

# INTERNATIONAL STANDARD



BASIC SAFETY PUBLICATION

**Fire hazard testing –  
Part 2-11: Glowing/hot-wire based test methods – Glow-wire flammability test  
method for end-products (GWEPT)**

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Part 2-11: Glowing/hot-wire based test methods – Glow-wire flammability test  
method for end-products (GWEPT)**

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

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## CONTENTS

FOREWORD.....	3
INTRODUCTION.....	5
1 Scope.....	6
2 Normative references .....	6
3 Terms and definitions .....	6
4 <del>Description of test considerations and test specimen selection</del> Test specimens.....	9
4.1 General.....	9
4.2 Complete end product.....	9
4.3 Partial end product (alternative).....	9
4.4 Test considerations and limitations associated with the specimen configuration.....	9
5 <del>Description of the</del> Test apparatus .....	10
<del>6 Severities .....</del>	<del>11</del>
<del>76</del> Verification of the temperature measuring system.....	11
<del>87</del> Conditioning .....	11
7.1 Conditioning of test specimens .....	11
7.2 Conditioning of specified layers .....	11
7.3 Testing conditions.....	11
<del>9</del> <del>Initial measurement .....</del>	<del>11</del>
<del>108</del> Test procedure .....	11
8.1 General.....	12
8.2 Test temperatures.....	12
8.3 Number of test specimens.....	12
<del>149</del> Observations and measurements.....	12
<del>1210</del> Evaluation of test results .....	13
11 Test report.....	13
<del>1312</del> Information to be given in the relevant <del>specification</del> product standard.....	14
Annex A (informative) <del>Guidance for glow wire test</del> Suggested GWEPT temperatures.....	16
Bibliography.....	17
Figure 1 – Small parts.....	10
Figure A.1 – Suggested GWEPT temperatures .....	16
Table 1 <del>Test severities</del> .....	11
Table 1 – Test temperatures .....	12
Table A.1 <del>Guidance for glow wire test</del> .....	15

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

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### FIRE HAZARD TESTING –

#### **Part 2-11: Glowing/hot-wire based test methods – Glow-wire flammability test method for end-products (GWEPT)**

#### FOREWORD

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International Standard IEC 60695-2-11 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
89/1197/FDIS	89/1206/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.

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 60695-2-10.

This second edition of IEC 60695-2-11 cancels and replaces the first edition of IEC 60695-2-11 published in 2000. It constitutes a technical revision.

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

- The Introduction has been added to provide background and how it relates to the Scope.
- The Scope has been modified for greater clarity and reference to basic safety publications.
- Numerous terms and definitions relevant to this Standard have been added to Clause 3.
- The application of “small parts” and “insignificant mass” have been introduced and clarified.
- The different types of specimens, how to specify them, and limitations of the test method have been further clarified in Clause 4.
- Clarified in Clause 5 the distance to specified layer when unknown.
- The information from Clause 6 has been moved into the test procedure in Clause 8.
- The conditioning of the specified layer and the laboratory ambient test conditions were clarified in Clause 7.
- Measurement of the maximum flame height was removed from Clause 9.
- The reference to this test as “GWEPT” was introduced along with an applicable title change.
- Annex A has been revised to reflect current practice by prominent product committees.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site 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

The purpose of this Introduction is to provide background regarding the basic guidance that prompted the preparation of this International Standard and how it relates to the Scope.

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 within the design of component, circuit, and product design, as well as the choice of the 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 Technical Committee 89 has developed IEC 60695-1-10, together with its companion, IEC 60695-1-11, 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 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 60695-2-12 describes a glow-wire flammability index (GWFI) test method for materials, and IEC 60695-2-13 describes a glow-wire ignition temperature (GWIT) test method for materials.

This standard is used to assess the reaction of end products to heat caused by contact with an electrically heated wire under controlled laboratory conditions. This may be useful for the evaluation of end products that may be exposed to excess thermal stress such as a fault current flowing through a wire, overloading of components, and/or poor electrical connections. It should not be used to solely describe or appraise the fire hazard or fire risk of 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 2-11: Glowing/hot-wire based test methods – Glow-wire flammability test method for end-products (GWEPT)

#### 1 Scope

This part of IEC 60695 specifies ~~the details of the glow-wire test to be applied to end-products for fire hazard testing~~ a test method on an end product. It is intended to simulate the effects of thermal stresses produced by an electrically heated source to represent a fire hazard.

~~For the purpose of this standard, end-product means electrotechnical equipment, its subassemblies, and components.~~

This test method is used to check that, under defined test conditions, an end product exposed to an electrically heated source has either a limited ability to ignite or, if it ignites, a limited ability to propagate flame. However, the fire hazard analysis, the flammability aspects and the flame spreading to other products are not covered by the present standard.

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.

~~IEC 60695-2-2:1991, Fire hazard testing – Part 2: Test methods – Section 2: Needle-flame test~~

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

ISO/IEC 13943:2000, Fire safety – Vocabulary

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

#### 3 Terms and definitions

For the purpose of this ~~part of IEC 60695 document, the definitions given in ISO/IEC 13943, as well as~~ the following terms and definitions apply.

**3.1**

**burn**, intransitive verb  
undergo combustion

[SOURCE: ISO/IEC 13943:2008, definition 4.28]

**3.2**

**combustible**, adjective  
capable of being ignited and burned

[SOURCE: ISO/IEC 13943:2008, definition 4.43]

**3.3**

**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/IEC 13943:2008, definition 4.46]

**3.4**

**enclosure**  
(electrotechnical) external casing protecting the electrical and mechanical parts of apparatus

Note 1 to entry: The term excludes cables.

[SOURCE: ISO/IEC 13943:2008, definition 4.78]

**3.5**

**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, definition 3.2.7]

**3.6**

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

[SOURCE: ISO/IEC 13943:2008, definition 4.112]

**3.7**

**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, definition 3.2.10]

**3.8**

**fire risk**  
probability of a fire combined with a quantified measure of its consequence

Note 1 to entry: It is often calculated as the product of probability and consequence.

[SOURCE: ISO/IEC 13943:2008, definition 4.124]

**3.9  
flame**

rapid, self sustaining, sub-sonic propagation of combustion in a gaseous medium, usually with emission of light

[SOURCE: ISO/IEC 13943:2008, definition 4.133]

**3.10  
flame spread**

propagation of a flame front

[SOURCE: ISO/IEC 13943:2008, definition 4.142]

**3.11  
flammability**

ability of a material or product to burn with a flame under specified conditions

[SOURCE: ISO/IEC 13943:2008, definition 4.151]

**3.12  
glowing**, adjective

emitting light without flame from the combustion of a material in the solid phase

**3.13  
ignition**

sustained ignition (deprecated)  
<general> initiation of combustion

[SOURCE: ISO/IEC 13943:2008, definition 4.187]

**3.14  
insignificant mass**

insufficient combustible material to constitute a fire hazard

Note 1 to entry: A default value is 2 g, but product TCs may assign a different value appropriate to the product type and scale.

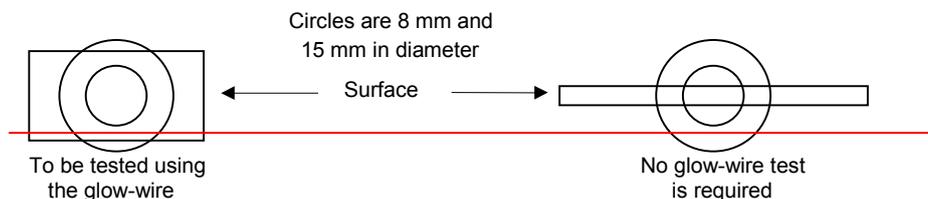
[SOURCE: IEC 60695-4:2012, definition 3.2.16]

~~3.1~~

**3.15  
small parts**

~~parts, where each surface lies completely within a circle of 15 mm diameter or where some of the surface lies outside the 15 mm diameter circle but in such a way that it is not possible to place a circle of 8 mm diameter on any of this remaining surface~~

~~NOTE— When checking a surface, projections on the surface and holes which are not greater than 2 mm on the largest dimensions are disregarded.~~



part with a dimension less than the minimum specified for the relevant test method

[SOURCE: IEC 60695-4:2012, definition 3.2.25]

#### **4 Description of test considerations and test specimen selection**

##### **Test specimens**

##### **4.1 General**

It is not necessary to test end products or parts of end products which have insignificant mass. Additionally, this test method is not suitable for testing small parts (see 4.4).

##### **4.2 Complete end product**

~~If possible, It is preferred that the test specimen should be a complete end product, as opposed to a partial end product (see 4.3). The test specimen shall be chosen so that the conditions of the test will not be significantly different from those occurring in normal use with regard to shape, ventilation, effect of thermal stresses, and, possibly eventually, of flames occurring in, or the effects of burning or glowing particles falling in the vicinity of, from the test specimen.~~

##### **4.3 Partial end product (alternative)**

If the test cannot be made on a complete end product, ~~or then,~~ unless otherwise specified by the relevant ~~specification~~ product standard, it is acceptable to

- a) cut a piece containing the part under examination from ~~it~~ a complete and assembled end product, or
- b) cut an aperture in the complete end product to allow the glow-wire access, or
- c) remove the part under examination in its entirety and test it separately.

Technical committees should define in their relevant ~~specifications~~ product standards what may be removed to achieve access. So far as possible, these product standards should strive to replicate actual service locations and conditions.

##### **4.4 Test considerations and limitations associated with the specimen configuration**

~~When cutting an opening for access purposes, a small aperture may affect the results by leading to the ignition of the surroundings, by and/or reducing the temperature of the tip of the glow-wire or by restricting the availability of oxygen, whereas too large an aperture may permit more oxygen than would normally be available. The opening should be large enough to supply an adequate supply of air for combustion.~~

If, during the test, any part of the equipment containing the test specimen is ignited by extraneous heat from the glow-wire ~~and so~~ which in turn influences the thermal conditions at the test specimen, the test shall be invalid.

~~The test is carried out to ensure that, under defined conditions, the glow-wire does not cause ignition of parts, and that a part, if ignited, has a limited duration of burning without spreading fire by flames or by burning or glowing particles falling from the test specimen.~~

~~If the test specimen emits flames during the application of the glow-wire, the fire hazard created may necessitate further tests using other ignition sources such as the needle flame applied to those parts which are reached by the emitted flames.~~

The glow-wire flammability test method for end products shall not be used for testing small parts ~~for which reference may need to be made to other test methods, for example, the needle flame test in IEC 60695-2-2.~~ This is because such parts cannot be effectively

supported to avoid heat losses (see IEC 60695-2-10), and they are not able to accommodate the penetration of the glow-wire.

The following are considered to be small parts:

- a) where each surface lies completely within a circle of 15 mm in diameter; or
- b) where it is not possible to fit a circle of 8 mm in diameter completely on at least one of the surfaces while, at least one part dimension is > 15 mm.

See Figure 1.

When checking a surface,

- a) projections on the surface are disregarded and
- b) holes or recesses which are not greater than 2 mm in any dimension are disregarded.

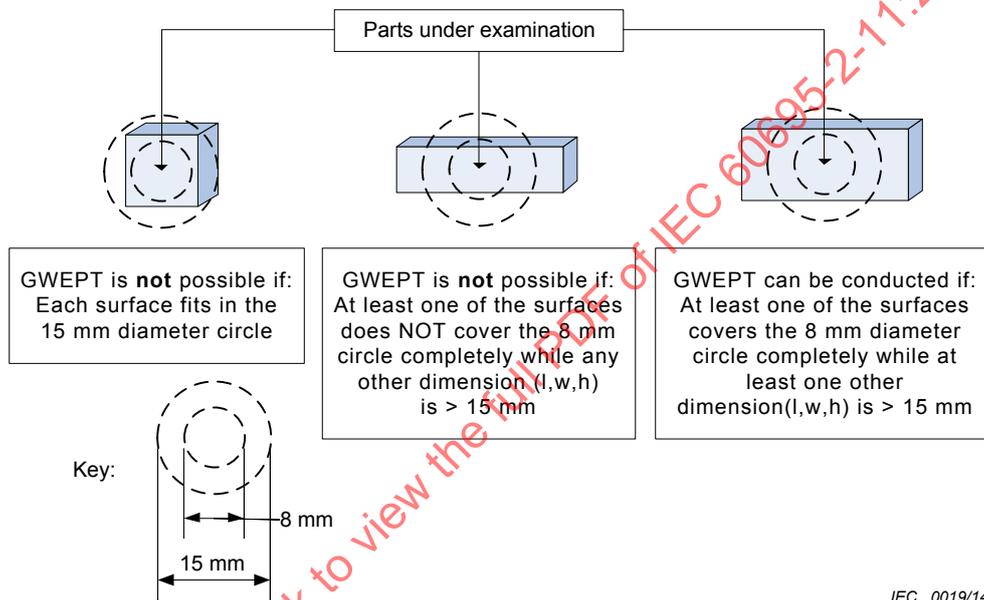


Figure 1 – Small parts

## 5 Description of the Test apparatus

The description of the test apparatus is given specified in clause 5 of IEC 60695-2-10.

To evaluate the possibility of the spread of fire, for example by burning or glowing particles falling from the test specimen, a specified layer as described in 5.3 of IEC 60695-2-10, or the material or components normally surrounding or situated underneath the test specimen, are placed underneath the test specimen. The distance between the test specimen and the specified layer representing the surrounding material or components, shall be equal to those when the test specimen is mounted in the electrotechnical product that which occurs in end use. If the test specimen is a component such that surrounding materials and distances are unknown, then the wrapping tissue / wooden board specified layer described in IEC 60695-2-10 shall be placed 200 mm ± 5 mm below the glow wire point of contact.

If the test specimen is a complete free-standing equipment, it is placed in its normal position of use on the specified layer as described in clause 5.3 of IEC 60695-2-10 extending for at least 100 mm outside the base of the equipment in all directions.

If the test specimen is a complete wall-mounted equipment, it is fixed in its normal position of use 200 mm ± 5 mm above the specified layer as described in 5.3 of IEC 60695-2-10.

## 6 Severities

The test temperature shall be chosen from the following values of table 1.

**Table 1 – Test severities**

Preferred test temperatures °C	Tolerances K
550	±10
650	±10
750	±10
850	±15
960	±15

If required by the relevant specification, other test temperatures may be used.

NOTE—See annex A for guidance.

## 76 Verification of the temperature measuring system

The method of verification of the temperature measuring system is specified in 6.2 of IEC 60695-2-10.

## 87 Conditioning

### 7.1 Conditioning of test specimens

Unless otherwise specified in the relevant product standard, the test specimens shall be conditioned for 24 h in an atmosphere having a temperature between 15 °C and 35 °C and a relative humidity between 45 % and 75 %.

### 7.2 Conditioning of specified layers

If the wrapping tissue, wooden board specified layer is used, the conditioning shall be carried out according to IEC 60695-2-10. If the material or components normally surrounding or situated underneath the test specimen is used, the material or components shall be conditioned in the same way as the test specimen (see 7.1).

### 7.3 Testing conditions

The test specimens shall be tested in a laboratory atmosphere having a temperature between 15 °C and 35 °C and a relative humidity less than or equal to 75 %. Testing shall be completed within 30 minutes after the specimen is removed from the conditions specified in 7.1.

## 9 Initial measurements

The test specimen shall be examined visually and, when specified in the relevant specification, the mechanical/electrical parameters measured.

## 108 Test procedure

See clause 8 of IEC 60695-2-10.

### 8.1 General

40.1—In addition to ~~clause 8 of the common test procedure specified in~~ IEC 60695-2-10, if not otherwise specified, the test specimen shall be so arranged that the tip of the glow-wire is applied to the part of the surface of the test specimen which is likely to be subjected to thermal stresses in normal use. The glow-wire shall be maintained as close to the horizontal as is practicable.

In cases where the test shall be made at more than one point on the same test specimen, care shall be taken that any deterioration caused by previous tests will not affect the result of the test to be made.

In cases where the areas subjected to thermal stresses during normal use of the equipment are not specified in detail, the tip of the glow-wire is applied at a place where the section is thinnest, but ~~preferably if possible~~ not less than 15 mm from the upper edge of the test specimen.

Clamping the test specimen onto the test apparatus shall not introduce excessive internal mechanical stresses in the test specimen during the test.

### 8.2 Test temperatures

The glow-wire is heated to the test temperature specified in the relevant product standard. This temperature should preferably be one of the temperatures shown in Table 1.

Table 1 – Test temperatures

Test temperatures °C	Tolerances °C
550	± 10
600	± 10
650	± 10
700	± 10
750	± 10
800	± 15
850	± 15
900	± 15
960	± 15

When selecting test temperatures, product committees should consider Figure A.1 which gives suggested glow-wire end product test (GWEPT) temperatures.

### 8.3 Number of test specimens

40.2—If not otherwise specified by the relevant ~~specification~~ product standard, the test is made on one test specimen.

### 419 Observations and measurements

During the time of application of the glow-wire,  $t_{aA}$  (30 s ± 1 s), and during a further period of 30 s, the test specimen, the parts surrounding the test specimen and the specified layer placed below it shall be observed and the following shall be reported:

- a) whether there is no ignition; or, if there is ignition, the duration,  $t_i$  (to the nearest 0,5 s), from the beginning of tip application up to the time at which the test specimen or the specified layer placed below it ignites;
- b) the duration,  $t_{eE}$ , (to the nearest 0,5 s) from the beginning of tip application up to the time when all flames extinguish, during or after the period of application;
- ~~c) the maximum height of any flame rounded up to the next 5 mm but disregarding the start of the ignition, which may produce a high flame for a period of approximately 1 s;~~
- ~~c) d) if a whether the test specimen passes the test extinguishes by virtue of most of the flaming material being withdrawn with the glow-wire, then this shall be reported in the test report;~~
- d) e) whether the test specimen is totally burned; and
- e) whether there is any ignition of the specified layer placed underneath the test specimen.

~~NOTE The height of the flame is the vertical distance measured between the upper edge of the glow-wire, when applied to the test specimen, and the visible tip of the flame, when viewed in subdued light.~~

~~The mechanical/electrical parameters shall be measured when specified in the relevant specification.~~

#### 4210 Evaluation of test results

~~Unless otherwise specified in the relevant specification, The test specimen is considered to have passed the glow-wire test a GWEPT of  $T$  if at a test temperature of  $T$  °C,~~

- a) there is no flaming or glowing ignition, or if
- b) all of the following situations apply when ignition has occurred:
  - ~~a~~ i) if flames or glowing combustion of the test specimen extinguish within 30 s after removal of the glow wire, i.e.  $t_e \leq t_a + t_E \leq t_A + 30$  s; and
  - ~~b~~ ii) when the specified layer of wrapping tissue is used there shall be no ignition of the wrapping tissue. placed underneath the test specimen does not ignite.

#### 11 Test report

The test report shall include the following information:

- ~~c) a reference to this International Standard;~~
- ~~d) a description of the test specimen including type and manufacturer (see Clause 4);~~
- ~~e) a description of the method for preparation of the test specimen (see Clause 4);~~
- ~~f) the conditioning of the test specimens (see Clause 7);~~
- ~~g) the number of test specimens tested (see 8.3);~~
- ~~h) the surface tested and the points of application of the glow-wire (see 8.1);~~
- ~~i) the specified layer used to evaluate the effect of flaming particles and its vertical distance to the glow wire point of application (see Clause 5);~~
- ~~j) the test temperature (see 8.2);~~
- ~~k) all applicable observations and measurements from Clause 9; and~~
- ~~l) the GWEPT as determined in Clause 10 shall be reported in the following manner, for example, for a test specimen tested at 850 °C:~~

GWEPT: 850

### **1312 Information to be given in the relevant ~~specification product standard~~**

When referencing this method, technical committees shall indicate the following details:

- a) the type and description of the test specimen (see Clause 4);
- b) the method of preparation (see Clause 4);
- c) any conditioning of the test specimens (see Clause ~~8~~ 7);
- d) the number of test specimens (see ~~10.3~~ 8.3);
- e) the surface to be tested and the points of application of the glow-wire (see ~~10.1~~ 8.1);
- f) the specified layer to be used to evaluate the effect of flaming particles (see Clause 5);
- g) the GWEPT (see Clause 10) and test temperature (see ~~table 4~~ 8.2), for example, "GWEPT of 850 °C in accordance with IEC 60695-2-11";
- h) ~~whether the tests shall be made at more than one point~~ the relevant part(s) or zone(s) of the product subjected to the test on the same test specimen (see ~~10.1~~ 8.1);
- i) whether the criteria specified are sufficient to check compliance with the safety requirements, or whether other criteria ~~— for example on  $t_i$ ,  $t_e$ , the height of flame —~~ should be ~~introduced~~ used (see Clause ~~11~~ 9); and
- j) ~~the mechanical/electrical parameters to be measured (see clauses 9 and 11)~~ whether consequential testing needs to be considered to cover residual risks and, if so, which test method and what requirements should be specified.

NOTE See IEC 60695-1-11 for additional guidance on consequential testing.

## Annex A (informative)

### Guidance for glow-wire test

The appropriate test temperature should be chosen by estimating the risk of failure due to inadequate response to abnormal heat, to ignition and to spread of fire, and the consequences to be expected as a result of such a failure.

To assist the technical committees in describing adequately the application of the glow wire test associated with the test temperatures shown in table 1, the following suggestions are made.

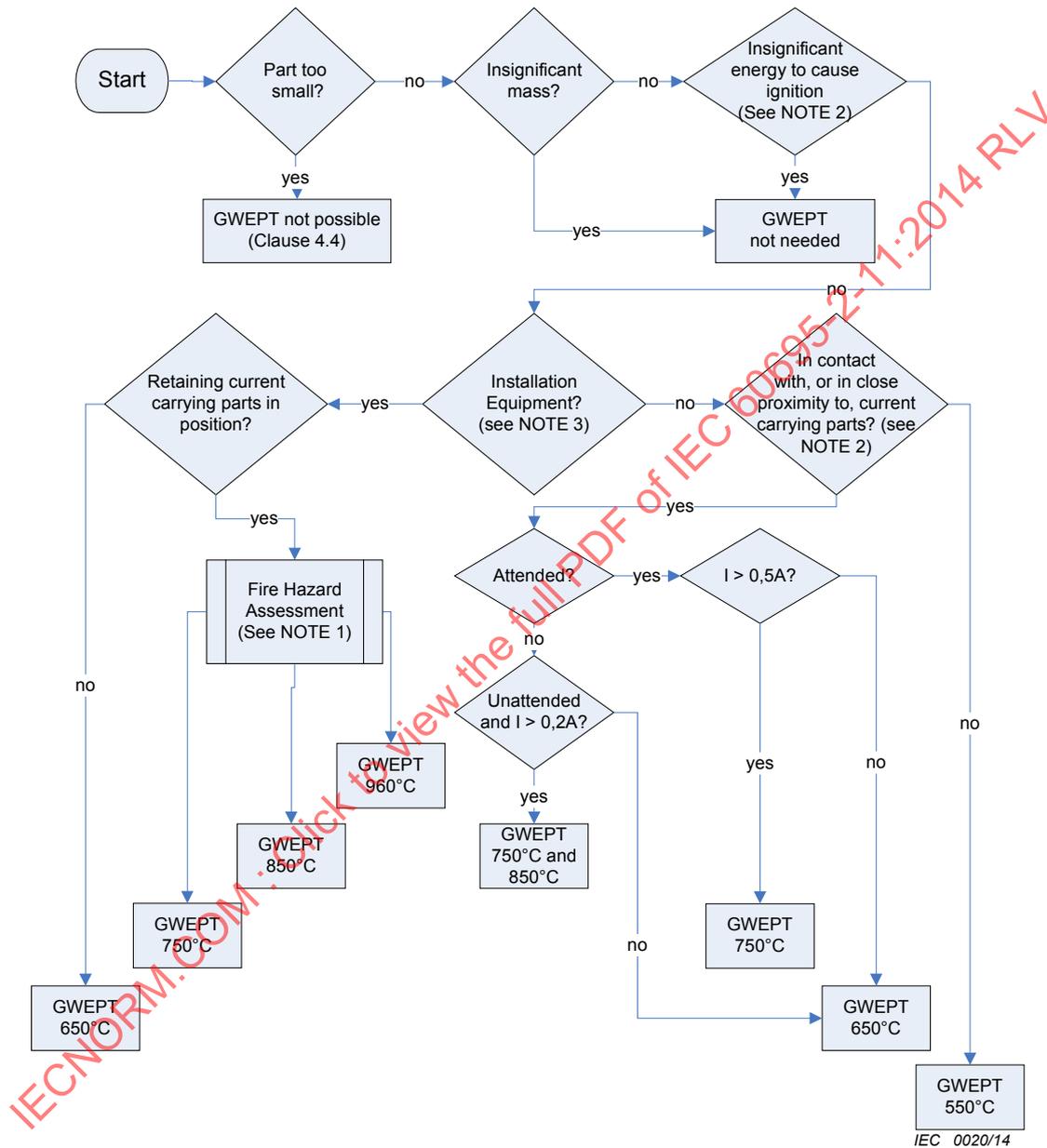
**Table A.1 – Guidance for glow-wire test**

Kind of equipment	Parts made of insulation material	
	Parts in contact with, or retaining in position, current-carrying parts	Enclosures and covers not retaining current-carrying parts in position
Equipment for attended use	650 °C	650 °C
Equipment for unattended use but under less stringent conditions	750 °C	750 °C
Equipment for attended use but under more stringent conditions	750 °C	750 °C
Equipment for unattended use continuously loaded	850 °C	850 °C
Equipment for unattended use continuously loaded but under more stringent conditions	960 °C	960 °C
Fixed accessories in installation	750 °C	650 °C
Equipment to be used near the central supply point of a building	960 °C	750 °C
To ensure a minimum level of resistance to ignition of, and/or spread of fire by, parts liable to contribute to a fire hazard, and which are not subjected to other tests in this respect (in order to eliminate highly combustible material)	550 °C	550 °C

**Annex A**  
(informative)

**Suggested GWEPT temperatures**

Figure A.1 demonstrates suggested GWEPT temperatures.



**Key:**

I = rated current

A = amps

GWEPT = Glow Wire End Product Test

NOTE 1 A separate Fire Hazard Assessment (FHA) as determined by the relevant product standard will dictate the appropriate GWEPT temperature.

NOTE 2 The phrases “insufficient energy” and “close proximity” should be defined by the relevant product committee. It is dependent upon a number of factors (for example: the severity of the hazard).

NOTE 3 Examples of installation equipment include socket outlets, circuit protection devices, and LV switchgear.

NOTE 4 The right side of the flow chart (Installation equipment = no) is intended to partially represent the limited application of the GWEPT as currently used by IEC 60335-1. Refer to that document for other considerations.

**Figure A.1 – Suggested GWEPT temperatures**

## Bibliography

- [1] IEC 60695-1-10, *Fire hazard testing – Part 1-10: Guidance for assessing the fire hazard of electrotechnical products – General guidelines*
- [2] IEC 60695-1-11, *Fire hazard testing – Part 1-11: Guidance for assessing the fire hazard of electrotechnical products – Fire hazard assessment*
- [3] 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*
- [4] 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*
- [5] IEC 60335-1, *Household and similar electrical appliances – Safety – Part 1: General requirements*

IEC 60695-4:2012, *Fire hazard testing – Part 4: Terminology*

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

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# INTERNATIONAL STANDARD

# NORME INTERNATIONALE



BASIC SAFETY PUBLICATION

PUBLICATION FONDAMENTALE DE SÉCURITÉ

**Fire hazard testing –**

**Part 2-11: Glowing/hot-wire based test methods – Glow-wire flammability test method for end-products (GWEPT)**

**Essais relatifs aux risques du feu –**

**Partie 2-11: Essais au fil incandescent/chauffant – Méthode d'essai d'inflammabilité pour produits finis (GWEPT)**

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## CONTENTS

FOREWORD .....	3
INTRODUCTION .....	5
1 Scope .....	6
2 Normative references .....	6
3 Terms and definitions .....	6
4 Test specimens .....	8
4.1 General .....	8
4.2 Complete end product .....	8
4.3 Partial end product (alternative) .....	8
4.4 Test considerations and limitations associated with the specimen configuration .....	9
5 Test apparatus .....	10
6 Verification of the temperature measuring system .....	10
7 Conditioning .....	10
7.1 Conditioning of test specimens .....	10
7.2 Conditioning of specified layers .....	10
7.3 Testing conditions .....	10
8 Test procedure .....	10
8.1 General .....	10
8.2 Test temperatures .....	11
8.3 Number of test specimens .....	11
9 Observations and measurements .....	11
10 Evaluation of test results .....	12
11 Test report .....	12
12 Information to be given in the relevant product standard .....	12
Annex A (informative) Suggested GWEPT temperatures .....	13
Bibliography .....	14
Figure 1 – Small parts .....	9
Figure A.1 – Suggested GWEPT temperatures .....	13
Table 1 – Test temperatures .....	11

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

## FIRE HAZARD TESTING –

**Part 2-11: Glowing/hot-wire based test methods –  
Glow-wire flammability test method for end-products (GWEPT)**

## 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 60695-2-11 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
89/1197/FDIS	89/1206/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.

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 60695-2-10.

This second edition of IEC 60695-2-11 cancels and replaces the first edition of IEC 60695-2-11 published in 2000. It constitutes a technical revision.

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

- The Introduction has been added to provide background and how it relates to the Scope.
- The Scope has been modified for greater clarity and reference to basic safety publications.
- Numerous terms and definitions relevant to this Standard have been added to Clause 3.
- The application of “small parts” and “insignificant mass” have been introduced and clarified.
- The different types of specimens, how to specify them, and limitations of the test method have been further clarified in Clause 4.
- Clarified in Clause 5 the distance to specified layer when unknown.
- The information from Clause 6 has been moved into the test procedure in Clause 8.
- The conditioning of the specified layer and the laboratory ambient test conditions were clarified in Clause 7.
- Measurement of the maximum flame height was removed from Clause 9.
- The reference to this test as “GWEPT” was introduced along with an applicable title change.
- Annex A has been revised to reflect current practice by prominent product committees.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site 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.

**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 document using a colour printer.**

## INTRODUCTION

The purpose of this Introduction is to provide background regarding the basic guidance that prompted the preparation of this International Standard and how it relates to the Scope.

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 within the design of component, circuit, and product design, as well as the choice of the 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 Technical Committee 89 has developed IEC 60695-1-10, together with its companion, IEC 60695-1-11, 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 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 60695-2-12 describes a glow-wire flammability index (GWFI) test method for materials, and IEC 60695-2-13 describes a glow-wire ignition temperature (GWIT) test method for materials.

This standard is used to assess the reaction of end products to heat caused by contact with an electrically heated wire under controlled laboratory conditions. This may be useful for the evaluation of end products that may be exposed to excess thermal stress such as a fault current flowing through a wire, overloading of components, and/or poor electrical connections. It should not be used to solely describe or appraise the fire hazard or fire risk of 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 2-11: Glowing/hot-wire based test methods – Glow-wire flammability test method for end-products (GWEPT)

#### 1 Scope

This part of IEC 60695 specifies a test method on an end product. It is intended to simulate the effects of thermal stresses produced by an electrically heated source to represent a fire hazard.

This test method is used to check that, under defined test conditions, an end product exposed to an electrically heated source has either a limited ability to ignite or, if it ignites, a limited ability to propagate flame. However, the fire hazard analysis, the flammability aspects and the flame spreading to other products are not covered by the present standard.

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.

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

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*

#### 3 Terms and definitions

For the purpose of this document the following terms and definitions apply.

##### 3.1

**burn**, intransitive verb  
undergo combustion

[SOURCE: ISO/IEC 13943:2008, definition 4.28]

**3.2**

**combustible**, adjective  
capable of being ignited and burned

[SOURCE: ISO/IEC 13943:2008, definition 4.43]

**3.3**

**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/IEC 13943:2008, definition 4.46]

**3.4**

**enclosure**  
(electrotechnical) external casing protecting the electrical and mechanical parts of apparatus

Note 1 to entry: The term excludes cables.

[SOURCE: ISO/IEC 13943:2008, definition 4.78]

**3.5**

**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, definition 3.2.7]

**3.6**

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

[SOURCE: ISO/IEC 13943:2008, definition 4.112]

**3.7**

**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, definition 3.2.10]

**3.8**

**fire risk**  
probability of a fire combined with a quantified measure of its consequence

Note 1 to entry: It is often calculated as the product of probability and consequence.

[SOURCE: ISO/IEC 13943:2008, definition 4.124]

**3.9**

**flame**  
rapid, self sustaining, sub-sonic propagation of combustion in a gaseous medium, usually with emission of light

[SOURCE: ISO/IEC 13943:2008, definition 4.133]

### 3.10

#### **flame spread**

propagation of a flame front

[SOURCE: ISO/IEC 13943:2008, definition 4.142]

### 3.11

#### **flammability**

ability of a material or product to burn with a flame under specified conditions

[SOURCE: ISO/IEC 13943:2008, definition 4.151]

### 3.12

#### **glowing**, adjective

emitting light without flame from the combustion of a material in the solid phase

### 3.13

#### **ignition**

sustained ignition (deprecated)  
(general) initiation of combustion

[SOURCE: ISO/IEC 13943:2008, definition 4.187]

### 3.14

#### **insignificant mass**

insufficient combustible material to constitute a fire hazard

Note 1 to entry: A default value is 2 g, but product TCs may assign a different value appropriate to the product type and scale.

[SOURCE: IEC 60695-4:2012, definition 3.2.16]

### 3.15

#### **small part**

part with a dimension less than the minimum specified for the relevant test method

[SOURCE: IEC 60695-4:2012, definition 3.2.25]

## 4 Test specimens

### 4.1 General

It is not necessary to test end products or parts of end products which have insignificant mass. Additionally, this test method is not suitable for testing small parts (see 4.4).

### 4.2 Complete end product

It is preferred that the test specimen should be a complete end product as opposed to a partial end product (see 4.3). The test specimen shall be chosen so that the conditions of the test will not be significantly different from those occurring in normal use with regard to shape, ventilation, effect of thermal stresses, and eventually, the effects of burning or glowing particles falling from the test specimen.

### 4.3 Partial end product (alternative)

If the test cannot be made on a complete end product then, unless otherwise specified by the relevant product standard, it is acceptable to

- a) cut a piece containing the part under examination from a complete and assembled end product, or
- b) cut an aperture in the complete end product to allow the glow-wire access, or
- c) remove the part under examination in its entirety and test it separately.

Technical committees should define in their relevant product standards what may be removed to achieve access. So far as possible, these product standards should strive to replicate actual service locations and conditions.

#### 4.4 Test considerations and limitations associated with the specimen configuration

When cutting an opening for access purposes, a small aperture may affect the results by leading to the ignition of the surroundings and/or reducing the temperature of the tip of the glow-wire. The opening should be large enough to supply an adequate supply of air for combustion.

If, during the test, any part of the equipment containing the test specimen is ignited by extraneous heat from the glow-wire which in turn influences the thermal conditions at the test specimen, the test shall be invalid.

The glow-wire flammability test method for end products shall not be used for testing small parts. This is because such parts cannot be effectively supported to avoid heat losses (see IEC 60695-2-10), and they are not able to accommodate the penetration of the glow-wire.

The following are considered to be small parts:

- a) where each surface lies completely within a circle of 15 mm in diameter; or
- b) where it is not possible to fit a circle of 8 mm in diameter completely on at least one of the surfaces while, at least one part dimension is  $> 15$  mm.

See Figure 1.

When checking a surface,

- a) projections on the surface are disregarded and
- b) holes or recesses which are not greater than 2 mm in any dimension are disregarded.

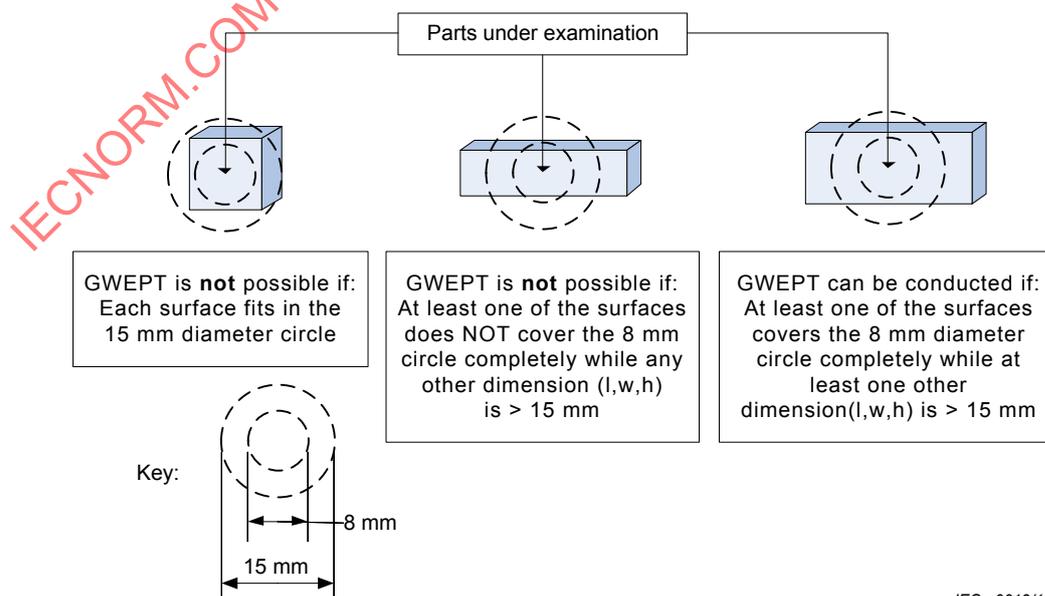


Figure 1 – Small parts

## 5 Test apparatus

The test apparatus is specified in IEC 60695-2-10.

To evaluate the possibility of the spread of fire, for example by burning or glowing particles falling from the test specimen, a specified layer as described in IEC 60695-2-10, or the material or components normally surrounding or situated underneath the test specimen, are placed underneath the test specimen. The distance between the test specimen and the specified layer representing the surrounding material or components, shall be equal to that which occurs in end use. If the test specimen is a component such that surrounding materials and distances are unknown, then the wrapping tissue / wooden board specified layer described in IEC 60695-2-10 shall be placed  $200 \text{ mm} \pm 5 \text{ mm}$  below the glow wire point of contact.

If the test specimen is a complete free-standing equipment, it is placed in its normal position of use on the specified layer as described in IEC 60695-2-10 extending for at least 100 mm outside the base of the equipment in all directions.

If the test specimen is a complete wall-mounted equipment, it is fixed in its normal position of use  $200 \text{ mm} \pm 5 \text{ mm}$  above the specified layer as described in IEC 60695-2-10.

## 6 Verification of the temperature measuring system

The method of verification of the temperature measuring system is specified in IEC 60695-2-10.

## 7 Conditioning

### 7.1 Conditioning of test specimens

Unless otherwise specified in the relevant product standard, the test specimens shall be conditioned for 24 h in an atmosphere having a temperature between  $15 \text{ }^\circ\text{C}$  and  $35 \text{ }^\circ\text{C}$  and a relative humidity between 45 % and 75 %.

### 7.2 Conditioning of specified layers

If the wrapping tissue / wooden board specified layer is used, the conditioning shall be carried out according to IEC 60695-2-10. If the material or components normally surrounding or situated underneath the test specimen is used, the material or components shall be conditioned in the same way as the test specimen (see 7.1).

### 7.3 Testing conditions

The test specimens shall be tested in a laboratory atmosphere having a temperature between  $15 \text{ }^\circ\text{C}$  and  $35 \text{ }^\circ\text{C}$  and a relative humidity less than or equal to 75 %. Testing shall be completed within 30 minutes after the specimen is removed from the conditions specified in 7.1.

## 8 Test procedure

### 8.1 General

In addition to the common test procedure specified in IEC 60695-2-10, if not otherwise specified, the test specimen shall be so arranged that the tip of the glow-wire is applied to the part of the surface of the test specimen which is likely to be subjected to thermal stresses in normal use. The glow-wire shall be maintained as close to the horizontal as is practicable.

In cases where the test shall be made at more than one point on the same test specimen, care shall be taken that any deterioration caused by previous tests will not affect the result of the test to be made.

In cases where the areas subjected to thermal stresses during normal use of the equipment are not specified in detail, the tip of the glow-wire is applied at a place where the section is thinnest, but if possible not less than 15 mm from the upper edge of the test specimen.

Clamping the test specimen onto the test apparatus shall not introduce excessive internal mechanical stresses in the test specimen during the test.

## 8.2 Test temperatures

The glow-wire is heated to the test temperature specified in the relevant product standard. This temperature should preferably be one of the temperatures shown in Table 1.

**Table 1 – Test temperatures**

Test temperatures °C	Tolerances °C
550	± 10
600	± 10
650	± 10
700	± 10
750	± 10
800	± 15
850	± 15
900	± 15
960	± 15

When selecting test temperatures, product committees should consider Figure A.1 which gives suggested glow-wire end product test (GWEPT) temperatures.

## 8.3 Number of test specimens

If not otherwise specified by the relevant product standard, the test is made on one test specimen.

## 9 Observations and measurements

During the time of application of the glow-wire,  $t_A$  ( $30 \text{ s} \pm 1 \text{ s}$ ), and during a further period of 30 s, the test specimen, the parts surrounding the test specimen and the specified layer placed below it shall be observed and the following shall be reported:

- whether there is no ignition; or, if there is ignition, the duration,  $t_i$  (to the nearest 0,5 s), from the beginning of tip application up to the time at which the test specimen or the specified layer placed below it ignites;
- the duration,  $t_E$ , (to the nearest 0,5 s) from the beginning of tip application up to the time when all flames extinguish, during or after the period of application;
- whether the test specimen extinguishes by virtue of most of the flaming material being withdrawn with the glow-wire;
- whether the test specimen is totally burned; and

- e) whether there is any ignition of the specified layer placed underneath the test specimen.

## 10 Evaluation of test results

The test specimen is considered to have a GWEPT of  $T$  if at a test temperature of  $T$  °C,

- a) there is no ignition, or
- b) all of the following situations apply when ignition has occurred:
  - i) if flames or glowing combustion of the test specimen extinguish within 30 s after removal of the glow wire, i.e.  $t_E \leq t_A + 30$  s; and
  - ii) the specified layer placed underneath the test specimen does not ignite.

## 11 Test report

The test report shall include the following information:

- a) a reference to this International Standard;
- b) a description of the test specimen including type and manufacturer (see Clause 4);
- c) a description of the method for preparation of the test specimen (see Clause 4);
- d) the conditioning of the test specimens (see Clause 7);
- e) the number of test specimens tested (see 8.3);
- f) the surface tested and the points of application of the glow-wire (see 8.1);
- g) the specified layer used to evaluate the effect of flaming particles and its vertical distance to the glow wire point of application (see Clause 5);
- h) the test temperature (see 8.2);
- i) all applicable observations and measurements from Clause 9; and
- j) the GWEPT as determined in Clause 10 shall be reported in the following manner, for example, for a test specimen tested at 850 °C:

GWEPT: 850

## 12 Information to be given in the relevant product standard

When referencing this method, technical committees shall indicate the following details:

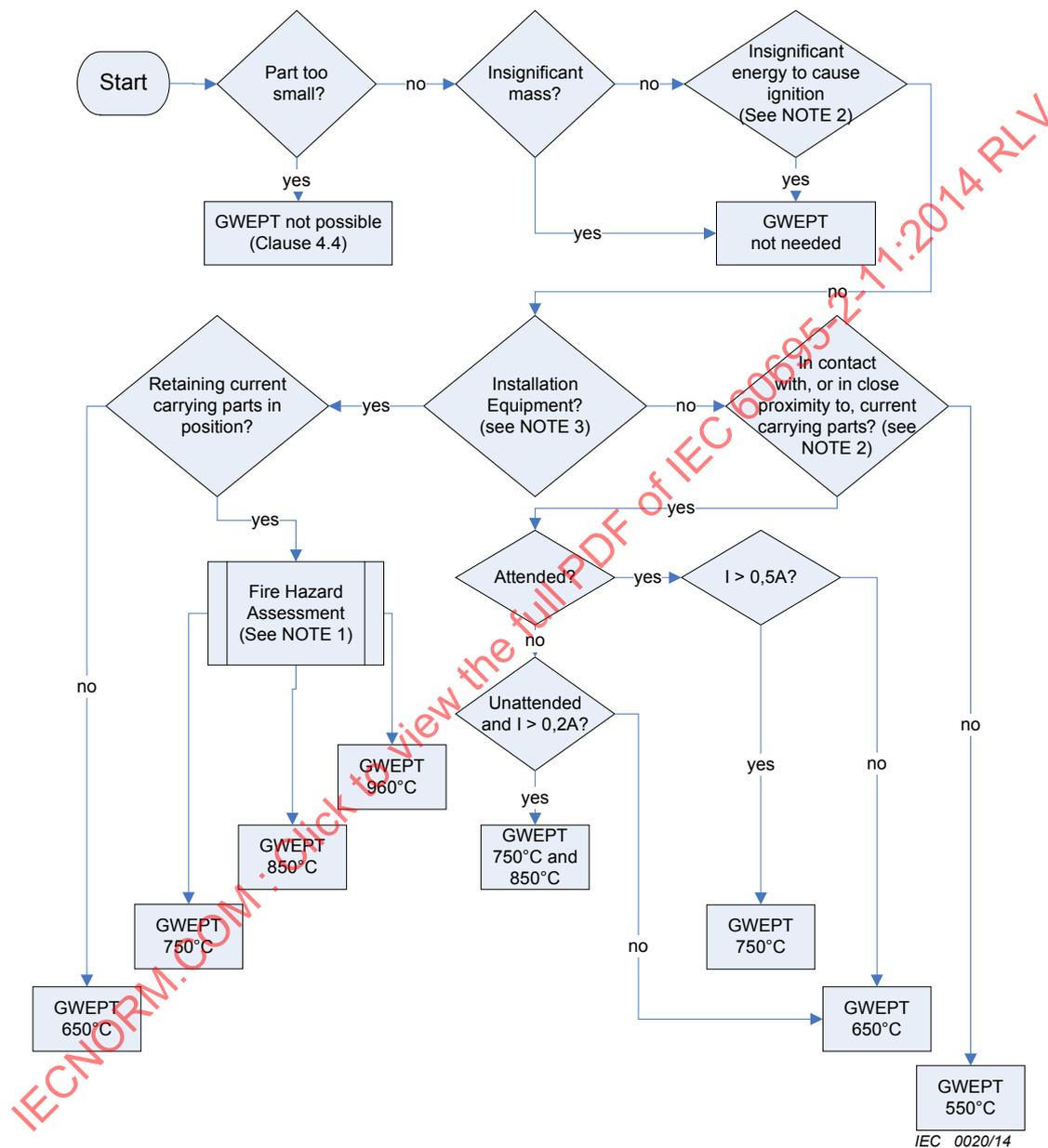
- a) the type and description of the test specimen (see Clause 4);
- b) the method of preparation (see Clause 4);
- c) any conditioning of the test specimens (see Clause 7);
- d) the number of test specimens (see 8.3);
- e) the surface to be tested and the points of application of the glow-wire (see 8.1);
- f) the specified layer to be used to evaluate the effect of flaming particles (see Clause 5);
- g) the GWEPT (see Clause 10) and test temperature (see 8.2), for example, “GWEPT of 850 °C in accordance with IEC 60695-2-11”;
- h) the relevant part(s) or zone(s) of the product subjected to the test on the same test specimen (see 8.1);
- i) whether the criteria specified are sufficient to check compliance with the safety requirements, or whether other criteria, should be used (see Clause 9); and
- j) whether consequential testing needs to be considered to cover residual risks and, if so, which test method and what requirements should be specified.

NOTE See IEC 60695-1-11 for additional guidance on consequential testing.

## Annex A (informative)

### Suggested GWEPT temperatures

Figure A.1 demonstrates suggested GWEPT temperatures.



#### Key:

I = rated current

A = amps

GWEPT = Glow Wire End Product Test

NOTE 1 A separate Fire Hazard Assessment (FHA) as determined by the relevant product standard will dictate the appropriate GWEPT temperature.

NOTE 2 The phrases “insufficient energy” and “close proximity” should be defined by the relevant product committee. It is dependent upon a number of factors (for example: the severity of the hazard).

NOTE 3 Examples of installation equipment include socket outlets, circuit protection devices, and LV switchgear.

NOTE 4 The right side of the flow chart (Installation equipment = no) is intended to partially represent the limited application of the GWEPT as currently used by IEC 60335-1. Refer to that document for other considerations.

Figure A.1 – Suggested GWEPT temperatures

## Bibliography

- [1] IEC 60695-1-10, *Fire hazard testing – Part 1-10: Guidance for assessing the fire hazard of electrotechnical products – General guidelines*
- [2] IEC 60695-1-11, *Fire hazard testing – Part 1-11: Guidance for assessing the fire hazard of electrotechnical products – Fire hazard assessment*
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- [4] 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*
- [5] IEC 60335-1, *Household and similar electrical appliances – Safety – Part 1: General requirements*

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

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## SOMMAIRE

AVANT-PROPOS.....	17
INTRODUCTION.....	19
1 Domaine d'application .....	20
2 Références normatives .....	20
3 Termes et définitions .....	20
4 Eprouvettes d'essai .....	22
4.1 Généralités .....	22
4.2 Produit fini complet .....	23
4.3 Produit fini partiel (variante).....	23
4.4 Considérations d'essai et limitations associées à la configuration de l'éprouvette d'essai .....	23
5 Appareillage d'essai .....	24
6 Vérification du système de mesure de la température .....	25
7 Conditionnement .....	25
7.1 Conditionnement des éprouvettes d'essai .....	25
7.2 Conditionnement des sous-couches spécifiées .....	25
7.3 Conditions d'essai.....	25
8 Mode opératoire .....	25
8.1 Généralités .....	25
8.2 Températures d'essai.....	26
8.3 Nombre d'éprouvettes d'essai.....	26
9 Observations et mesures .....	26
10 Evaluation des résultats d'essai.....	26
11 Rapport d'essai .....	27
12 Renseignements à fournir dans la norme de produits applicable.....	27
Annexe A (informative) Températures suggérées pour la méthode GWEPT .....	28
Bibliographie.....	30
Figure 1 – Petites pièces .....	24
Figure A.1 – Températures suggérées pour la méthode GWEPT.....	29
Tableau 1 – Températures d'essai .....	26

## COMMISSION ÉLECTROTECHNIQUE INTERNATIONALE

## ESSAIS RELATIFS AUX RISQUES DU FEU –

**Partie 2-11: Essais au fil incandescent/chauffant –  
Méthode d'essai d'inflammabilité pour produits finis (GWEPT)**

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La Norme internationale CEI 60695-2-11 a été établie par le comité d'études 89 de la CEI: Essais relatifs aux risques du feu.

Le texte de cette norme est issu des documents suivants:

FDIS	Rapport de vote
89/1197/FDIS	89/1206/RVD

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

Cette publication a été rédigée selon les Directives ISO/CEI, Partie 2.

Elle a le statut d'une publication fondamentale de sécurité, conformément au Guide CEI 104 et au Guide ISO/CEI 51.

Cette norme doit être utilisée conjointement avec la CEI 60695-2-10.

Cette deuxième édition de la CEI 60695-2-11 annule et remplace la première édition de la CEI 60695-2-11 publiée en 2000. Elle constitue une révision technique.

Les principales modifications apportées par rapport à l'édition précédente sont énumérées ci-dessous:

- L'introduction a été modifiée pour fournir le contexte et montrer la relation avec le domaine d'application.
- Modification du domaine d'application pour davantage de clarté, et pour faire référence aux publications fondamentales de sécurité.
- Ajout à l'Article 2 de nombreux termes et définitions applicables à la présente Norme.
- Introduction et clarification de l'application des "petites pièces" et de la "masse négligeable".
- Clarification supplémentaire à l'Article 4 des différents types d'éprouvettes, de la manière de les spécifier et des limitations de la méthode d'essai.
- Clarification à l'Article 5 de la distance par rapport à la sous-couche spécifiée, lorsqu'elle n'est pas connue.
- Transfert des informations de l'Article 6 dans la procédure d'essai de l'Article 8.
- Clarification à l'Article 7 du conditionnement de la sous-couche spécifiée et des conditions d'essai ambiantes de laboratoire.
- Suppression de la mesure de la hauteur de flamme maximale de l'Article 9.
- Introduction de la référence à cet essai comme essai "GWEPT", et modification du titre en conséquence.
- Révision de l'Annexe A, afin de refléter les pratiques en vigueur au sein des comités de produits clés.

Le comité a décidé que le contenu de cette publication ne sera pas modifié avant la date de stabilité indiquée sur le site web de la CEI sous "<http://webstore.iec.ch>" dans les données relatives à la publication recherchée. A cette date, la publication sera

- reconduite,
- supprimée,
- remplacée par une édition révisée, ou
- amendée

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## INTRODUCTION

La présente introduction a pour objet de fournir le contexte relatif aux lignes directrices de base à l'origine de l'élaboration de cette Norme internationale et sa relation avec le domaine d'application.

La conception de tout produit électrotechnique doit tenir compte du risque de feu et des dangers potentiels associés au feu. A 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 de feu dans les conditions de fonctionnement normal, d'utilisation anormale raisonnablement prévisible, de dysfonctionnement et/ou de défaillance. Le comité d'études 89 de la CEI a établi la CEI 60695-1-10, avec sa norme associée, la CEI 60695-1-11, afin de fournir des lignes directrices sur les méthodes de réalisation correspondantes.

La CEI 60695-1-10 et la CEI 60695-1-11 ont pour principaux objectifs de fournir des lignes directrices sur les éléments suivants:

- a) éviter l'allumage provoqué par une partie de composant soumis à une alimentation électrique, et
- b) confiner le feu résultant dans les limites de l'enveloppe du produit électrotechnique en cas d'allumage.

Les objectifs secondaires de ces documents comprennent la réduction de toute propagation de la flamme au-delà de l'enveloppe du produit et la réduction des effets préjudiciables 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. Il convient de tenir compte de ces éléments dans le cadre de l'évaluation globale du danger d'incendie.

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

La CEI 60695-2-10 décrit l'appareillage d'essai au fil incandescent et la procédure d'essai commune, la CEI 60695-2-12 décrit une méthode d'essai d'indice d'inflammabilité au fil incandescent (GWFI, *glow-wire flammability index*) et la CEI 60695-2-13 décrit une méthode d'essai de température d'allumabilité au fil incandescent (GWIT, *glow-wire ignition temperature*) pour matériaux.

La présente norme permet d'évaluer la réaction des produits finis à la chaleur engendrée par le contact avec un fil chauffé électriquement dans des conditions contrôlées en laboratoire. Elle peut être utile pour l'évaluation de produits finis susceptibles d'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 électriques. Il convient de ne pas l'utiliser pour uniquement décrire ou évaluer le danger d'incendie ou le risque d'incendie de produits ou assemblages dans des conditions réelles d'incendie. Cependant, les résultats de cet essai peuvent servir d'éléments pour une évaluation du danger d'incendie qui prend en considération tous les facteurs appropriés à une utilisation finale particulière.

La présente norme internationale peut impliquer des matériaux, opérations et matériels dangereux. Elle n'a pas pour objet de traiter tous les problèmes de sécurité associés à son utilisation. Il incombe à l'utilisateur de la présente norme internationale d'établir des bonnes pratiques appropriées en termes de sécurité et de santé et de déterminer l'applicabilité des limitations réglementaires avant usage.

## ESSAIS RELATIFS AUX RISQUES DU FEU –

### Partie 2-11: Essais au fil incandescent/chauffant – Méthode d'essai d'inflammabilité pour produits finis (GWEPT)

#### 1 Domaine d'application

La présente partie de la CEI 60695 spécifie une méthode d'essai applicable au produit fini. Elle est destinée à simuler l'effet de contraintes thermiques produites par une source chauffée électriquement afin de représenter un danger d'incendie.

La présente méthode d'essai permet de vérifier que, dans des conditions d'essai définies, un produit fini exposé à une source chauffée électriquement présente une aptitude limitée à s'enflammer ou, s'il s'enflamme, une aptitude limitée à propager la flamme. Cependant, la présente norme ne traite pas de l'analyse du danger d'incendie, des aspects d'inflammabilité et de propagation de flammes à d'autres produits.

La présente publication fondamentale de sécurité est destinée à être utilisée par les comités d'études dans le cadre de l'élaboration de normes conformément aux principes établis dans le Guide CEI 104 et le Guide ISO/CEI 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. Les exigences, les méthodes d'essai ou les conditions d'essai de la présente publication fondamentale de sécurité ne s'appliquent pas sauf référence spécifique ou inclusion dans les publications correspondantes.

#### 2 Références normatives

Les documents suivants sont cités en référence de manière normative, en intégralité ou en partie, dans le présent document et sont indispensables pour son application. 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).

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

Guide CEI 104, *Élaboration des publications de sécurité et utilisation des publications fondamentales de sécurité et publications groupées de sécurité*

Guide ISO/CEI 51, *Aspects liés à la sécurité – Principes directeurs pour les inclure dans les normes*

#### 3 Termes et définitions

Pour les besoins du présent document, les termes et définitions suivants s'appliquent.

##### 3.1

**brûler**, verbe intransitif  
être en état de combustion

[SOURCE: ISO/CEI 13943:2008, définition 4.28]

### 3.2

**combustible**, adjectif  
susceptible d'être allumé et de brûler

[SOURCE: ISO/CEI 13943:2008, définition 4.43]

### 3.3

**combustion**  
réaction exothermique d'une substance avec un comburant

Note 1 à l'article: Cette combustion émet généralement des effluents du feu accompagnés de flammes et/ou d'incandescence.

[SOURCE: ISO/CEI 13943:2008, définition 4.46]

### 3.4

**enceinte**  
(électrotechnique) enveloppe qui protège les parties mécaniques et électriques d'un appareillage

Note 1 à l'article: Ce terme exclut les câbles.

[SOURCE: ISO/CEI 13943:2008, définition 4.78]

### 3.5

**produit final**  
produit prêt à être utilisé

Note 1 à l'article: Un produit final peut être un composant d'un autre produit final.

[SOURCE: CEI 60695-4:2012, définition 3.2.7]

### 3.6

**danger d'incendie**  
objet physique ou condition susceptible d'entraîner des conséquences non souhaitables causées par un incendie

[SOURCE: ISO/CEI 13943:2008, définition 4.112]

### 3.7

**évaluation du danger d'incendie**  
évaluation des causes possibles d'incendie, de la possibilité et de la nature de la croissance ultérieure du feu, et des conséquences éventuelles de l'incendie

[SOURCE: CEI 60695-4:2012, définition 3.2.10]

### 3.8

**risque d'incendie**  
combinaison entre la probabilité qu'un incendie se produise et les conséquences particulières quantifiées qui en découlent

Note 1 à l'article: Il est souvent calculé comme le produit de la probabilité et des conséquences.

[SOURCE: ISO/CEI 13943:2008, définition 4.124]