

Fire hazard testing —

Part 7-2: Toxicity of fire effluent — Summary and relevance of test methods

ICS 13.220; 29.020

National foreword

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Partie 7-2:

Toxicité des effluents du feu –

Résumé et pertinence des méthodes d'essai

Fire hazard testing –

Part 7-2:

Toxicity of fire effluent –

Summary and relevance of test methods



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INTERNATIONAL ELECTROTECHNICAL COMMISSION

FIRE HAZARD TESTING –**Part 7-2: Toxicity of fire effluent –
Summary and relevance of test methods**

FOREWORD

- 1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the 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, the IEC publishes International Standards. 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. The 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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The main task of IEC technical committees is to prepare International Standards. However, a technical committee may propose the publication of a technical report when it has collected data of a different kind from that which is normally published as an International Standard, for example "state of the art".

Technical reports do not necessarily have to be reviewed until the data they provide are considered to be no longer valid or useful by the maintenance team.

IEC 60695-7-2, which is a technical report, has been prepared by IEC technical committee 89: Fire hazard testing.

The text of this technical report is based on the following documents:

Enquiry draft	Report on voting
89/470/DTR	89/503/RVC

Full information on the voting for the approval of this technical report 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 document, which is purely informative, is not to be regarded as an International Standard.

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

The committee has decided that the contents of this publication will remain unchanged until 2007. At this date, the publication will be

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- withdrawn;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

INTRODUCTION

The IEC 60695-7 series provides guidance to IEC product committees on the adoption and implementation of the recommendations of ISO TC 92, for the minimization of toxic hazard from fires involving electrotechnical products.

Electrotechnical products, primarily as the objects of a fire, may contribute to the fire hazard due to release of toxic effluent, which may be a significant contributing factor to the overall fire hazard.

IEC product committees incorporating requirements for the assessment of toxic hazard in product standards should note that toxic potency and other measurements of toxicity which are described in this technical report should not be used directly in product specifications. Data from toxic potency test methods should only be used as part of a toxic hazard assessment, in conjunction with other product based reaction to fire data such as mass loss rate.

FIRE HAZARD TESTING –

Part 7-2: Toxicity of fire effluent – Summary and relevance of test methods

1 Scope

This technical report gives a brief summary of the test methods that are in common use in the assessment of lethal and sublethal acute toxic potency, and other toxicity tests. It includes special observations on their relevance to real fire scenarios and gives recommendations on their use.

It advises which tests provide toxic potency data which is relevant to real fire scenarios, and which are suitable for use in fire hazard assessment and fire safety engineering.

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 60695-7-1:1993, *Fire hazard testing – Part 7: Guidance on the minimization of toxic hazards due to fires involving electrotechnical products – Section 1: General*

IEC/TS 60695-7-3:1998, *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/TR 9122-1:1989, *Toxicity testing of fire effluents – Part 1: General*

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

3 Definitions

For the purposes of this part of IEC 60695, definitions taken from ISO/IEC 13943 and IEC 60695-7-3 apply.

3.1

burn

to undergo combustion

(ISO/IEC 13943, definition 10)

3.2**combustible**

item capable of combustion

(ISO/IEC 13943, definition 22)

3.3**combustion**

exothermic reaction of a substance with an oxidizer

NOTE Combustion generally emits effluent accompanied by flames and/or visible light.

(ISO/IEC 13943, definition 23)

3.4**exposure dose**

concentration of fire effluent (C) multiplied by time of exposure to the fire effluent (t). Generally noted as " Ct ", it is a time-dependent quantity, since the concentration can vary with time

(IEC 60695-7-3:1998, definition 3.3)

3.5**fire effluent**

totality of gases and/or aerosols (including suspended particles) created by combustion or pyrolysis

(ISO/IEC 13943, definition 45)

3.6**fire hazard**

potential for injury and/or damage from fire

(ISO/IEC 13943, definition 48)

3.7**fire model**

procedure or process intended to represent, predict or reproduce one or more phases of a fire, or the transition between phases

(ISO/IEC 13943, definition 51)

3.8**fire scenario**

detailed description of conditions, including environmental, of one or more stages from before ignition to after completion of combustion in an actual fire at a specific location or in a real-scale simulation

(ISO/IEC 13943, definition 58)

3.9**fractional effective dose (FED)**

ratio of the exposure dose (Ct) to the effective dose (ECt_{50}) for the same fire effluent

NOTE When $FED = 1$, the defined effect (incapacitation or death) is predicted to occur.

(IEC 60695-7-3:1998, definition 3.4)

3.10

fully developed fire

state of total involvement of combustible materials in a fire
(ISO/IEC 13943, definition 80)

3.11

heat flux

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

NOTE It is expressed in watts per square metre.

(ISO/IEC 13943, definition 85)

3.12

ignition source

source of energy that initiates combustion
(ISO/IEC 13943, definition 97)

3.13

ignition temperature (minimum)

(minimum) temperature at which combustion can be initiated under specific test conditions

NOTE 1 It is expressed in degrees Celsius.

NOTE 2 The minimum ignition temperature implies thermal stressing to infinite time.

For practical purposes, the temperature should be measured either on the material or the ignition source, and the standard should clearly show how and when the temperature is measured.

(ISO/IEC 13943, definition 98)

3.14

incapacitation

loss of ability to escape from a fire
(IEC 60695-7-3:1998, definition 3.5)

3.15

irritant

toxicant causing pulmonary irritancy and/or sensory irritancy
(ISO/IEC 13943, definition 107)

3.16

lethal concentration (LC_{50})

concentration of toxic gas or fire effluent statistically calculated from concentration-response data to produce lethality in 50 % of test animals of a given species under specified conditions

NOTE It is expressed in grams per cubic metre.

(ISO/IEC 13943, definition 108)

3.17

lethal exposure dose ($L Ct_{50}$)

result of the multiplication of the concentration of toxic gas or fire effluent, with the exposure time (concentration $\times$ time, Ct), causing lethality of 50 % of test animals of a given species under specified conditions

NOTE It is expressed in gram minutes per cubic metre.

(ISO/IEC 13943, definition 110)