

Fire hazard testing —

Part 7-1: Toxicity of fire effluent — General guidance

The European Standard EN 60695-7-1:2004 has the status of a British Standard

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National foreword

This British Standard is the official English language version of EN 60695-7-1:2004. It is identical with IEC 60695-7-1:2004. It supersedes BS EN 60695-7-1:1996 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee GEL/89, Fire hazard testing, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

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

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Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 22, an inside back cover and a back cover.

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English version

Fire hazard testing
Part 7-1: Toxicity of fire effluent –
General guidance
(IEC 60695-7-1:2004)

Essais relatifs aux risques du feu
Partie 7-1: Toxicité des effluents du feu -
Lignes directrices générales
(CEI 60695-7-1:2004)

Prüfungen zur Beurteilung
der Brandgefahr
Teil 7-1: Toxizität von Rauch
und/oder Brandgasen –
Allgemeiner Leitfaden
(IEC 60695-7-1:2004)

This European Standard was approved by CENELEC on 2004-07-01. 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.

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CENELEC

European Committee for Electrotechnical Standardization
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Europäisches Komitee für Elektrotechnische Normung

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Foreword

The text of document 89/650/FDIS, future edition 2 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 2004-07-01.

This European Standard supersedes EN 60695-7-1:1995.

Although the structure of this standard remains essentially the same, the main changes with respect to EN 60695-7-1:1995 are listed below:

- introduction:
 - an explanation concerning the publication of IEC 60695-7-50,
 - a small-scale toxicity test method,
 - reference to IEC 60695-7-51 which covers the calculation and interpretation of test results,
 - an explanation of the alignment with ISO/TC 92 *Fire safety*;
- the expansion of the scope further clarifies the subject matter and alignment with ISO/TC 92, in particular ISO 13344 and ISO/TS 13571;
- formulae are given for the calculation of the fraction of the incapacitating dose for each of the asphyxiants, carbon monoxide and hydrogen cyanide;
- volume fractions that are expected to cause incapacitation (F values) are given for some of the more important irritants;
- the definitions have been greatly expanded and updated;
- the subclause on factors determining toxic hazard has been expanded;
- new subclauses include general aspects of small-scale test methods, evaluation of test methods and the relevance of toxic hazard data to hazard assessment;
- a flowchart has been added to outline the stages to be followed for test method assessment.

This European Standard is to be used in conjunction with IEC 60695-7-2:2002, *Fire hazard testing – Part 7-2: Toxicity of fire effluent – Summary and relevance of test methods*.

The following dates were fixed:

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| – latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement | (dop) | 2005-04-01 |
| – latest date by which the national standards conflicting with the EN have to be withdrawn | (dow) | 2007-07-01 |
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Endorsement notice

The text of the International Standard IEC 60695-7-1:2004 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 60695-1-1 NOTE Harmonized as EN 60695-1-1:2000 (not modified).

IEC 60695-6-1 NOTE Harmonized as EN 60695-6-1:2001 (not modified).

CONTENTS

INTRODUCTION.....	5
1 Scope.....	6
2 Normative references.....	6
3 Terms and definitions	7
4 Factors determining toxic hazard	11
4.1 Evaluation of the toxic hazard	11
4.2 Burning rate.....	11
4.3 Toxicity of fire effluent	11
4.3.1 General	11
4.3.2 Asphyxiants	12
4.3.3 Sensory and/or upper respiratory irritants	13
4.3.4 Unusually high toxicity and extreme toxic potency	14
4.4 Escape time	14
5 General aspects of small scale test methods used to evaluate the toxic hazard of fire gas effluent.....	14
5.1 General	14
5.2 Fire model	15
5.3 Static methods.....	16
5.4 Dynamic methods	16
5.5 Measurement of toxicity	17
5.5.1 General	17
5.5.2 Chemical analysis based methods.....	17
5.5.3 Methods based on animal exposure	18
6 Evaluation of test methods.....	18
6.1 Parameters to be considered	18
6.2 Selection of test specimen	18
7 Relevance of toxic hazard data to hazard assessment.....	19
Annex ZA (normative) Normative references to international publications with their corresponding European publications.....	21
Bibliography	22

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/TR 9122, Parts 1 to 6. General guidance for the assessment of the fire hazard of electrotechnical products is provided in IEC 60695-1-1. Guidance on the estimation of escape times from fires is provided in ISO/TS 13571. The determination of the lethal toxic potency of fire effluents is described in ISO 13344.

The following is a summary of the views 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 has developed IEC 60695-7-50. This is a practical small-scale test for toxic potency which, by virtue of its ability to model defined stages of a fire, will yield toxic potency data suitable for use in a full hazard assessment. The test method follows the guidance of ISO TC 92 (SC 3) in terms of the fire models used, and in methods of measurement of effluent. IEC 60695-7-51 covers the calculation and interpretation of test results, again following the guidance of ISO TC 92 (SC 3).

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/TS 13571. General guidance on the effects of smoke obscuration is provided in IEC 60695-6-1.

ISO/TR 9122-1 recognizes that effective mitigation of toxic hazard 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.

FIRE HAZARD TESTING –

Part 7-1: Toxicity of fire effluent – General guidance

1 Scope

This part of IEC 60695 provides guidance on the factors which affect the toxic hazard from fires involving electrotechnical products, and provides information on the methodologies recommended by ISO TC 92 (SC 3) for estimating and reducing toxic hazard from fires, as expressed in ISO/TR 9122 (Parts 1 to 6), ISO 13344 and ISO/TS 13571.

There is no single test to realistically assess toxic hazard in fires. Small-scale toxic potency tests are not capable on their own of assessing fire hazard. Current toxicity tests attempt to measure the toxic potency of a laboratory generated fire effluent. Toxic potency should not be confused with toxic hazard.

One of the responsibilities of a technical committee is, wherever applicable, to make use of basic safety publications in the preparation of its 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 60695-7-2:2002, *Fire hazard testing – Part 7-2: Toxicity of fire effluent – Summary and relevance of test methods*

IEC 60695-7-3:2004, *Fire hazard testing – Part 7-3: Toxicity of fire effluent – Use and interpretation of test results*

IEC Guide 104:1997, *The preparation of safety publications and the use of basic safety publications and group safety publications*

ISO/IEC 13943:2000, *Fire safety – Vocabulary*

ISO/TR 9122 (all parts), *Toxicity testing of fire effluents*

ISO 13344:1996, *Determination of the lethal toxic potency of fire effluents*

ISO/TS 13571:2002, *Life-threatening components of fire – Guidelines for the estimation of time available for escape using fire data*