

INTERNATIONAL STANDARD

BASIC SAFETY PUBLICATION

HORIZONTAL PUBLICATION

**Fire hazard testing -
Part 1-12: Guidance for assessing the fire hazard of electrotechnical products -
Fire safety engineering**



THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2026 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester. If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

IEC Secretariat
3, rue de Varembe
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigendum or an amendment might have been published.

IEC publications search -

webstore.iec.ch/advsearchform

The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee, ...). It also gives information on projects, replaced and withdrawn publications.

IEC Just Published - webstore.iec.ch/justpublished

Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and once a month by email.

IEC Customer Service Centre - webstore.iec.ch/csc

If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: sales@iec.ch.

IEC Products & Services Portal - products.iec.ch

Discover our powerful search engine and read freely all the publications previews, graphical symbols and the glossary. With a subscription you will always have access to up to date content tailored to your needs.

Electropedia - www.electropedia.org

The world's leading online dictionary on electrotechnology, containing more than 22 500 terminological entries in English and French, with equivalent terms in 25 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

Warning! Make sure that you obtained this publication from an authorized distributor.

CONTENTS

FOREWORD	2
INTRODUCTION	4
1 Scope	6
2 Normative references	6
3 Terms and definitions	6
4 The fire safety engineering process	7
4.1 General	7
4.2 Fire safety engineering calculations	8
4.3 Validity of methods	9
5 Benefits of fire safety engineering	9
6 Objectives of fire safety engineering	10
6.1 General	10
6.2 Safety of life	10
6.3 Conservation of property	10
6.4 Continuity of operation	10
6.5 Protection of the natural environment	11
6.6 Preservation of heritage	11
7 Functional requirements	11
8 Performance criteria	11
8.1 General	11
8.2 Explicit performance criteria	11
8.3 Implicit performance criteria	12
9 Design fire scenarios and design fires	12
9.1 Design fire scenarios	12
9.2 Design fires	13
10 Data for fire safety engineering	13
11 Tests on electrotechnical products	14
11.1 General	14
11.2 Condition for evaluation in fire tests	14
11.3 Test selection and/or development	14
12 Evaluation of electrotechnical products	15
12.1 As the source of ignition of a fire	15
12.2 As the victim of a fire	16
Annex A (informative) An example of application of Fire Safety Engineering (FSE) Method for prediction of flammability of materials in microgravity environment	17
A.1 Background	17
A.2 Method of application of Fire Safety Engineering (FSE) to predict the flammability of materials in microgravity environment	17
A.3 Details of the application of FSE	17
Bibliography	18
Figure 1 – FSE process – Design, implementation and management	8
Table 1 – Examples of design fire scenario	12
Table 2 – Common ignition phenomena encountered in electrotechnical products	15

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**Fire hazard testing -
Part 1-12: Guidance for assessing the fire hazard
of electrotechnical products - Fire safety engineering**

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.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) IEC draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). IEC takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, IEC had not received notice of (a) patent(s), which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at <https://patents.iec.ch>. IEC shall not be held responsible for identifying any or all such patent rights.

IEC 60695-1-12 has been prepared by IEC technical committee 89: Fire hazard testing. It is an International Standard.

This document has been given the status of a horizontal document in accordance with the ISO/IEC Directives, Part 1. It has the status of a basic safety publication in accordance with IEC Guide 104 and ISO/IEC Guide 51.

This second edition cancels and replaces the first edition published in 2015. This edition constitutes a technical revision.

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

- a) whole text is renewed to contain the most recent technologies of fire safety engineering mainly developed by ISO/TC92 Fire safety SC4 Fire safety engineering.

b) Annex A is changed to show example of application of FSE in an international standard.

The text of this International Standard is based on the following documents:

Draft	Report on voting
89/1631/CDV	89/1670/RVC

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

The language used for the development of this International Standard is English.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/reference. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

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 60695-1 consists of the following parts:

Part 1-10: Guidance for assessing the fire hazard of electrotechnical products - General guidelines

Part 1-11: Guidance for assessing the fire hazard of electrotechnical products - Fire hazard assessment

Part 1-12: Guidance for assessing the fire hazard of electrotechnical products - Fire safety engineering

Part 1-30: Guidance for assessing the fire hazard of electrotechnical products - Preselection testing process - General guidelines

Part 1-40: Guidance for assessing the fire hazard of electrotechnical products - Insulating liquids.

This document is to be used in conjunction with IEC 60695-1-10 and IEC 60695-1-11.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn, or
- revised.

INTRODUCTION

Fire safety engineering

Fire safety engineering (FSE) is the application of engineering methods based on scientific principles to the development or assessment of designs in the built environment through the analysis of specific fire scenarios or through the quantification of risk for a group of fire scenarios.

Typical objectives of FSE are:

- a) to protect life safety,
- b) to protect property,
- c) to maintain the continuity of operations,
- d) to protect the natural environment, and
- e) to preserve heritage.

The analysis of FSE is usually based on calculations that use input data obtained principally from quantitative fire tests as described in IEC 60695-1-11.

Fire safety engineering (FSE) is a discipline increasingly being used in support of performance-based national fire safety regulations in many states and regional jurisdictions throughout the world. ISO 23932-1 [1]¹, developed by ISO TC 92/SC 4, outlines the fundamental methodologies and uses of FSE. Further detailed aspects of FSE are covered in ISO 16730-1 [2], ISO 16732-1 [3], ISO 16733-1 [4], ISO 24678-2 [5], ISO 24678-3 [6], ISO 24678-4 [7] and ISO/TR 16738 [8].

In addition to performance-based regulations, many nations are also using FSE to supplement prescriptive regulations by applying FSE principles to specific design aspects, where reduced costs, alternative practices, improved performance and improved safety are the objectives.

The International Maritime Organization (IMO) is using FSE and the ISO standards mentioned above to develop fire safety designs for ships as described in IMO MSC/Circ.1002[27]. These are considered to bring an improvement in the design of electrotechnical products.

There are handbooks, guides and literatures which give information with regards to FSE. See Bibliography [28], [29], [30], [31], [32], [33], [34], [35], [36], [37], [38].

Qualitative and quantitative fire tests

Many standardized qualitative fire test methods give information on the performance of a material or end product as measured in the test. Such information usually is not related to a real fire scenario or real installation practices. These qualitative fire test methods result in a "pass" or "fail" and/or a product or material ranking. They play an important role in prescriptive regulations, and the results of a qualitative test can be used indirectly in fire hazard assessment of electrotechnical products, but they are not suitable for directly supporting performance-based design.

Most standardized test methods developed by IEC TC 89 for electrotechnical products are of the qualitative type. It is agreed within ISO TC 92 and IEC TC 89 that this type of fire test will continue to be maintained and, where necessary, developed. It is recognized that, even if the use of these standards is in prescriptive codes, product data from many of these standards can be potentially adaptable for fire safety engineering purposes.

¹ Numbers in square brackets refer to the Bibliography.

In contrast, quantitative fire tests are increasingly being developed and used, and these provide data that can be inputs to fire safety engineering calculations.

Various ISO standards [14] to [23] for quantitative fire tests have been developed by ISO TC 92/SC 1, *Fire safety - Initiation and growth of fire*, some of which can be used to assess the performance of electrotechnical products, and referred to in the series of IEC 60695, e.g. IEC TS 60695-5-2 [9], IEC 60695-6-2 [10], IEC 60695-7-2 [11], IEC 60695-8-2 [12] and IEC 60695-9-2 [13].

Sample Document

get full document from standards.iteh.ai