

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE

HORIZONTAL PUBLICATION  
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**Fire hazard testing –  
Part 2-12: Glowing/hot-wire based test methods – Glow-wire flammability index  
(GWFI) test method for materials**

**Essais relatifs aux risques du feu –  
Partie 2-12: Essais au fil incandescent/chauffant – Méthode d'essai d'indice  
d'inflammabilité au fil incandescent (GWFI) pour matériaux**



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## CONTENTS

FOREWORD .....	3
INTRODUCTION .....	5
1 Scope .....	6
2 Normative references .....	6
3 Terms and definitions .....	7
4 Test specimens .....	8
4.1 Test specimen preparation .....	8
4.2 Test specimen dimensions .....	8
4.3 Testing ranges in formulations .....	9
4.3.1 General .....	9
4.3.2 Density, melt flows and filler/reinforcement .....	9
4.3.3 Colour .....	9
5 Apparatus .....	9
6 Temperature measuring system verification .....	9
7 Conditioning and test conditions .....	9
7.1 Conditioning of test specimens .....	9
7.2 Conditioning of the wrapping tissue and the wooden board .....	10
7.3 Testing conditions .....	10
8 Test procedure .....	10
8.1 General .....	10
8.2 Initial test temperatures .....	10
8.3 Test temperatures .....	10
9 Observations and measurements .....	11
9.1 Initial observations .....	11
9.2 Test observations .....	11
10 Evaluation of test results .....	11
10.1 Test criteria .....	11
10.2 Glow-wire flammability index .....	12
11 Test report .....	12
Bibliography .....	13
Table 1 – Initial test temperatures .....	10

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

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**FIRE HAZARD TESTING –****Part 2-12: Glowing/hot-wire based test methods –  
Glow-wire flammability index (GWFI) test method for materials****FOREWORD**

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IEC 60695-2-12 has been prepared by IEC technical committee 89: Fire hazard testing. It is an International Standard.

This third edition cancels and replaces the second edition published in 2010 and Amendment 1:2014. This edition constitutes a technical revision.

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

- a) New terms and definitions with regards to times and durations have been added to Clause 3, with an effect on the application of the test method.

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

FDIS	Report on voting
89/1537/FDIS	89/1545/RVD

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 was drafted in accordance with 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/refdocs](http://www.iec.ch/members_experts/refdocs). The main document types developed by IEC are described in greater detail at [www.iec.ch/standardsdev/publications](http://www.iec.ch/standardsdev/publications).

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

This standard is to be used in conjunction with IEC 60695-2-10.

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.

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.

## 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. IEC 60695-1-10 [1]<sup>1</sup>, together with its companion IEC 60695-1-11 [2], has been developed 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 to:

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

Secondary aims of IEC 60695-1-10 and IEC 60695-1-11 include the minimization of any flame spread beyond the product's enclosure and the minimization of the 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 are normally dealt with in the overall fire hazard assessment.

In electrotechnical equipment, overheated metal parts can act as ignition sources. In glow-wire tests, a glowing wire is used to simulate such an ignition source.

IEC 60695-2-10 describes a glow-wire test apparatus and common test procedure, IEC 60695-2-11 [3] describes a glow-wire flammability test for end products, and IEC 60695-2-13 describes a glow-wire ignition temperature (GWIT) test method for materials.

This document describes a glow-wire flammability index test for materials. It is intended to be used to measure, describe, and rank the properties of materials in response to heat caused by contact with an electrically heated wire under controlled laboratory conditions. This may be useful for the evaluation of materials for use in products that may be exposed to excess thermal stress such as a fault current flowing through a wire, overloading of components, and/or bad connections. It is not intended to 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 can 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 document 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 document to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

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

## FIRE HAZARD TESTING –

### Part 2-12: Glowing/hot-wire based test methods – Glow-wire flammability index (GWFI) test method for materials

#### 1 Scope

This part of IEC 60695 specifies the details of the glow-wire test to be applied to test specimens of solid electrical insulating materials or other solid materials for flammability testing to determine the glow-wire flammability index (GWFI).

GWFI is the highest temperature, determined during this standardized procedure, at which the tested material does not ignite or, if it does, extinguishes within 30 s after removal of the glow-wire and is not totally consumed; and molten drips, if they occur, do not ignite the wrapping tissue.

This test method is a materials test carried out on a series of standard test specimens. The data obtained, along with data from the glow-wire ignition temperature (GWIT) test method for materials, IEC 60695-2-13, can then be used in a preselection process in accordance with IEC 60695-1-30 [4] to judge the ability of materials to meet the requirements of IEC 60695-2-11.

NOTE As an outcome of conducting a fire hazard assessment, an appropriate series of preselection flammability and ignition tests can allow a reduction of end product testing.

This basic safety publication focusing on safety test method(s) is primarily intended for use by technical committees in the preparation of safety publications 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.

#### 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 60695-2-10, *Fire hazard testing – Part 2-10: Glowing/hot-wire based test methods – Glow-wire apparatus and common test procedure*

IEC 60695-2-13, *Fire hazard testing – Part 2-13: Glowing/hot-wire based test methods – Glow-wire ignition temperature (GWIT) test method for materials*

IEC 60695-4:2021, *Fire hazard testing – Part 4: Terminology concerning fire tests for electrotechnical products*

ISO 291:2008, *Plastics – Standard atmospheres for conditioning and testing*

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

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