

INTERNATIONAL STANDARD

NORME INTERNATIONALE



BASIC SAFETY PUBLICATION

PUBLICATION FONDAMENTALE DE SÉCURITÉ

Fire hazard testing –

Part 11-20: Test flames – 500 W flame test method

Essais relatifs aux risques du feu –

Partie 11-20: Flammes d'essai – Méthode d'essai à la flamme de 500 W



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INTERNATIONAL ELECTROTECHNICAL COMMISSION

FIRE HAZARD TESTING –**Part 11-20: Test flames –
500 W flame test method****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.
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International Standard IEC 60695-11-20 has been prepared by IEC technical committee 89: Fire hazard testing.

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

FDIS	Report on voting
89/1241/FDIS	89/1250/RVD

Full information on the voting for the approval of this standard 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 second edition cancels and replaces the first edition of IEC 60695-11-20 published in 1999. This edition constitutes a technical revision.

The main changes with respect to the first edition are listed below:

- The Part title has been modified to the singular – 500 W flame test method.
- Editorial changes have been made throughout the document for the purpose of aligning IEC 60695-11-10 with IEC 60695-11-20.
- The Introduction has been modified to clarify the description of the test method.
- The Scope has been modified for clarification.
- All occurrences of the term “fixture” have been deleted from the document.
- Preferred thickness values have been added to 7.2 and 7.3.
- 7.4.4: ‘Thickness measurement’ is now numbered 7.5 to which a new Table 1 – Thickness tolerances has been added.
- New Subclause 8.1.4 ‘Conditioning of the cotton pad’ has been added.
- 8.2.3 clarifies the application of the test flame to distorted specimens
- Explanatory notes have been added to Figures 5 and 6.
- The Bibliography has been updated and references added.

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

This International Standard is to be used in conjunction with IEC 60695-11-3.

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 11 consists of the following parts:

- Part 11-2: Test flames – 1 kW nominal pre-mixed flame – Apparatus, confirmatory test arrangement and guidance
- Part 11-3: Test flames – 500 W flames – Apparatus and confirmational test methods
- Part 11-4: Test flames – 50 W flame – Apparatus and confirmational test method
- Part 11-5: Test flames – Needle-flame test method – Apparatus, confirmatory test arrangement and guidance
- Part 11-10: Test flames – 50 W horizontal and vertical flame test methods
- Part 11-11: Test flames – Determination of the characteristic heat flux for ignition from a non-contacting flame source
- Part 11-20: Test flames – 500 W flame test methods
- Part 11-30: Test flames – History and development from 1979 to 1999
- Part 11-40: Test flames – Confirmatory tests – Guidance

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

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

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INTRODUCTION

In the design of an 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 to a tolerable level of risk of fire even in the event of reasonably foreseeable (mis)use, malfunction or failure. Fires involving electrotechnical products can also be initiated from external non-electrical sources. Considerations of this nature are dealt with in the overall fire hazard assessment.

The aim of the IEC 60695 series of standards is to save lives and property by reducing the number of fires or reducing the consequences of the fire. This can be accomplished by:

- trying to prevent ignition caused by an electrically energised component part and, in the event of ignition, to confine any resulting fire within the bounds of the enclosure of the electrotechnical product.
- trying to minimise flame spread beyond the product's enclosure and to minimise the harmful effects of fire effluents including heat, smoke, and toxic or corrosive combustion products.

This part of IEC 60695 describes a test method which consists of two small-scale fire test procedures carried out on materials used in electrotechnical equipment. A 500 W test flame is used as an ignition source. The test method described provides classifications which may be used for quality assurance, the pre-selection of component materials of products, or to verify the required minimum flammability classification of materials used in end products.

This test method should not be used to solely describe or appraise the fire hazard or fire risk of materials, products, or assemblies under actual fire conditions. However, results of this test may be used as elements of a fire hazard assessment which takes into account all of the factors which are pertinent to a particular end use.

This international standard may involve hazardous materials, operations, and equipment. It does not purport to address all of the safety problems associated with its use. It is the responsibility of the user of this international standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

FIRE HAZARD TESTING –

Part 11-20: Test flames – 500 W flame test method

1 Scope

This part of IEC 60695 describes a test method consisting of two small-scale laboratory test procedures which is intended to compare the burning behaviour of different materials used in electrotechnical products. Vertically oriented bar specimens or horizontally oriented plate test specimens are exposed to a small flame ignition source with a nominal thermal power of 500 W. The test method uses two test specimen configurations to classify material performance. Rectangular bar-shaped test specimens are used to assess ignitability and burning behaviour, and square plate test specimens are used to assess the resistance of the test specimen to burn-through, as defined in 8.3.3. This test method only applies to materials that have been classified as V-0 or V-1 according to IEC 60695-11-10.

This test method is only applicable to solid and cellular materials that have an apparent density of more than 250 kg/m³, determined in accordance with ISO 845. The method does not apply to materials that shrink away from the applied flame without igniting due to their thinness.

The test method described provides classifications which may be used for quality assurance, the pre-selection of component materials of products, or to verify the required minimum flammability classification of materials used in end products. If used for pre-selection, then positive results shall be obtained at a test specimen thickness which equals the smallest thickness used in the product application.

The results obtained provide some information about the behaviour of materials in service, but cannot by themselves assure safe performance in service.

NOTE 1 Guidance on pre-selection is given in IEC 60695-1-30 [3]¹.

NOTE 2 Test results are influenced by material additives, e.g. pigments, fillers, and fire retardants, and properties such as the direction of anisotropy and the molecular mass.

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, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

¹ Numbers in square brackets refer to the bibliography.

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

IEC 60695-11-3, *Fire hazard testing – Part 11-3: Test flames – 500 W flames – Apparatus and confirmational test methods*

IEC 60695-11-10, *Fire hazard testing – Part 11-10: Test flames – 50 W horizontal and vertical flame test methods*

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/IEC 13943:2008, *Fire Safety – Vocabulary*

ISO 291, *Plastics – Standard atmospheres for conditioning and testing*

ISO 293, *Plastics – Compression moulding test specimens of thermoplastic materials*

ISO 294:1996 (all parts), *Plastics – Injection moulding of test specimens of thermoplastic materials*

ISO 295, *Plastics – Compression moulding of test specimens of thermosetting materials*

ISO 845, *Cellular plastics and rubbers – Determination of apparent density*

ISO 16012, *Plastics – Determination of linear dimensions of test specimens*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/IEC 13943:2008 and IEC 60695-4:2005, some of which are reproduced below for the user's convenience, as well as the following apply.

3.1

afterflame

flame that persists after the ignition source has been removed

[SOURCE: ISO/IEC 13943:2008, definition 4.6]

3.2

afterflame time

length of time for which an afterflame persists under specified test conditions

Note 1 to entry: Designated in this standard by the parameter t_1 .

[SOURCE: ISO/IEC 13943:2008, definition 4.7]

3.3

afterglow

persistence of glowing combustion after both removal of the ignition source and the cessation of any flaming combustion

[SOURCE: ISO/IEC 13943:2008, definition 4.8]