonized as EN 60695-6-1:2005 (not modified).
- [11] IEC 60695-1-10 NOTE Harmonized as EN 60695-1-10.
- [12] IEC 60695-1-11 NOTE Harmonized as EN 60695-1-11<sup>1)</sup>.

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<sup>1)</sup> At draft stage.

## 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 60695-7-2	-	Fire hazard testing - Part 7-2: Toxicity of fire effluent - Summary and relevance of test methods	EN 60695-7-2	-
IEC 60695-7-3	-	Fire hazard testing - Part 7-3: Toxicity of fire effluent - Use and interpretation of test results	EN 60695-7-3	-
IEC Guide 104	1997	The preparation of safety publications and the use of basic safety publications and group safety publications	-	-
ISO/IEC Guide 51	1999	Safety aspects - Guidelines for their inclusion in standards	-	-
ISO 13344	2004	Estimation of the lethal toxic potency of fire effluents	-	-
ISO 13571	2007	Life-threatening components of fire - Guidelines for the estimation of time available for escape using fire data	-	-
ISO 13943	2008	Fire safety - Vocabulary	EN ISO 13943	200X <sup>2)</sup>
ISO 16312-1	-	Guidance for assessing the validity of physical fire models for obtaining fire effluent toxicity data for fire hazard and risk assessment - Part 1: Criteria	-	-
ISO/TR 16312-2	-	Guidance for assessing the validity of physical fire models for obtaining fire effluent toxicity data for fire hazard and risk assessment - Part 2: Evaluation of individual physical fire models	-	-
ISO 19701	-	Methods for sampling and analysis of fire effluents	-	-
ISO 19702	-	Toxicity testing of fire effluents - Guidance for analysis of gases and vapours in fire effluents using FTIR gas analysis	-	-

<sup>2)</sup> At draft stage.

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<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
ISO 19703	2005	Generation and analysis of toxic gases in fire - Calculation of species yields, equivalence ratios and combustion efficiency in experimental fires	-	-
ISO 19706	2007	Guidelines for assessing the fire threat to people	-	-

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

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### **FIRE HAZARD TESTING –**

### **Part 7-1: Toxicity of fire effluent – 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 60695-7-1 has been prepared by IEC technical committee 89: Fire hazard testing.

This third edition cancels and replaces the second edition published in 2004. It constitutes a technical revision.

The main changes with respect to the previous edition are listed below:

- minor editorial and technical changes throughout;
- Introduction – text referring to IEC 60695-7-50 and ISO/TS 19700 has been updated;
- references to the ISO 9122 series have been deleted (other than an historical reference to ISO 9122-1 in the Introduction) and the text throughout has been updated;
- definitions have been updated in accordance with ISO/IEC 13943:2008;



- dispersal volume is stated to be an important parameter in the assessment of toxic hazard;
- Table 2 has been updated;
- Figures 1 and 2 have both been updated.

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

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

FDIS	Report on voting
89/990/FDIS	89/1003/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 standard is to be used in conjunction with IEC 60695-7-2.

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

Part 7 consists of the following parts:

- Part 7-1: Toxicity of fire effluent – General guidance
- Part 7-2: Toxicity of fire effluent – Summary and relevance of test methods
- Part 7-3: Toxicity of fire effluent – Use and interpretation of test results
- Part 7-50: Toxicity of fire effluent – Estimation of toxic potency – Apparatus and test method
- Part 7-51: Toxicity of fire effluent – Estimation of toxic potency – Calculation and interpretation of test results

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

Electrotechnical products sometimes become involved in fires. However, except for certain specific cases (for example, power generating stations, mass transit tunnels, computer suites), electrotechnical products are not normally present in sufficient quantities to form the major source of toxic hazard. For example, in domestic dwellings and places of public assembly, electrotechnical products are usually a very minor source of fire effluent compared with, for example, furnishings.

The IEC 60695-7 series of publications is subject to the ongoing evolution of fire safety philosophy within ISO TC 92.

The guidance in this International Standard is consistent with the principles of fire safety developed by ISO TC 92 (SC 3) on toxic hazards in fire as described in ISO 19706. General guidance for the fire hazard assessment of electrotechnical products is provided in IEC 60695-1-10 and IEC 60695-1-11. Guidance on the estimation of escape times from fires is provided in ISO 13571. The determination of the lethal toxic potency of fire effluents is described in ISO 13344.

In 1989, the following views were expressed in ISO/TR 9122-1.

"Small-scale toxic potency tests as we know them today are inappropriate for regulatory purposes. They cannot provide rank orderings of materials with respect to their propensity to produce toxic atmospheres in fires. All currently available tests are limited because of their inability to replicate the dynamics of fire growth which determine the time/concentration profiles of the effluent in full-scale fires, and the response of electrotechnical products, not just materials. This is a crucial limitation because the toxic effects of combustion effluent are now known to depend much more on the rates and conditions of combustion than on the chemical constitution of the burning materials."

Because of these limitations IEC TC 89 developed IEC 60695-7-50 and ISO subsequently developed ISO/TS 19700 [1]<sup>1</sup>. Both these standards use the same apparatus. It is a practical small-scale apparatus which is used to measure toxic potency and which, by virtue of its ability to model defined stages of a fire, yields toxic potency data suitable for use in a full hazard assessment. Both methods use variations in air flow and temperature to give different physical fire models, but the ISO test method additionally uses the equivalence ratio as a key parameter.

The evidence from fires and fire casualties, when taken with data from experimental fire and combustion toxicity studies, suggests that chemical species with unusually high toxicity are not important (see 4.3.4). Carbon monoxide is by far the most significant agent contributing to toxic hazard. Other agents of major significance are hydrogen cyanide, carbon dioxide and irritants. There are also other important non-toxic threats to life such as the effects of heat, radiant energy, depletion of oxygen and smoke obscuration, all of which are discussed in ISO 13571. General guidance on of smoke obscuration is provided in IEC 60695-6-1 [2].

IEC TC 89 recognizes that the effective mitigation of toxic hazard from electrotechnical products is best accomplished by tests and regulations leading to improved resistance to ignition and to reduced rates of fire growth, thus limiting the level of exposure to fire effluent.

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<sup>1</sup> Figures in square brackets refer to the bibliography.

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