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NORME INTERNATIONALE

BASIC SAFETY PUBLICATION

PUBLICATION FONDAMENTALE DE SÉCURITÉ

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

Essais relatifs aux risques du feu –
Partie 1-30: Lignes directrices pour l'évaluation des risques du feu des produits électrotechniques – Processus d'essai de présélection – Lignes directrices générales

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FIRE HAZARD TESTING –

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

FOREWORD

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International Standard IEC 60695-1-30 has been prepared by IEC technical committee 89: Fire hazard testing.

This third edition cancels and replaces the second edition published in 2008. This edition constitutes a technical revision.

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

a) Reference to IEC 60695-1-12;
b) Modified Introduction;
c) Clause 2: updated and additional normative references;
d) Clause 3: updated and additional terms and definitions;

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e) Clause 4: updated text, with a requirement and normative reference to IEC 60695-1-10, IEC 60695-1-11 and IEC 60695-1-12;

f) Clause 5: modified text;

g) Annex A: updated references with additions and deletions;

h) Annex B: Examples of materials used in attended appliances replaces the previous example of an ITE product;

i) Bibliographic references updated.

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

FDIS	Report on voting
89/1350/FDIS	89/1355/RVD

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

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

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

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

Part 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 1-20: *Guidance for assessing the fire hazard of electrotechnical products – Ignitability – General guidance*

Part 1-21: *Guidance for assessing the fire hazard of electrotechnical products – Ignitability – Summary and relevance of test methods*

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*

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

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

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INTRODUCTION

In the design of any electrotechnical product, the risk of fire and the potential hazards associated with fire need to be considered. In this respect the objective of component, circuit and equipment design as well as the choice of materials is to reduce the risk of fire to a tolerable level even in the event of reasonably foreseeable (mis)use, malfunction or failure. IEC 60695-1-10, IEC 60695-1-11 and IEC 60695-1-12 provide guidance on how this is to be accomplished.

The best method for testing electrotechnical products with regard to fire hazard is to duplicate exactly the conditions occurring in practice within a real-scale fire test. Where this is not practicable, fire hazard testing is conducted by simulating as closely as possible, the actual conditions of use and of the situation to which a sub-assembly, component, part or material may be exposed in such use.

Preselection is the procedure for assessing and choosing materials, components or sub-assemblies for parts of end products. Preselection has been used for many years to assist in the design stage of the end product.

The information gained from properly designed small-scale tests can be used as an aid for the preselection of appropriate materials, parts, components or sub-assemblies with regard to the fire hazard evaluation of the final end product. As an outcome of conducting a fire hazard assessment, an appropriate series of preselection flammability and ignition tests may enable reduced end product testing.

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FIRE HAZARD TESTING –

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

1 Scope

This part of IEC 60695 provides guidance for assessing and choosing candidate materials, components or sub-assemblies for making an end product based upon preselection testing.

It describes how preselection provides comparative fire hazard test methods to evaluate the performance of a test specimen and how preselection can be used in the selection of materials, parts, components and sub-assemblies during the design stage of an end product. It further describes how standardized test methods may be used as one part in the decision making processes directed to minimize the fire hazards from electrotechnical equipment. It takes into account the desired reaction to fire properties of the end product, and the possible effects of environmental conditions on the behaviour of the end product.

This basic safety publication is intended for use by technical committees in the preparation of standards in accordance with the principles laid down in IEC Guide 104 and ISO/IEC Guide 51.

One of the responsibilities of a technical committee is, wherever applicable, to make use of basic safety publications in the preparation of its publications. The requirements, test methods or test conditions of this basic safety publication will not apply unless specifically referred to or included in the relevant publications.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 60695-1-10, *Fire hazard testing – Part 1-10: Guidance for assessing the fire hazard of electrotechnical products – General guidelines*

IEC 60695-1-11, *Fire hazard testing – Part 1-11: Guidance for assessing the fire hazard of electrotechnical products – Fire hazard assessment*

IEC 60695-1-12, *Fire hazard testing – Part 1-12: Guidance for assessing the fire hazard of electrotechnical products – Fire safety engineering*

IEC 60695-4:2012, *Fire hazard testing – Part 4: Terminology concerning fire tests for electrotechnical products*

IEC GUIDE 104, *The preparation of safety publications and the use of basic safety publications and group safety publications*

ISO/IEC Guide 51, *Safety aspects – Guidelines for their inclusion in standards*

ISO 13943:2008, *Fire safety – Vocabulary*

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3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 13943:2008 and IEC 60695-4:2012 (some of which are reproduced below), as well as the following, apply.

3.1
end product
product that is ready for use without modification

Note 1 to entry: An end product can be a component of another end product.

[SOURCE: IEC 60695-4:2012, 3.2.7]

3.2
end product fire test
fire test that is carried out on an end product and is described in a relevant specification

Note 1 to entry: End product fire tests may be small-scale, intermediate-scale, large-scale or real-scale.

[SOURCE: IEC 60695-4:2012, 3.2.8]

3.3
fire hazard
physical object or condition with a potential for an undesirable consequence from fire

[SOURCE: ISO 13943:2008, 4.112]

3.4
fire hazard assessment
evaluation of the possible causes of fire, the possibility and nature of subsequent fire growth, and the possible consequences of fire

[SOURCE: IEC 60695-4:2012, 3.2.10]

3.5
preselection
process of assessing and choosing candidate materials, components or sub-assemblies for making an end product

[SOURCE: IEC 60695-4:2012, 3.2.21]

4 Principles of product design considering preselection

One objective of equipment design is to choose individual materials, parts, components and sub-assemblies that reduce the likelihood of fire.

Guidance on the fire hazard testing of electrotechnical products is given in IEC 60695-1-10. Guidance on fire hazard assessment is given in IEC 60695-1-11. Guidance on fire safety engineering is given in IEC 60695-1-12.

The preselection procedure, as well as end product testing, should take into account all possible ignition sources, even those that may have an influence in the event of reasonably foreseeable (mis)use, malfunction or failure.

The properties required by individual materials, parts, components and sub-assemblies are determined by their function and related requirements as part of the final end product. The

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selection and magnitude of these properties will be dependent upon the details of reasonably foreseeable (mis)use and environmental exposure.

An integral element of preselection is the acquisition of relevant information regarding a material's characteristics. This knowledge can be acquired from an analysis of data obtained from standardized test methods conducted on specified test specimens. Examples of tests which may be relevant to preselection are contained in Annex A.

The preselection process should describe how standardized test methods may be used in decision-making processes to minimize the fire hazards from electrotechnical equipment. The preselection process shall take into account the relevant features of the end product, since the actual performance of the material may be affected by various factors and constructional characteristics.

The fire performance of materials, parts, components and sub-assemblies is affected by a number of factors, some of which are listed in Table 1.

Consequently, a preselection procedure to adequately assess the expected performance of a final end product requires test data on materials, parts, components and sub-assemblies and should take into account all of the relevant features (for example, the environmental conditions, association with other items, and possible ignition sources).

A decision analysis flow chart (see Figure B.1) is shown in Annex B for an illustrative example of the use of preselection.

Table 1 – Some factors which can affect fire performance in preselection tests

Item	Factor
a)	Thickness and size of the test specimen
b)	Shape, homogeneity and volume of the test specimen
c)	Combination and interaction of materials, parts, components and sub-assemblies
d)	Position and orientation of the test specimen
e)	Composition of materials
f)	Presence of fire-retardant covers, barriers and/or coatings
g)	Effects of environmental influence and contamination, e.g. effects of temperature, ageing and ventilation
h)	Effects of manufacturing processes
i)	Type and power of the ignition source
j)	Location of application of the ignition source
k)	Time of application of the ignition source
l)	Presence of any heat sinks, and heat transfer effects

5 Advantages and limitations of preselection

A preselection process that can meet the principles described in Clause 4 may present certain advantages and limitations:

a) Preselection provides a comparative method to evaluate the performance of a test specimen and can be of assistance in the selection of materials, parts, components and sub-assemblies during the design stage.

b) The grading and classification obtained from a comprehensive preselection process may be used to specify a basic minimum performance of materials and parts used in product specifications.

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c) In general, it cannot be assumed that any direct relationship exists between the results of a preselection test and the results of a test made on the final end product. However, a material, part, component or sub-assembly that reacts more favourably than another when subjected to a standardized preselection test and has a history of safe use in similar applications, could also react more favourably when used in the design of an end product.

d) Priority is given to fire hazard assessment tests made on the final end product. However, in certain cases preselection may be agreed upon for practical reasons as a way to reduce the amount of end product testing. It should be noted that in this case, it is advisable to establish an increased margin of safety in an attempt to ensure satisfactory performance, based on the relevant features of the end product.

e) Preselection tests may result in safer products because of the use of specified test samples and consistency in test methods and test data. Preselection tests tend to use relatively small, discrete samples, consequently reducing the costs of testing and also enabling a variety of ignition sources to be used, which may not be easily applied in a test on the end product.

f) Preselection data are readily available from multiple international sources. Preselection data can be used to examine the variation of a material's properties with respect to a range of parameters. Typical examples of such parameters are: source of data (test laboratory), source of material, test orientation, colour and thickness.

Examples of ISO and IEC fire hazard test methods that may be applicable to preselection are listed in Annex A.

If an end product test is required, it cannot be replaced by the result of a preselection test.

6 Aspects of preselection relative to fire hazard assessment

Preselection of materials, based on the results obtained by tests for reaction to abnormal heat and reaction to fire may be used in the decision-making process related to fire hazard assessment, when the relevant aspects discussed in Clause 4 have been considered, or if there is a history of safe use of the material in similar applications.

Some of the factors listed in Table 1 may be reasonably covered by the preselection test itself, others may require careful interpretation of a result with regard to evaluation of fire hazard.

When the design is based on previous known fire hazard assessment elements the tests might be limited to the relevant preselection process or a combination of a relevant preselection process and an end product test. When the outcome of the fire hazard assessment is uncertain or when a new design is used it is recommended to use an end product test to verify the likelihood of fire from an electrotechnical product.

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