

# INTERNATIONAL STANDARD

## NORME INTERNATIONALE



BASIC SAFETY PUBLICATION

PUBLICATION FONDAMENTALE DE SÉCURITÉ

**Fire hazard testing –**

**Part 11-2: Test flames – 1 kW nominal pre-mixed flame – Apparatus, confirmatory test arrangement and guidance**

**Essais relatifs aux risques du feu –**

**Partie 11-2: Flamme d'essai – Flamme à prémélange de 1 kW nominal – Appareillage, configuration pour l'essai de vérification et préconisations**



**THIS PUBLICATION IS COPYRIGHT PROTECTED**  
**Copyright © 2017 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.

Droits de reproduction réservés. Sauf indication contraire, aucune partie de cette publication ne peut être reproduite ni utilisée sous quelque forme que ce soit et par aucun procédé, électronique ou mécanique, y compris la photocopie et les microfilms, sans l'accord écrit de l'IEC ou du Comité national de l'IEC du pays du demandeur. Si vous avez des questions sur le copyright de l'IEC ou si vous désirez obtenir des droits supplémentaires sur cette publication, utilisez les coordonnées ci-après ou contactez le Comité national de l'IEC de votre pays de résidence.

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

Tel.: +41 22 919 02 11  
Fax: +41 22 919 03 00  
[info@iec.ch](mailto:info@iec.ch)  
[www.iec.ch](http://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 corrigenda or an amendment might have been published.

#### IEC Catalogue - [webstore.iec.ch/catalogue](http://webstore.iec.ch/catalogue)

The stand-alone application for consulting the entire bibliographical information on IEC International Standards, Technical Specifications, Technical Reports and other documents. Available for PC, Mac OS, Android Tablets and iPad.

#### IEC publications search - [www.iec.ch/searchpub](http://www.iec.ch/searchpub)

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](http://webstore.iec.ch/justpublished)

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

#### Electropedia - [www.electropedia.org](http://www.electropedia.org)

The world's leading online dictionary of electronic and electrical terms containing 20 000 terms and definitions in English and French, with equivalent terms in 16 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

#### IEC Glossary - [std.iec.ch/glossary](http://std.iec.ch/glossary)

65 000 electrotechnical terminology entries in English and French extracted from the Terms and Definitions clause of IEC publications issued since 2002. Some entries have been collected from earlier publications of IEC TC 37, 77, 86 and CISPR.

#### IEC Customer Service Centre - [webstore.iec.ch/csc](http://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: [csc@iec.ch](mailto:csc@iec.ch).

#### A propos de l'IEC

La Commission Electrotechnique Internationale (IEC) est la première organisation mondiale qui élabore et publie des Normes internationales pour tout ce qui a trait à l'électricité, à l'électronique et aux technologies apparentées.

#### A propos des publications IEC

Le contenu technique des publications IEC est constamment revu. Veuillez vous assurer que vous possédez l'édition la plus récente, un corrigendum ou amendement peut avoir été publié.

#### Catalogue IEC - [webstore.iec.ch/catalogue](http://webstore.iec.ch/catalogue)

Application autonome pour consulter tous les renseignements bibliographiques sur les Normes internationales, Spécifications techniques, Rapports techniques et autres documents de l'IEC. Disponible pour PC, Mac OS, tablettes Android et iPad.

#### Recherche de publications IEC - [www.iec.ch/searchpub](http://www.iec.ch/searchpub)

La recherche avancée permet de trouver des publications IEC en utilisant différents critères (numéro de référence, texte, comité d'études,...). Elle donne aussi des informations sur les projets et les publications remplacées ou retirées.

#### IEC Just Published - [webstore.iec.ch/justpublished](http://webstore.iec.ch/justpublished)

Restez informé sur les nouvelles publications IEC. Just Published détaille les nouvelles publications parues. Disponible en ligne et aussi une fois par mois par email.

#### Electropedia - [www.electropedia.org](http://www.electropedia.org)

Le premier dictionnaire en ligne de termes électroniques et électriques. Il contient 20 000 termes et définitions en anglais et en français, ainsi que les termes équivalents dans 16 langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International (IEV) en ligne.

#### Glossaire IEC - [std.iec.ch/glossary](http://std.iec.ch/glossary)

65 000 entrées terminologiques électrotechniques, en anglais et en français, extraites des articles Termes et Définitions des publications IEC parues depuis 2002. Plus certaines entrées antérieures extraites des publications des CE 37, 77, 86 et CISPR de l'IEC.

#### Service Clients - [webstore.iec.ch/csc](http://webstore.iec.ch/csc)

Si vous désirez nous donner des commentaires sur cette publication ou si vous avez des questions contactez-nous: [csc@iec.ch](mailto:csc@iec.ch).

# INTERNATIONAL STANDARD

## NORME INTERNATIONALE



BASIC SAFETY PUBLICATION

PUBLICATION FONDAMENTALE DE SÉCURITÉ

**Fire hazard testing –**

**Part 11-2: Test flames – 1 kW nominal pre-mixed flame – Apparatus, confirmatory test arrangement and guidance**

**Essais relatifs aux risques du feu –**

**Partie 11-2: Flamme d'essai – Flamme à prémélange de 1 kW nominal – Appareillage, configuration pour l'essai de vérification et préconisations**

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

COMMISSION  
ELECTROTECHNIQUE  
INTERNATIONALE

ICS 13.220.40

ISBN 978-2-8322-4313-8

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

**Attention! Veuillez vous assurer que vous avez obtenu cette publication via un distributeur agréé.**

## CONTENTS

FOREWORD.....	3
INTRODUCTION.....	5
1 Scope.....	6
2 Normative references .....	6
3 Terms and definitions .....	6
4 Burner/supply arrangement.....	7
4.1 Requirements .....	7
4.2 Apparatus and fuel.....	7
4.2.1 Burner .....	7
4.2.2 Flow control.....	7
4.2.3 Copper block .....	8
4.2.4 Thermocouple.....	8
4.2.5 Temperature/time indicating/recording devices .....	8
4.2.6 Laboratory fumehood/chamber .....	8
5 Production of the test flame .....	8
5.1 Selection of the method .....	8
5.2 Method A .....	9
5.3 Method B (alternative).....	9
6 Confirmation of the test flame .....	9
6.1 Principle .....	9
6.2 Frequency of confirmatory tests .....	9
6.3 Procedure .....	10
7 Recommended arrangements for use of the test flame .....	10
Annex A (normative) Burner details, arrangements and confirmatory test.....	12
A.1 Burner construction.....	12
A.2 Gas supply arrangement.....	17
A.3 The copper block .....	18
A.4 Confirmatory test .....	18
Bibliography.....	20
Figure 1 – Flame dimensions .....	11
Figure A.1 – General assembly.....	13
Figure A.2 – Burner details (1).....	13
Figure A.3 – Burner details (2).....	14
Figure A.4 – Burner details (3).....	15
Figure A.5 – Burner details (4).....	16
Figure A.6 – Example of supply arrangement for burner.....	17
Figure A.7 – Copper block .....	18
Figure A.8 – Confirmatory test arrangement.....	19

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

## FIRE HAZARD TESTING –

**Part 11-2: Test flames – 1 kW nominal pre-mixed flame –  
Apparatus, confirmatory test arrangement and guidance**

## 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, accept 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) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 60695-11-2 has been prepared by IEC technical committee 89: Fire hazard testing.

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

CDV	Report on voting
89/1327/CDV	89/1354/RVC

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.

This third edition of IEC 60695-11-2 cancels and replaces the second edition published in 2013. It constitutes a technical revision.

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

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

- addition of an alternative production of the test flame;
- deletion of Annex B.

In this standard, the following print types are used:

- **terms defined within Clause 3: in bold type**

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

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 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.

**IMPORTANT – The “colour inside” logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this publication using a colour printer.**

## 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 product design, as well as the choice of materials, is to reduce to acceptable levels the potential risks of fire during normal operating conditions, reasonable foreseeable abnormal use, malfunction, and/or failure. The IEC has developed IEC 60695-1-10 [1]<sup>1</sup>, together with its companion, IEC 60695-1-11 [2], to provide guidance on how this is to be accomplished.

The primary aims of IEC 60695-1-10 and IEC 60695-1-11 are to provide guidance on how:

- a) to prevent ignition caused by an electrically energized component part, and
- b) to confine any resulting fire within the bounds of the enclosure of the electrotechnical product in the event of ignition.

Secondary aims of these documents include the minimization of any flame spread beyond the product's enclosure and the minimization of harmful effects of fire effluents such as heat, smoke, toxicity and/or corrosivity.

Fires involving electrotechnical products can also be initiated from external non-electrical sources. Considerations of this nature should be dealt with in the overall fire risk assessment.

IEC 60695-11-2 provides a description of the apparatus required to produce a 1 kW test flame, and provides a description of the principle of a confirmation procedure to check that the effective power output of the flame is as intended. Guidance on confirmatory tests for test flames is given in IEC TS 60695-11-40 [3].

This part of IEC 60695 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.

---

<sup>1</sup> Numbers in square brackets refer to the bibliography.

## FIRE HAZARD TESTING –

### Part 11-2: Test flames – 1 kW nominal pre-mixed flame – Apparatus, confirmatory test arrangement and guidance

#### 1 Scope

This part of IEC 60695 gives the requirements for the production and confirmation of a nominal 1 kW propane/air **pre-mixed flame** for use in fire hazard testing.

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 14 [4] and ISO/IEC Guide 51 [5].

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 60584-1, *Thermocouples - Part 1: Environmental specifications and tolerances*

ISO/IEC 13943:2008, *Fire safety – Vocabulary*

#### 3 Terms and definitions

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

##### 3.1 combustion

exothermic reaction of a substance with an oxidizing agent

Note 1 to entry: **Combustion** generally emits fire effluent accompanied by **flames** and/or glowing.

[SOURCE: ISO 13943:2008, definition 4.46]

##### 3.2 draught-free environment

space in which the results of experiments are not significantly affected by the local air speed

Note 1 to entry: A qualitative example is a space in which a wax candle **flame** remains essentially undisturbed. Quantitative examples are small-scale fire tests in which a maximum air speed of  $0,1 \text{ m} \times \text{s}^{-1}$  or  $0,2 \text{ m} \times \text{s}^{-1}$  sometimes specified.