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colour inside

HORIZONTAL PUBLICATION

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

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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FIRE HAZARD TESTING –

Part 2-13: Glowing/hot-wire based test methods – Glow-wire ignition temperature (GWIT) test method for materials

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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IEC 60695-2-13 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
89/1538/FDIS	89/1546/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. The main document types developed by IEC are described in greater detail at 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 webstore.iec.ch in the data related to the specific document. At this date, the document will be

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- amended.

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INTRODUCTION

~~In electrotechnical equipment, overheated metal parts can act as ignition sources. In glow-wire tests an electrically heated 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 describes a glow-wire flammability test for end products, and IEC 60695-2-12 describes a glow-wire flammability index test method for materials.~~

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] [1], 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 ~~should be~~ 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 60695-2-12 describes a glow-wire flammability index (GWFI) test method for materials.

This document describes a glow-wire ignition temperature test method for materials. It ~~should~~ 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 ~~should~~ 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 ~~may~~ 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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[1] Numbers in square brackets refer to the bibliography.

FIRE HAZARD TESTING –

Part 2-13: Glowing/hot-wire based test methods – Glow-wire ignition temperature (GWIT) 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 ignitability testing to determine the glow-wire ignition temperature (GWIT).

The GWIT is the temperature which is 25 K (or 30 K) higher than the maximum test temperature, determined during this standardized procedure, at which the tested material does not ignite, or sustained flaming combustion does not occur for a time longer than 5 s for any single flame event and the specimen is not totally consumed.

This test is a materials test carried out on a series of standard test specimens. The data obtained, along with data from the glow-wire flammability index (GWFI) test method for materials, IEC 60695-2-12, 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 ~~may~~ 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 ~~standards~~ 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. ~~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 60695-1-30:2008, *Fire hazard testing – Part 1-30: Guidance for assessing the fire hazard of electrotechnical products – Preselection testing process – General guidelines*~~

IEC 60695-2-10~~:2000~~, *Fire hazard testing – Part 2-10: Glowing/hot-wire based test methods – Glow-wire apparatus and common test procedure*

IEC 60695-2-12, *Fire hazard testing – Part 2-12: Glowing/hot-wire based test methods – Glow-wire flammability index (GWFI) test method for materials*

IEC 60695-4:2021, *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 inclusion in standards*~~

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

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

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INTERNATIONAL STANDARD

NORME INTERNATIONALE

HORIZONTAL PUBLICATION
PUBLICATION HORIZONTALE

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

Essais relatifs aux risques du feu –
Partie 2-13: Essais au fil incandescent/chauffant – Méthode d'essai de température d'allumage au fil incandescent (GWIT) pour matériaux



IEC 60695-2-13:2021-08(en-fr)

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COMMISSION ÉLECTROTECHNIQUE INTERNATIONALE

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ESSAIS RELATIFS AUX RISQUES DU FEU –

Partie 2-13: Essais au fil incandescent/chauffant – Méthode d'essai de température d'allumage au fil incandescent (GWIT) pour matériaux

AVANT-PROPOS

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Cette troisième édition annule et remplace la deuxième édition parue en 2010 et l'Amendement 1:2014. Cette édition constitue une révision technique.

Cette édition inclut les modifications techniques majeures suivantes par rapport à l'édition précédente:

a) Ajout à l'Article 3 de nouveaux termes et définitions, ayant rapport aux moments et durées, applicables à la méthode d'essai.

Le texte cette Norme internationale est issu des documents suivants:

FDIS	Rapport de vote
89/1538/FDIS	89/1546/RVD

Le rapport de vote indiqué dans le tableau ci-dessus donne toute information sur le vote ayant abouti à son approbation.

La langue employée pour l'élaboration de cette Norme internationale est l'anglais.

Ce document a été rédigé selon les Directives ISO/IEC, Partie 2, il a été développé selon les Directives ISO/IEC, Partie 1 et les Directives ISO/IEC, Supplément IEC, disponibles sous www.iec.ch/members_experts/refdocs. Les principaux types de documents développés par l'IEC sont décrits plus en détail sous www.iec.ch/standardsdev/publications.

Il a le statut d'une publication fondamentale de sécurité conformément au Guide IEC 104.

Cette norme doit être utilisée conjointement avec l'IEC 60695-2-10.

Une liste de toutes les parties de la série IEC 60695, publiées sous le titre général *Essais relatifs aux risques du feu*, peut être consultée sur le site web de l'IEC.

Le comité a décidé que le contenu de ce document ne sera pas modifié avant la date de stabilité indiquée sur le site web de l'IEC sous webstore.iec.ch dans les données relatives au document recherché. À cette date, le document sera

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- remplacé par une édition révisée, ou
- amendé.

INTRODUCTION

Lors de la conception d'un quelconque produit électrotechnique, il est nécessaire de prendre en considération le danger d'incendie et les dangers potentiels associés au feu. À cet égard, la conception des composants, circuits et produits ainsi que le choix des matériaux ont pour objectif de réduire à des niveaux acceptables les risques potentiels d'incendie dans les conditions de fonctionnement normal, d'utilisation anormale raisonnablement prévisible, de dysfonctionnement et/ou de défaillance. L'IEC 60695-1-10 [1][1] a été élaborée, avec sa norme associée IEC 60695-1-11 [2], afin de fournir les recommandations sur les méthodes de réalisation correspondantes.

L'IEC 60695-1-10 et l'IEC 60695-1-11 ont pour principaux objectifs de fournir des recommandations relatives aux éléments suivants:

a) éviter l'allumage provoqué par un composant sous tension électrique, et
b) confiner le feu résultant dans les limites de l'enceinte du produit électrotechnique en cas d'allumage.

Les objectifs secondaires de l'IEC 60695-1-10 et de l'IEC 60695-1-11 comprennent la réduction à un niveau minimal de toute propagation de la flamme au-delà de l'enceinte du produit et la réduction à un niveau minimal des effets nuisibles des effluents du feu tels que la chaleur, la fumée, la toxicité et/ou la corrosivité.

Les feux impliquant des produits électrotechniques peuvent également être déclenchés par des sources externes non électriques. Ces éléments sont pris en considération lors de l'évaluation globale du danger d'incendie.

Dans l'appareillage électrotechnique, les parties métalliques surchauffées peuvent constituer des sources d'allumage. Pour les essais au fil incandescent, un fil incandescent est utilisé pour simuler ce type de source d'allumage.

L'IEC 60695-2-10 décrit un appareillage d'essai au fil incandescent et la méthode commune d'essai, l'IEC 60695-2-11 [3] décrit un essai d'inflammabilité au fil incandescent pour produits finis et l'IEC 60695-2-12 décrit une méthode d'essai d'indice d'inflammabilité au fil incandescent (GWFI) pour matériaux.

Le présent document décrit une méthode d'essai de température d'allumage au fil incandescent pour matériaux. Il est destiné à être utilisé pour mesurer, décrire et classer les propriétés des matériaux en réponse à la chaleur produite par contact avec un fil chauffé électriquement dans des conditions de laboratoire contrôlées. Il peut être utile pour l'évaluation de matériaux destinés à être utilisés dans des produits pouvant être exposés à des contraintes thermiques excessives telles qu'un courant de défaut passant dans un fil, une surcharge de composants et/ou de mauvaises connexions. Il n'est pas destiné à être utilisé pour uniquement décrire ou évaluer le danger d'incendie ou le danger d'incendie de matériaux, de produits ou d'assemblages dans des conditions réelles de feu. Cependant, les résultats de cet essai peuvent servir d'éléments pour une évaluation du danger d'incendie qui prend en compte tous les facteurs appropriés à une utilisation finale particulière.

Le présent document peut concerner des matériaux, opérations et matériels dangereux. Il n'a pas pour objet de traiter tous les problèmes de sécurité associés à son utilisation. Il incombe à l'utilisateur du présent document d'établir les bonnes pratiques appropriées en termes de sécurité et de santé et de déterminer l'applicabilité des limites réglementaires avant usage.

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[1] Les chiffres entre crochets se réfèrent à la bibliographie.

ESSAIS RELATIFS AUX RISQUES DU FEU –

Partie 2-13: Essais au fil incandescent/chauffant – Méthode d'essai de température d'allumage au fil incandescent (GWIT) pour matériaux

1 Domaine d'application

La présente partie de l'IEC 60695 décrit l'essai au fil incandescent applicable à des éprouvettes d'essai de matériaux isolants électriques solides ou autres matériaux solides pour les essais d'allumage dans le but de déterminer la température d'allumage au fil incandescent (GWIT, *glow-wire ignition temperature*).

La GWIT est la température qui est supérieure de 25 K (ou 30 K) à la température d'essai maximale, déterminée durant cette procédure normalisée, à laquelle le matériau soumis à l'essai ne s'enflamme pas, ou une combustion avec flamme persistante ne se produit pas pendant une durée supérieure à 5 s pour un événement d'inflammation unique quelconque et l'éprouvette d'essai n'est pas entièrement consumée.

Cet essai est un essai de matériaux exécuté sur une série d'éprouvettes d'essai normalisées. Les données obtenues, ainsi que les données issues de la méthode d'essai d'indice d'inflammabilité au fil incandescent (GWFI, *glow-wire flammability index*) pour matériaux, IEC 60695-2-12, peuvent alors être utilisées dans un processus de présélection conformément à l'IEC 60695-1-30 [4] pour estimer l'aptitude des matériaux à satisfaire aux exigences de l'IEC 60695-2-11.

NOTE En tant que résultat de l'exécution d'une évaluation du danger d'incendie, une série appropriée d'essais de présélection d'inflammabilité et d'allumage peut permettre un allègement des essais sur le produit final.

La présente publication fondamentale de sécurité, fondée sur la ou les méthodes d'essai de sécurité, est essentiellement destinée à être utilisée par les comités d'études dans le cadre de l'élaboration de publications de sécurité conformément aux principes établis dans le Guide IEC 104 et le Guide ISO/IEC 51.

L'une des responsabilités d'un comité d'études consiste, le cas échéant, à utiliser les publications fondamentales de sécurité dans le cadre de l'élaboration de ses publications.

2 Références normatives

Les documents suivants sont cités dans le texte de sorte qu'ils constituent, pour tout ou partie de leur contenu, des exigences du présent document. Pour les références datées, seule l'édition citée s'applique. Pour les références non datées, la dernière édition du document de référence s'applique (y compris les éventuels amendements).

IEC 60695-2-10*, Essais relatifs aux risques du feu – Partie 2-10: Essais au fil incandescent/chauffant – Appareillage et méthode commune d'essai*

IEC 60695-2-12*, 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*

IEC 60695-4:2021*, Essais relatifs aux risques du feu – Partie 4: Terminologie relative aux essais au feu pour les produits électrotechniques*

ISO 291:2008, *Plastiques – Atmosphères normales de conditionnement et d'essai*

ISO 293, *Plastiques – Moulage par compression des éprouvettes en matières thermoplastiques*

ISO 294 (toutes les parties), *Plastiques – Moulage par injection des éprouvettes de matériaux thermoplastiques*

ISO 295, *Plastiques – Moulage par compression des éprouvettes en matières thermodurcissables*

ISO 13943:2017, *Sécurité au feu – Vocabulaire*