

Fire hazard testing —

Part 1: Guidance for assessing fire hazard of electrotechnical products —

Section 1: General guidance

The European Standard EN 60695-1-1:1995 has the status of a
British Standard

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Committees responsible for this British Standard

The preparation of this British Standard was entrusted to Technical Committee GEL/89, Fire hazard testing, upon which the following bodies were represented:

- Association of Manufacturers of Domestic Electrical Appliances
- British Cable Makers Confederation
- British Electrical Systems Association (BEAMA Ltd.)
- British Plastics Federation
- British Telecommunications plc
- Electrical Installation Equipment Manufacturers' Association (BEAMA Ltd.)
- Electricity Association
- Federation of the Electronics Industry
- Home Office
- Lighting Industry Federation Ltd.
- Ministry of Defence
- National Supervising Inspectorate
- Society of British Aerospace Companies Limited
- Warrington Fire Research Centre

This British Standard, having been prepared under the direction of the Electrotechnical Sector Board, was published under the authority of the Standards Board and comes into effect on 15 May 1996

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Contents

	Page
Committees responsible	Inside front cover
National foreword	ii
Foreword	2
Text of EN 60695-1-1	3
List of references	Inside back cover

National foreword

This British Standard has been prepared by Technical Committee GEL/89 and is the English language version of EN 60695-1-1:1995, *Fire hazard testing — Part 1: Guidance for assessing fire hazard of electrotechnical products — Section 1: General guidance*, published by the European Committee for Electrotechnical Standardization (CENELEC). It is identical with IEC 60695-1-1:1995 including Corrigendum, October 1996, published by the International Electrotechnical Commission (IEC).

From 1 January 1997, all IEC publications have the number 60000 added to the old number. For instance, IEC 27-1 has been renumbered as IEC 60027-1. For a period of time during the change over from one numbering system to the other, publications may contain identifiers from both systems.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, the EN title page, pages 2 to 20, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

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English version

Fire hazard testing
Part 1: Guidance for assessing fire hazard of
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Section 1: General guidance

(IEC 60695-1-1:1995 including Corrigendum, October 1996)

Essais relatifs aux risques du feu
Partie 1: Guide pour l'évaluation des risques du
feu des produits électrotechniques
Section 1: Guide général
(CEI 60695-1-1:1995 inclut Corrigendum,
Octobre 1996)

Prüfungen zur Beurteilung der Brandgefahr
Teil 1: Anleitung zur Beurteilung der
Brandgefahr von elektrotechnischen
Erzeugnissen
Hauptabschnitt 1: Allgemeine Anleitung
(IEC 60695-1-1:1995 enthält Corrigendum,
Oktober 1996)

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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
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

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Foreword

The text of document 89(CO)37, future edition 2 of IEC 695-1-1, prepared by IEC TC 89, Fire hazard testing, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 60695-1-1 on 1995-07-04.

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) 1996-04-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 1996-04-01

Annexes designated “normative” are part of the body of the standard.

Annexes designated “informative” are given for information only.

In this standard, Annex ZA is normative and Annex A is informative.

Annex ZA has been added by CENELEC.

Contents

	Page
Foreword	2
Introduction	3
1 Scope	3
2 Normative reference	3
3 Definitions	3
4 Fire hazard assessment	3
4.1 General	3
4.2 Development of fire hazard assessment	4
5 Fire hazard tests	6
5.1 General	6
5.2 Hazard assessment	6
5.3 Types of fire hazard tests	6
5.4 Preparation of requirements and test specifications	7
Annex A (informative) Flow charts	11
Annex ZA (normative) Normative references to international publications with their corresponding European publications	20
Bibliography	19
Table 1 — Common ignition phenomena in electrotechnical products	9
Table 2 — Terms specific to electrotechnical products used in this standard	10

Introduction

The risk of fire needs to be considered in any electrical circuit. With regard to this risk, the objective of component circuit and equipment design and the choice of material is to reduce the likelihood of fire even in the event of foreseeable abnormal use, malfunction or failure. The primary aim is to prevent ignition due to the electrically energized part but, if ignition and fire do occur, to control the fire preferably within the bounds of the enclosure of the electrotechnical product. In cases where surfaces of the electrotechnical products are exposed to an external fire, care will be taken to ensure that they do not contribute to the fire growth to a greater extent than the building products or structures in the immediately surrounding areas.

1 Scope

This part of IEC 695 provides guidance for assessing the fire hazard of electrotechnical products (see clause 4) and for the resulting development of fire hazard testing (see clause 5) as related directly to harm to people, animals or property. Products, as defined in this standard, relate to materials, components or complete end-use products.

This standard is intended as guidance to IEC committees, and should be used with respect to their individual applications. Attention is drawn to the principles in IEC Guide 104, and to the role of committees with safety pilot functions and safety group functions.

2 Normative references

The following normative document contains provisions which, through reference in this text, constitutes provisions of this part of IEC 695. At the time of publication, the edition indicated was valid. All normative documents are subject to revision, and parties to agreements based on this part of IEC 695 are encouraged to investigate the possibility of applying the most recent edition of the normative document indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC Guide 104:1984, *Guide to the drafting of safety standards, and the role of Committees with safety pilot functions and safety group functions*.

IEC 695-4:1993, *Fire hazard testing — Part 4: Terminology concerning fire tests*.

3 Definitions

For the purposes of this part of IEC 695, the following definitions apply.

3.1

fire hazard (n)

the potential degree of personal injury or damage to property by a fire

3.2

fire risk (n)

the expected loss from a fire. The expected loss is described in terms of probability as the product of:

- frequency of occurrence of an undesired event to be expected in a given technical operation or state, and
- the extent of damage (i.e., the hazard) to be expected when the event occurs.

4 Fire hazard assessment

4.1 General

It is important to understand and maintain the differences between “fire hazard” and “fire risk”. The primary concern for hazard assessment is to minimize the risk of fires caused by electrically induced ignition within electrotechnical products and, should one start, to limit fire propagation. External events, such as the outbreak of a fire in the environment, shall also be considered, but as a secondary matter and to a lesser extent; however, deliberate misuse of an electrotechnical product shall, in general, be disregarded.

Consideration shall also be given to heat release and opacity, toxicity and corrosivity of the smoke from a burning product, and any necessary ability to function under fire conditions. These hazards are all related to ignition and fire growth. The emission of gases may also lead to a risk of explosion under certain circumstances.

Certain electrotechnical products, such as large enclosures, insulated cables and conduits, may in fact cover large portions of surfaces and finishing materials of building construction or may penetrate fire-resisting walls. In these circumstances, electrotechnical products, when exposed to an external fire, shall be evaluated from the standpoint of their contribution to the fire hazard in comparison to the building materials or structure lacking the installation of electrotechnical products. Following a detailed review of all the hazards related to a fire scenario, the final product standards, as drafted, should include a series of tests or a single test, as appropriate, to address the specific hazard(s) defined.

4.2 Development of fire hazard assessment

4.2.1 Overview of fire hazard elements

The fire hazard of an electrotechnical product depends on its characteristics, service conditions and the environment in which it is used, including the number and type of people, the value and vulnerability of property to be exposed to a fire involving that product. Therefore, a fire hazard assessment procedure for a particular product shall describe the product, its conditions of operation and its environment.

4.2.2 Basic steps

The basic steps to follow in developing a fire hazard assessment are:

- a) the definition of the scope (for example, the electrotechnical product range concerned) and the context (for example, where and how the products are used) (see 4.2.2.1);
- b) the identification of the scenarios concerned (see 4.2.2.2);
- c) the selection of the criteria to be used (see 4.2.2.3);
- d) the interpretation of results (see 4.2.2.4).

4.2.2.1 Definition of the scope and context

The first step involves defining the range of electrotechnical products to which the fire hazard assessment is to apply, examining the points of variability and commonality in the product range and its uses which may define the parameters of the fire hazard assessment procedure. This may be done by answering the questions set out below.

a) Range of electrotechnical products

What is the definition of the product to be covered? Is the product described well enough that it can always be determined whether the product is in the range? Is it described by an applicable IEC standard? Is the description broad enough so that all products capable of substituting for the products covered are also included? Does the scope allow it to be determined if a given product is covered?

b) Circumstances of use

What are the service conditions of the electrotechnical product: continuous or intermittent use? Is the product attended or not during service? Is the surrounding temperature controlled?

What does the location of the electrotechnical product indicate about its role in causing or propagating fire, resulting from its interaction with other objects in the environment?

Is the product always in an enclosed or exposed space?

What are the number and capabilities of persons involved?

How close is the exposed population or critical equipment to the fire?

c) Testing of the defined scope and context

Using the answers to the above questions, formulate a trial description of the product and its circumstances of use. The trial description can then be tested against a list of products, which are potentially candidates for inclusion in the scope and context, by making use of the procedure outlined in Annex A, flow chart 1.

4.2.2.2 Identification of scenarios of concern

A fire scenario is a detailed description of conditions of one or more stages in an actual fire from before ignition to completion of combustion, or a full-scale simulation. There will often be more than one fire scenario in which the electrotechnical product can participate, and in principle, the product can be assumed to contribute differently to the fire hazard associated with each scenario. Therefore, a separate hazard assessment is required for each important scenario identified.

Whether the focus of assessment is a product or a system, typically the most important scenario characteristics will be those that either define the fire conditions that cause the product to become involved in fire, or that indicate the time in the fire when its contribution will cause the greatest hazard consequences.

a) Electrotechnical product involvement in fire

The knowledge of the source of ignition is of prime importance in the case of electrotechnical products. If the product is its own source of ignition, conditions through which the ignition could take place are to be analysed in detail in terms of electrical behaviour (see Table 1). Is it a short circuit (which is seldom the case), a hot spot (cause of the hot spot), or a general overheating? How long did the electrical malfunction continue before ignition took place? Each scenario should give a precise description of the detailed conditions governing the initiation of the fire, including the possible accumulation of gases within an enclosed space.

If the electrotechnical product is not its own source of ignition, describe when and how it tends to become involved in fire:

- Is the product likely to be the first item ignited?
- Is the product a potentially significant fuel source, even if it is not the first item ignited?
- Is the product a potential agent for fire propagation?