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Glow-wire Test Apparatus

Product No: ZRS-3H

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Description

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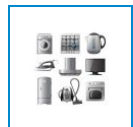
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Solutions



Cable and Wire Test Solutions



Household Appliances Test Solutions



Plug and Switch Test Solutions

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IEC International Electrotechnical Commission



ISO International Organization for Standardization

Related Technical Articles

[UL 94 flammability test using LISUN Glow wire tester](#)

What is glow wire test:

The Glow wire tester ZRS-3H/ZRS-3HS is suitable for resistance to abnormal heat and fire test on lighting lamps, electronic products and household appliances. It uses high-temperature coating spraying on steel structure and imported instrument display, with easy operation and stable performance. The glow wire testing equipment is applicable to flame resistance test of all levels of QC departments and corresponding enterprises.

Specifications:

- Heating temperature: adjustable continuously within the range of $\leq 500-1000^{\circ}\text{C}$, the accuracy of temperature is 1°C , the resolution of temperature is $\pm 3^{\circ}\text{C}$
- Glowing time: 0.1-999.9s , $\pm 0.1\text{S}$ (time range is adjustable)
- Burning time: 0.1-999.9s, auto record, manual pause
- Flame chilling time: 0.1-999.9s (auto record and manual pause)
- Glow wire pressure on test specimen: $1\pm 0.2\text{N}$. Limiting pressure depth is 7mm
- Glow wire: $\varphi 4$ nickel (80%) and chromium (20%) Made in specific dimensions.
- Thermoelectric couple: $\varphi 0.5$ armored nickel & chromium/nickel-chromium wire, K degree.
- Auto break away: While reaching specified glowing time, test specimen will break away from glow wire automatically.

To save the delivery cost for the oversea market, LISUN designed a compact version glow-wire tester which gross weight is less than 50kg. (Customer need to prepare additional ventilation system for ZRS-3HS)

Tags : [Glow-wire Test Apparatus](#) , [ZRS-3H](#)



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procedure

How you can properly conduct a Glow Wire Test

IEC standards for Electronic Products

Glow Wire Test Method

What is glow wire test

Test Principle of glow-wire tester

What is glow wire tester compatible

Related Successful Case

Turkey-Install the LSG-1800BCCD High Precision Rotation Luminaire Goniophotometer by watching the vedio

Columbia – Installation and training for electrical safety tester, glow wire, needle flame, tracking chamber, horizontal vertical flame apparatus

Algeria – National Lab Ordered Whole LED Lighting Test Systems from Lisun Group

Malaysia and Indonesia – Training for integrating sphere and goniophotometer systems



ZRS-3HS Glow-wire Test Apparatus (Compact Version)

What is glow wire capable?

The **glow wire tester** uses simulation technology to evaluate the fire hazard caused by thermal stress caused by heat sources such as hot components or overload resistors in a short period of time. It is one of the series of electrical and electronic components fire hazard test instruments. It is suitable for evaluating the flammability test and light-off temperature test of electrical equipment and its components and parts, as well as solid electrical insulating materials or other solid flammable materials.



Taejin Choi



2020-01-12

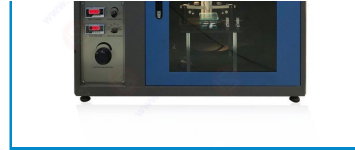
It was an essential product for manufacturing and research. I purchased it after confirming that it is a CIE/IEC certified product. The quality of the product is excellent and the satisfaction with the price is high. Employees are also satisfied with their response to repairs

1

Related Products



HVR-LS Horizontal Vertical Flame Tester



TTC-1 Tracking Test Chamber | Leakage Tracking Test Apparatus



RSY-LT Hot Wire Ignition Tester



HCAI-2 High Current Arc Ignition Test System

**NORME
INTERNATIONALE
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**CEI
IEC**

60695-2-10

Première édition
First edition
2000-10

**PUBLICATION FONDAMENTALE DE SÉCURITÉ
BASIC SAFETY PUBLICATION**

Essais relatifs aux risques du feu –

Partie 2-10:

Essais au fil incandescent/chauffant –

Appareillage et méthode commune d'essai

Fire hazard testing –

Part 2-10:

Glowing/hot-wire based test methods –

Glow-wire apparatus and common test procedure



Numéro de référence
Reference number
CEI/IEC 60695-2-10:2000

Numérotation des publications

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INTERNATIONALE
INTERNATIONAL
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CEI
IEC

60695-2-10

Première édition
First edition
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PUBLICATION FONDAMENTALE DE SÉCURITÉ
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Fire hazard testing –

Part 2-10:

**Glowing/hot-wire based test methods –
Glow-wire apparatus and common test procedure**

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Commission Electrotechnique Internationale
International Electrotechnical Commission
Международная Электротехническая Комиссия

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

FIRE HAZARD TESTING –

Part 2-10: Glowing/hot-wire based test methods – Glow-wire apparatus and common test procedure

FOREWORD

- 1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the 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, the IEC publishes International Standards. 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. The IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of the IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested National Committees.
- 3) The documents produced have the form of recommendations for international use and are published in the form of standards, technical specifications, technical reports or guides and they are accepted by the National Committees in that sense.
- 4) In order to promote international unification, IEC National Committees undertake to apply IEC International Standards transparently to the maximum extent possible in their national and regional standards. Any divergence between the IEC Standard and the corresponding national or regional standard shall be clearly indicated in the latter.
- 5) The IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with one of its standards.
- 6) Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. The IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 60695-2-10 has been prepared by technical committee 89: Fire hazard testing.

The first edition of IEC 60695-2-10 cancels and replaces the first edition of IEC 60695-2-1/0 published in 1994. It also constitutes a technical revision.

This standard has the status of a basic safety standard in accordance with IEC Guide 104.

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

FDIS	Report on voting
89/412/FDIS	89/431/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 3.

IEC 60695-2-11, IEC 60695-2-12, and IEC 60695-2-13 are to be used in conjunction with this standard.

Annex A is for information only.

IEC 60695-2, under the general heading *Fire hazard testing – Part 2: Glowing/hot-wire based test methods*, consists of the following parts:

Part 2-10: Glowing/hot-wire based test methods – Glow-wire apparatus and common test procedure

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

Part 2-12: Glowing/hot-wire based test methods – Glow-wire flammability test method for materials

Part 2-13: Glowing/hot-wire based test methods – Glow-wire ignitability test method for materials

The committee has decided that the contents of this publication will remain unchanged until 2006. At this date, the publication will be

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

INTRODUCTION

The best method for testing electrotechnical products with regard to fire hazard is to duplicate exactly the conditions occurring in practice. In most instances, this is not possible. Accordingly, for practical reasons, the testing of electrotechnical products with regard to fire hazard is best conducted by simulating as closely as possible the actual effects occurring in practice.

Parts of electrotechnical equipment which might be exposed to excessive thermal stress due to electric effects and the deterioration of which might impair the safety of the equipment must not be unduly affected by heat and by fire generated within the equipment.

Parts of insulating material or of other solid combustible material which are liable to propagate flames inside the equipment may be ignited by glowing wires or glowing elements. Under certain conditions (for example, a fault current flowing through a wire, overloading of components, and bad connections), certain elements may attain a temperature such that they will ignite parts in their vicinity.

FIRE HAZARD TESTING –

Part 2-10: Glowing/hot-wire based test methods – Glow-wire apparatus and common test procedure

1 Scope

This part of IEC 60695 specifies the glow-wire apparatus and common test procedure to simulate the effect of thermal stresses which may be produced by heat sources such as glowing elements or overloaded resistors, for short periods, in order to assess the fire hazard by a simulation technique.

The test described in this standard is applicable to electrotechnical equipment, its subassemblies and components, and may also be applied to solid electrical insulating materials or other solid combustible materials.

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 normative documents contain provisions which, through reference in this text, constitute provisions of this part of IEC 60695. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of IEC 60695 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 60584-1:1995, *Thermocouples – Part 1: Reference tables*

IEC 60584-2:1982, *Thermocouples – Part 2: Tolerances*

IEC 60695-2-11:2000, *Fire hazard testing – Part 2-11: Glowing/hot-wire based test methods – Glow wire flammability test methods for end-products*

IEC 60695-2-12:2000, *Fire hazard testing – Part 2-12: Glowing/hot-wire based test methods – Glow wire flammability test method for materials*

IEC 60695-2-13:2000, *Fire hazard testing – Part 2-13: Glowing/hot-wire based test methods – Glow wire ignitability test method for materials*

ISO 4046:1978, *Paper, board, pulp and related terms – Vocabulary*

ISO/IEC 13943:2000, *Fire safety – Vocabulary*

3 Definitions

For the purposes of this part of IEC 60695, the definitions given in ISO/IEC 13943, as well as the following definition, apply.

3.1

test temperature and temperature of the glow-wire

temperature to which the tip of the glow-wire is heated and stabilized prior to any contact with the test specimen

4 Outline of the test apparatus and common test procedure

This part of IEC 60695 specifies the glow-wire apparatus and common test procedure as a fire test using a non-flame ignition source.

The glow-wire is a specified loop of resistance wire, which is electrically heated to a specified temperature. The tip of the glow-wire is brought into contact with a test specimen for a specific period of time and a range of observations and measurements made, dependant upon the particular test procedure.

A detailed description of each test procedure is given in IEC 60695-2-11, IEC 60695-2-12 and IEC 60695-2-13.

5 Description of the test apparatus

5.1 Glow-wire

The glow-wire is made from nickel/chromium (80/20) wire, with an overall nominal diameter of 4 mm. The wire is formed into a loop as detailed in figure 1.

The glow-wire is heated by a simple electric circuit as shown in figure 2. There shall be no feedback mechanism or circuit to maintain the temperature.

Due to the high currents involved, it is essential that the electrical connections for the glow-wire are capable of carrying the current without affecting the performance or long-term stability of the circuit.

NOTE 1 The typical current necessary for heating the tip to a temperature of 960 °C is between 120 A and 150 A.

The test apparatus shall be so designed that the glow-wire is kept in a horizontal plane and that it applies a force of $1,0 \text{ N} \pm 0,2 \text{ N}$ to the test specimen during the application of the glow-wire. The force shall be maintained at this value when the glow-wire or the test specimen is moved horizontally one towards the other. The penetration of the tip of the glow-wire into and through the test specimen shall be limited to $7 \text{ mm} \pm 0,5 \text{ mm}$.

The test apparatus shall be so designed that burning or glowing particles falling from the test specimen are able to fall on the layer as specified in 5.3.

Two typical examples of the test apparatus are shown in figures 3a and 3b.

NOTE 2 The apparatus shown in figure 3b is used where heavy test specimens are being tested or where specimens are tested within the equipment.

5.2 Temperature measuring system

The temperature of the tip of the glow-wire shall be measured by a class 1 (see IEC 60584-2) mineral-insulated metal-sheathed fine-wire thermocouple with an insulated junction. It shall have an overall nominal diameter of 1,0 mm or 0,5 mm and wires of, for example, NiCr and NiAl (type K) (see IEC 60584-1) suitable for continuous operation at temperatures up to 960 °C with the welded point located inside the sheath as close to the tip as possible. The sheath shall consist of a metal resistant to continuous operation at a temperature of at least 1 050 °C. In case of dispute, the 0,5 mm thermocouple shall be used.

NOTE 1 A sheath made from a nickel-based heat-resistant alloy will satisfy the above requirements.

NOTE 2 It is the intention for a future revision of this standard that the reference to 0,5 mm thermocouples will be withdrawn.

The glow-wire, with the thermocouple, is shown in figure 1.

The thermocouple is arranged in a pocket hole, drilled in behind the tip of the glow-wire, and maintained as a close fit as shown in detail Z of figure 1. The thermal contact between the tip of the thermocouple and the end of the drilled hole shall be maintained. Care should be taken to ensure that the thermocouple is able to follow the dimensional changes of the tip of the glow-wire caused by heating.

The instrument for measuring the thermovoltages may consist of any commercial digital thermometer with a built-in reference junction.

NOTE 3 Other temperature-measuring instrumentation may be used, but, in case of dispute, the thermocouple method must be used.

5.3 Specified layer

To evaluate the possible spread of fire, for example by burning or glowing particles falling from the test specimen, a specified layer is placed underneath the test specimen.

Unless otherwise specified, a single layer of wrapping tissue, resting on, and in close contact with, the upper surface of a piece of flat smooth wooden board, having a minimum thickness of 10 mm, is positioned at a distance of 200 mm ± 5 mm below the place where the glow-wire is applied to the test specimen. See figures 3a and 3b.

Wrapping tissue, as specified in 6.86 of ISO 4046 is a soft and strong, lightweight wrapping tissue of grammage between 12 g/m² and 30 g/m².

The wrapping tissue may be replaced by other similar materials if they have been verified as equally suitable for the purpose.

NOTE The wrapping tissue is primarily intended for protective packaging of delicate articles and for gift wrapping.

5.4 Test chamber

The apparatus shall be operated in a draught-free condition. This can be achieved by using a chamber with a volume of at least 0,5 m³ which permits observation of the test specimen. The volume of the chamber shall be such that oxygen depletion during the test does not significantly affect the result. The test specimen shall be mounted at least 100 mm from any surface of the chamber. After each test, the chamber shall be vented to safely remove air containing degradation products. The ambient light falling on the test specimen, not counting the glow-wire, shall not exceed 20 lx and the background material shall be dark. The chamber shall be considered dark enough when the lux meter, facing towards the rear part of the chamber, is positioned in place of the test specimen and the level is less than 20 lx.

6 Verification of the apparatus

6.1 Verification of the glow-wire tip

Before each series of tests, it is necessary to inspect the glow-wire tip by measuring and recording dimension "A" as shown in figure 1, detail Z. This shall be compared with subsequent tests and when this dimension is reduced to 90 % of its initial reading then the glow-wire shall be replaced.

On completion of each test, it is necessary to clean the tip, if necessary, of any residue of previously tested material, for example, by means of a wire brush and then to inspect the tip of the glow-wire for any cracks.

6.2 Verification of the temperature measuring system

6.2.1 The continuous correct performance and calibration of the temperature measuring system described in 5.2 shall be verified periodically.

6.2.2 A one-point verification of the temperature of the glow-wire can be performed using a foil of silver with a purity of at least 99,8 %, approximately 2 mm² and 0,06 mm thick, placed upon the upper surface of the tip of the glow-wire. The glow-wire is heated at a suitably slow heating rate, and, when the foil starts to melt, the thermometer shall indicate 960 °C ± 15 °C. The glow-wire, while still hot, shall be cleared of all traces of silver immediately after this verification process to reduce the probability of alloying. In case of dispute, this verification method using a silver foil shall be used.

7 Conditioning

Before testing, the wooden board and wrapping tissue shall be stored for 24 h in an atmosphere having a temperature between 15 °C and 35 °C and a relative humidity between 45 % and 75 %.

8 Common test procedure

Warning note:

Precautions shall be taken to safeguard the health of personnel conducting tests against

- the risks of explosion, burning or fire;
- the risk of electric shock;
- the inhalation of smoke and/or toxic products;
- the toxic residues.

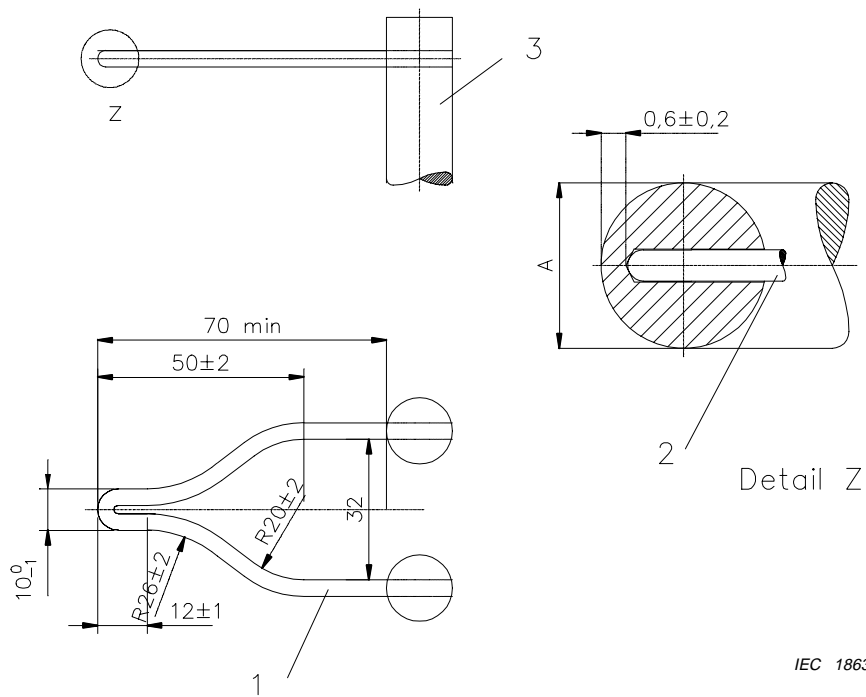
8.1 The test specimen shall be mounted or clamped so that

- a) the heat losses due to the supporting or fixing means are insignificant (see figure 4);
- b) the planar area of the surface is vertical;
- c) the tip of the glow-wire is applied to the centre of the planar area of the surface.

8.2 The glow-wire is heated to the specified temperature, which is measured by means of the calibrated temperature measurement system. Before bringing the tip of the glow-wire into contact with the test specimen, care shall be taken to ensure that

- a) this temperature is constant within 5 K for a period of at least 60 s;
- b) heat radiation does not influence the test specimen during this period by providing an adequate distance i.e. 5,0 cm minimum, or by using an appropriate screen;
- c) no further adjustment to the heating current or voltage is to be made until after the test is completed.

8.3 The tip of the glow-wire is then brought slowly into contact with the test specimen for $30\text{ s} \pm 1\text{ s}$. An approximate rate of approach and withdrawal of 10 mm/s to 25 mm/s has been found to be satisfactory. However, the rate of approach shall be reduced to near zero upon contact to avoid forces of impact exceeding $1,0\text{ N} \pm 0,2\text{ N}$. In those cases where the material melts away from the glow-wire, the glow-wire shall not be kept in contact with the test specimen. Following the application time, the glow-wire and the test specimen are slowly separated, avoiding any further heating of the test specimen and any movement of air which might affect the result of the test. The penetration of the tip of the glow-wire into and through the test specimen shall be limited to $7\text{ mm} \pm 0,5\text{ mm}$.



IEC 1863/2000

Dimensions in millimetres

Glow-wire material: Nickel/Chromium (80/20)
 Diameter: 4,0 mm ± 0,04 mm (before bending)
 Diameter A: (After bending) see 6.1

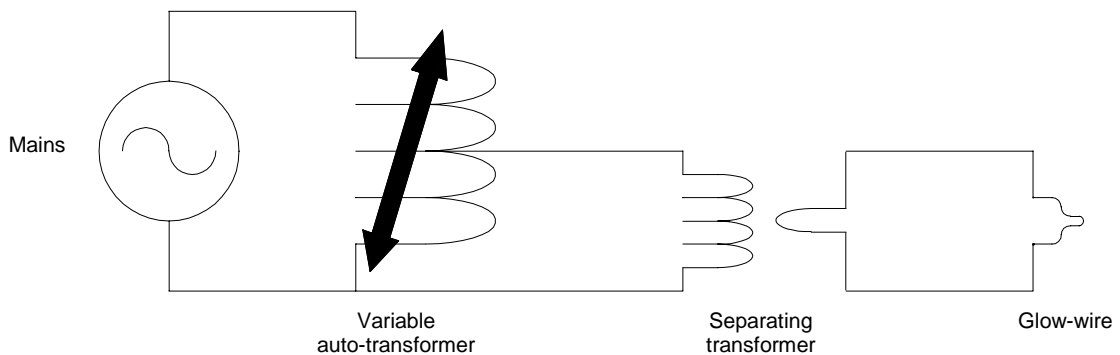
When forming the glow-wire loop, care shall be taken to avoid fine cracking at the tip.

NOTE Annealing is a suitable process for prevention of fine cracking at the tip.

Key

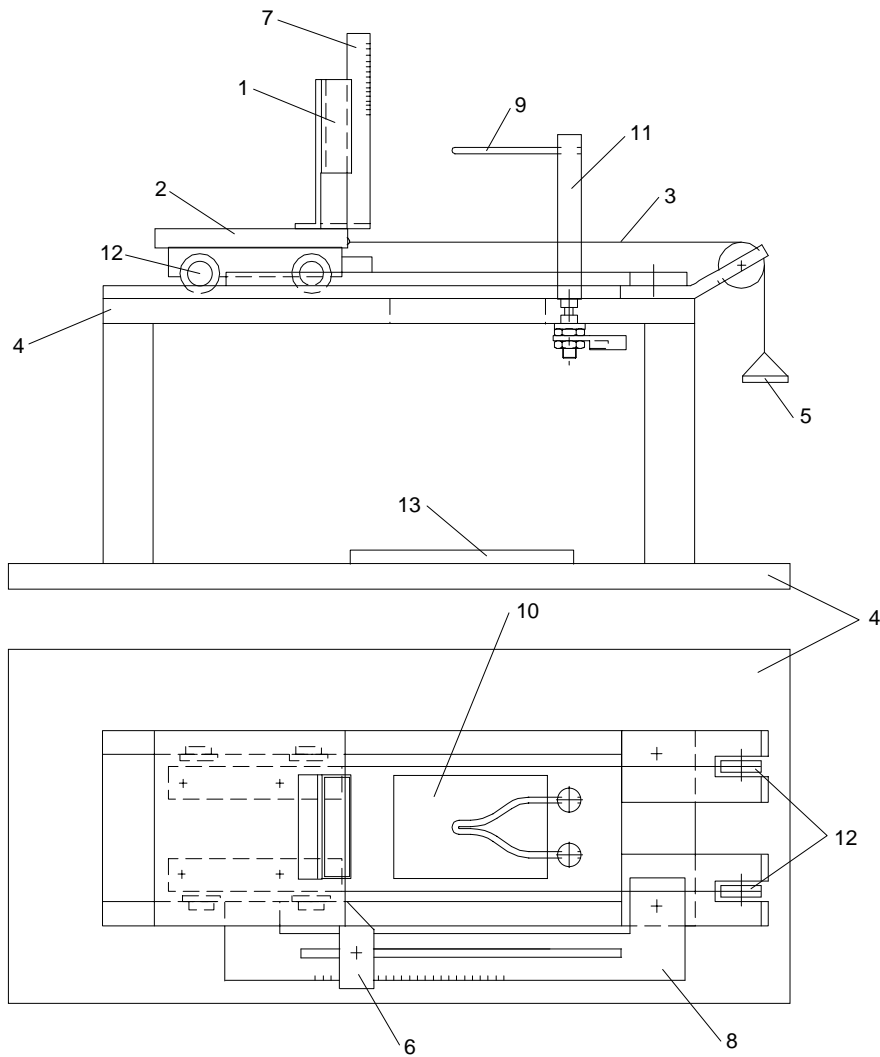
- 1 Glow-wire
- 2 Thermocouple
- 3 Stud

Figure 1 – Glow-wire and position of thermocouple



IEC 1864/2000

Figure 2 – Test circuit

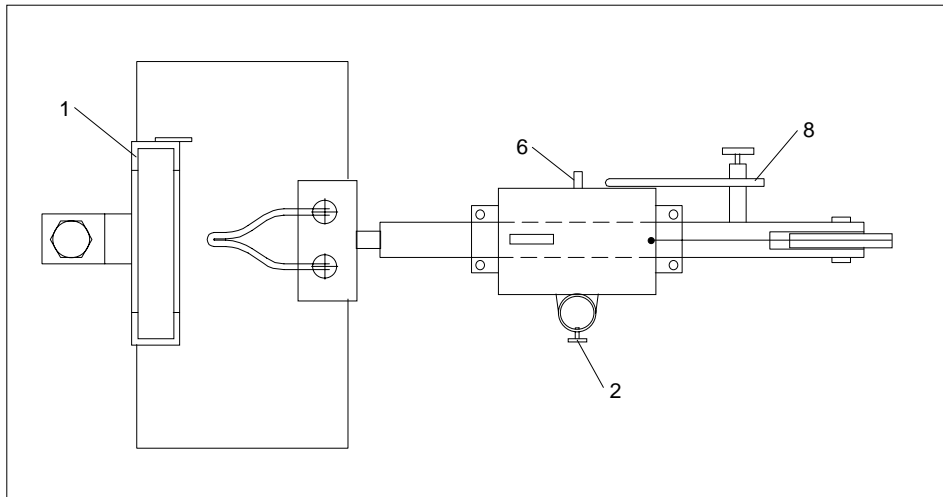
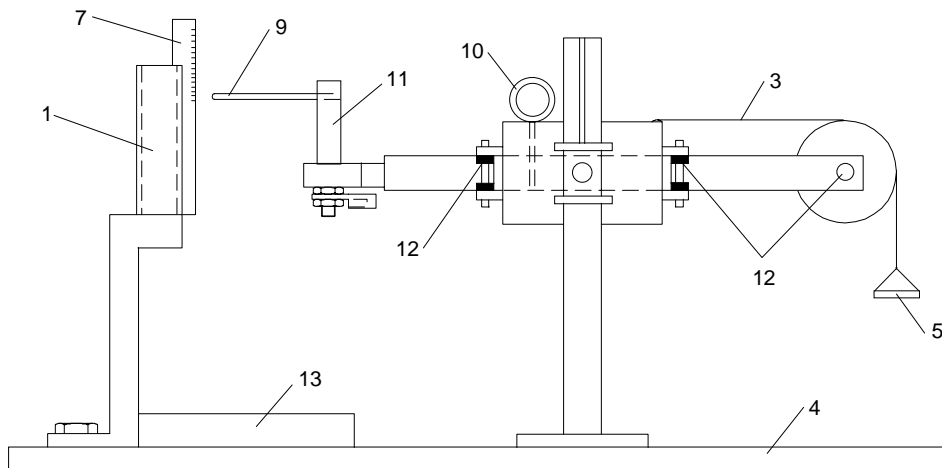


IEC 1865/2000

Key

- | | |
|--|--|
| 1 Test specimen support (see figure 4) | 8 Penetration adjustment |
| 2 Carriage | 9 Glow-wire |
| 3 Tensioning cord | 10 Cut-out in base plate for falling particles |
| 4 Base plate | 11 Glow-wire mounting stud |
| 5 Weight | 12 Low-friction rollers |
| 6 Adjustable stop | 13 Specified layer |
| 7 Scale to measure height of flame | |

Figure 3a – Test apparatus (example)

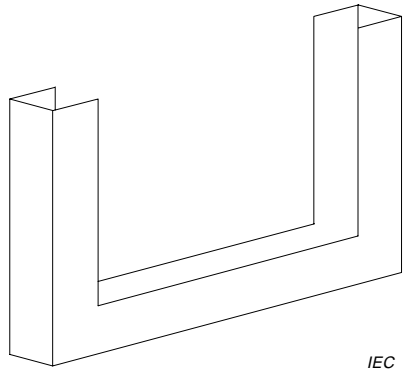


IEC 1866/2000

Key

- | | |
|--|----------------------------|
| 1 Test specimen support (see figure 4) | 8 Penetration adjustment |
| 2 Height adjustment screw | 9 Glow-wire |
| 3 Tensioning cord | 10 Restraining pin |
| 4 Base plate | 11 Glow-wire mounting stud |
| 5 Weight | 12 Low-friction rollers |
| 6 Adjustable stop | 13 Specified layer |
| 7 Scale to measure height of flame | |

Figure 3b – Test apparatus (example)



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This design proposed above is to ensure that thermal losses are insignificant.
No tolerances or dimensions are shown because it is an example only.

Figure 4 – Test specimen support (example – see figures 3a and 3b)

Annex A
(informative)**Glow-wire equipment manufacturers**

An up-to-date list of glow-wire equipment manufacturers and suppliers is maintained by the Secretary of IEC technical committee 89 and by the IECEE-CTL. The coordinates of both these sources of information can be found in either the IEC Directory or in the IEC website: <http://www.iec.ch>
