INTERNATIONAL STANDARD

IEC 60335-2-59

Third edition
2002-10

Household and similar electrical appliances – Safety –

Part 2-59: Particular requirements for insect killers

Appareils électrodomestiques et analogues – Sécurité –

Partie 2-59: Règles particulières pour les destructeurs d'insectes

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CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –

Part 2-59: Particular requirements for insect killers

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.

This part of International Standard IEC 60335 has been prepared by IEC technical committee 61: Safety of household and similar electrical appliances.

This third edition cancels and replaces the second edition published in 1997 and its amendment 1 (2000). It constitutes a technical revision.

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

FDIS	Report on voting
61/2172/FDIS	61/2253/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 part 2 is to be used in conjunction with the latest edition of IEC 60335-1 and its amendments. It was established on the basis of the fourth edition (2001) of that standard.

NOTE 1 When “Part 1” is mentioned in this standard, it refers to IEC 60335-1.

This part 2 supplements or modifies the corresponding clauses in IEC 60335-1, so as to convert that publication into the IEC standard: Safety requirements for electric insect killers.

When a particular subclause of Part 1 is not mentioned in this part 2, that subclause applies as far as is reasonable. When this standard states “addition”, “modification” or “replacement”, the relevant text in Part 1 is to be adapted accordingly.

NOTE 2 The following numbering system is used:

– subclauses, tables and figures that are numbered starting from 101 are additional to those in Part 1;

– unless notes are in a new subclause or involve notes in Part 1, they are numbered starting from 101, including those in a replaced clause or subclause;

– additional annexes are lettered AA, BB, etc.

NOTE 3 The following print types are used:

– requirements: in roman type;

– *test specifications: in italic type;*

– notes: in small roman type.

Words in **bold** in the text are defined in Clause 3. When a definition concerns an adjective, the adjective and the associated noun are also in bold.

The committee has decided that the contents of this publication will remain unchanged until 2004. At this date, the publication will be

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

The following differences exist in the countries indicated below.

– 6.1: Class 0 appliances for indoor use having a rated voltage not exceeding 150 V and class 0I appliances are allowed (Japan).

– 6.1: Class 0 appliances are allowed for indoor use only (USA).

– 7.1: Additional markings are required (USA).

– 16.101: The test is different (USA).

– Clause 22: The high voltage has to be obtained from an isolating transformer (Canada, Japan and USA).

– Clause 22: Earthing of the secondary circuit of the transformer is not allowed (Japan).

– 24.1.3: Interlock switches are operated 6 000 times (Canada and USA).

– 24.101: The contact separation need not be in accordance with IEC 61058-1 (USA).

– 25.7: Other types of supply cords are allowed (Australia and USA).

– 30.101: The test is not carried out on parts of the enclosure classified as V-2 (USA).

– Clause 31: The test is different (Canada and USA).

A bilingual version of this publication may be issued at a later date.

INTRODUCTION

It has been assumed in the drafting of this International Standard that the execution of its provisions is entrusted to appropriately qualified and experienced persons.

This standard recognizes the internationally accepted level of protection against hazards such as electrical, mechanical, thermal, fire and radiation of appliances when operated as in normal use taking into account the manufacturer's instructions. It also covers abnormal situations that can be expected in practice.

This standard takes into account the requirements of IEC 60364 as far as possible so that there is compatibility with the wiring rules when the appliance is connected to the supply mains. However, national wiring rules may differ.

If an appliance within the scope of this standard also incorporates functions that are covered by another part 2 of IEC 60335, the relevant part 2 is applied to each function separately, as far as is reasonable. If applicable, the influence of one function on the other is taken into account.

This standard is a product family standard dealing with the safety of appliances and takes precedence over horizontal and generic standards covering the same subject.

An appliance that complies with the text of this standard will not necessarily be considered to comply with the safety principles of the standard if, when examined and tested, it is found to have other features that impair the level of safety covered by these requirements.

An appliance employing materials or having forms of construction differing from those detailed in the requirements of this standard may be examined and tested according to the intent of the requirements and, if found to be substantially equivalent, may be considered to comply with the standard.

HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –

Part 2-59: Particular requirements for insect killers

1 Scope

This clause of Part 1 is replaced by the following.

This International Standard deals with the safety of electric **insect killers** for household and similar purposes, their **rated voltage** being not more than 250 V.

Appliances not intended for normal household use but that nevertheless may be a source of danger to the public, such as appliances intended to be used by laymen in shops, in light industry and on farms, are within the scope of this standard.

As far as is practicable, this standard deals with the common hazards presented by appliances that are encountered by all persons in and around the home. However, in general, it does not take into account

– the use of appliances by young children or infirm persons without supervision;

– playing with the appliance by young children.

NOTE 101 Attention is drawn to the fact that

– for appliances intended to be used in vehicles or on board ships or aircraft, additional requirements may be necessary;

– in many countries additional requirements are specified by the national health authorities, the national authorities responsible for the protection of labour and similar authorities.

NOTE 102 This standard does not apply to

– appliances that function by emitting vaporized chemicals;

– appliances emitting ultrasonic waves;

– appliances intended to be used in locations where special conditions prevail, such as the presence of a corrosive or explosive atmosphere (dust, vapour or gas).

NOTE 103 For appliances provided with discharge lamps or tungsten filament lamps, IEC 60598-1 also applies as far as is reasonable.

2 Normative references

Addition:

IEC 60068-2-52:1996, *Environmental testing – Part 2: Tests – Test Kb: Salt mist, cyclic (sodium chloride solution)*

3 Definitions

This clause of Part 1 is applicable except as follows.

3.1.9 *Replacement:*

normal operation
operation of the appliance under the following conditions:

– the output circuit is short-circuited;

– the grids are separated by the maximum distance for maintaining an arc, the appliance being operated in cycles consisting of 1 s of operation followed by a rest period of 2 s;

– a resistive load is connected between the grids and adjusted to obtain the maximum current.

3.101
insect killer
appliance that electrocutes insects by applying a voltage between two or more grids

3.102
effective irradiance
irradiance of electromagnetic radiation weighted according to a specific action curve

4 General requirement

This clause of Part 1 is applicable.

5 General conditions for the tests

This clause of Part 1 is applicable except as follows.

5.101 *For each test, the most unfavourable condition specified in 3.1.9 is used.*

5.102 ***Insect killers*** *are tested as* ***motor-operated appliances****.*

6 Classification

This clause of Part 1 is applicable except as follows.

6.1 *Modification:*

Insect killers shall be **class I** or **class II**.

6.2 *Addition:*

Insect killers intended for outdoor use shall be at least IPX4.

7 Marking and instructions

This clause of Part 1 is applicable except as follows.

7.1 *Addition:*

Appliances shall be marked with symbol 5036 of IEC 60417-1 or with the substance of the following:

DANGER: High voltage

Appliances provided with replaceable lamps shall be marked with the type reference of the lamp.

7.6 *Addition:*

[symbol 5036 of IEC 60417-1] dangerous voltage

7.12 *Addition:*

The instructions shall state whether the appliance is for indoor use only or suitable for outdoor use.

The instructions for appliances for indoor use only shall state that they are not suitable for use in barns, stables and similar locations.

The instructions for appliances intended for outdoor use shall include the substance of the following:

WARNING: An electric shock hazard may exist if water from a garden hose is directed at the insect killer.

When using extension cords, keep the socket-outlet away from moisture and avoid damage to the cord.

The instructions shall state the substance of the following:

– the appliance is to be kept out of reach of children;
– the appliance is not to be used in locations where flammable vapour or explosive dust is likely to exist.

The instructions shall give details concerning

– the method and frequency of cleaning, together with the precautions to be taken;
– precautions to be taken when replacing lamps and starters, if applicable.

If symbol 5036 of IEC 60417-1 is used, its meaning shall be explained.

7.14 *Addition:*

The height of symbol 5036 of IEC 60417-1 shall be at least 10 mm.

The height of the lettering of the warning relating to high voltage shall be at least 3 mm.

Compliance is checked by measurement.

8 Protection against access to live parts

This clause of Part 1 is applicable except as follows.

8.1.1 *Addition:*

When the grid voltage is obtained from an isolating transformer, the test probe may touch earthed parts of the secondary circuit.

9 Starting of motor-operated appliances

This clause of Part 1 is not applicable.

10 Power input and current

This clause of Part 1 is applicable.

11 Heating

This clause of Part 1 is applicable except as follows.

11.7 *Replacement:*

Appliances are operated until steady conditions are established.

11.8 *Addition:*

The temperature rise of surfaces likely to collect dust or insects shall not exceed 60 K.

NOTE 101 Surfaces having an inclination of at least 60° to the horizontal and parts having a diameter less than 10 mm are not considered likely to collect dust or insects.

12 Void

13 Leakage current and electric strength at operating temperature

This clause of Part 1 is applicable.

14 Transient overvoltages

This clause of Part 1 is applicable.

15 Moisture resistance

This clause of Part 1 is applicable except as follows.

15.1 *Addition:*

Water on the grids is ignored.

16 Leakage current and electric strength

This clause of Part 1 is applicable except as follows.

16.101 The transformer shall have adequate internal insulation.

Compliance is checked by the following test.

*Twice the **working voltage** is induced in the secondary winding of the transformer by applying a sinusoidal voltage having a frequency higher than **rated frequency** to the primary terminals.*

The duration of the test is

– *60 s, for frequencies up to twice the **rated frequency**, or*

– $120 \times \frac{\textbf{rated frequency}}{\text{test frequency}}$ *s, with a minimum of 15 s, for higher frequencies.*

NOTE The frequency of the test voltage is higher than the **rated frequency** to avoid excessive excitation current.

A maximum of one-third of the test voltage is applied and is then rapidly increased without creating transients. At the end of the test, the voltage is decreased in a similar manner to approximately one-third of its full value before switching off.

There shall be no breakdown between windings or between adjacent turns of the same winding.

17 Overload protection of transformers and associated circuits

This clause of Part 1 is applicable.

18 Endurance

This clause of Part 1 is not applicable.

19 Abnormal operation

This clause of Part 1 is applicable.

20 Stability and mechanical hazards

This clause of Part 1 is applicable.

21 Mechanical strength

This clause of Part 1 is applicable.

22 Construction

This clause of Part 1 is applicable except as follows.

22.6 *Addition:*

Drain holes shall be at least 5 mm in diameter or 20 mm^2 in area with a width of at least 3 mm.

22.101 Interlock switches that prevent access to **live parts** during **user maintenance** shall be connected in the input circuit and located to prevent unintentional operation.

Compliance is checked by inspection and by applying test probe B of IEC 61032.

22.102 Appliances having grids in the form of horizontal bars, and one pole of the output of the transformer connected to **accessible parts**, shall have the lowest bar connected to earth.

Compliance is checked by inspection.

22.103 Appliances shall be constructed so that there is no risk of electric shock when touching the grids during **user maintenance**.

Compliance is checked by the following test.

*The appliance is supplied at **rated voltage**. It is then disconnected from the supply mains. One second after disconnection, the voltage between the grids is measured with an instrument that does not appreciably affect the value to be measured.*

The voltage shall not exceed 34 V.

22.104 The short-circuit current of the output circuit shall not be excessive.

Compliance is checked by the following test.

*The appliance is supplied at **rated voltage**. The short-circuit current is measured between both grids and between each grid and earth.*

The current shall not exceed 10 mA.

23 Internal wiring

This clause of Part 1 is applicable except as follows.

23.5 *Addition:*

For circuits having a voltage over 1 000 V, the test voltage is $\left(\sqrt{2}\ U + 750\right)$ *V and is applied for 1 min.*

NOTE 101 *U* is the peak value of the **working voltage**.

NOTE 102 The test is only carried out in case of doubt.

24 Components

This clause of Part 1 is applicable except as follows.

24.1.3 *Addition:*

Interlock switches are operated 1 000 times.

24.2 *Addition:*

Appliances for indoor use only may be fitted with switches in flexible cords.

24.101 Interlock switches that prevent access to **live parts** during **user maintenance** shall

– disconnect all poles, unless the secondary circuit is supplied through an isolating transformer;
– have a contact separation that provides full disconnection in accordance with IEC 61058-1.

Compliance is checked by inspection.

25 Supply connection and external flexible cords

This clause of Part 1 is applicable except as follows.

25.7 *Addition:*

Supply cords of appliances intended for outdoor use, and of appliances having a lamp emitting ultra-violet radiation, shall be polychloroprene sheathed and not be lighter than ordinary polychloroprene sheathed cord (code designation 60245 IEC 57).

26 Terminals for external conductors

This clause of Part 1 is applicable.

27 Provision for earthing

This clause of Part 1 is applicable.

28 Screws and connections

This clause of Part 1 is applicable.

29 Clearances, creepage distances and solid insulation

This clause of Part 1 is applicable except as follows.

29.2 *Addition:*

The microenvironment is pollution degree 3 unless the insulation is enclosed or located so that it is unlikely to be exposed to pollution during normal use of the appliance.

30 Resistance to heat, fire and tracking

This clause of Part 1 is applicable except as follows.

30.2.2 Not applicable.

30.101 Parts of non-metallic material enclosing or supporting the grids, and non-metallic trays intended to collect insects, shall be resistant to fire. This also applies to parts within 50 mm above the tray.

Printed boards in the output circuit having a surface area exceeding 25 cm^2 shall be resistant to fire, unless they are contained in a metal enclosure.

Compliance is checked by the needle-flame test of Annex E.

The needle-flame test is not carried out on parts of material classified as V-0 or V-1 according to IEC 60695-11-10, provided that the sample tested was not thicker than the relevant part.

31 Resistance to rusting

This clause of Part 1 is applicable except as follows.

Addition:

For appliances intended for outdoor use, compliance is checked by the salt mist test of IEC 60068-2-52, severity 2 being applicable.

Before the test, coatings are scratched by means of a hardened steel pin, the end of which has the form of a cone with an angle of 40°. Its tip is rounded with a radius of 0,25 mm ± 0,02 mm. The pin is loaded so that the force exerted along its axis is 10 N ± 0,5 N. The scratches are made by drawing the pin along the surface of the coating at a speed of approximately 20 mm/s. Five scratches are made at least 5 mm apart and at least 5 mm from the edges.

After the test, the appliance shall not have deteriorated to such an extent that compliance with this standard, in particular with Clauses 8 and 27, is impaired. The coating shall not be broken and shall not have loosened from the metal surface.

32 Radiation, toxicity and similar hazards

This clause of Part 1 is applicable except as follows.

Addition:

For appliances incorporating lamps emitting UV radiation, compliance is checked by the following test.

*The appliance is supplied at **rated voltage** and operated under **normal operation**. The irradiance is measured at a distance of 1 m, the measuring instrument being positioned so that the highest radiation is recorded.*

NOTE 101 The measuring instrument used measures the mean irradiance over a circular area having a diameter not exceeding 20 mm. The response of the instrument is proportional to the cosine of the angle between incident radiation and the normal to the circular area. The spectral distribution is measured at intervals of 1 nm by means of a spectrophotometer having a bandwidth not exceeding 2,5 nm.

NOTE 102 The total **effective irradiance** is given by

$$E = \sum_{250\,\mathrm{nm}}^{400\,\mathrm{nm}} S_\lambda E_\lambda \Delta_\lambda$$

where

E is the **effective irradiance**;

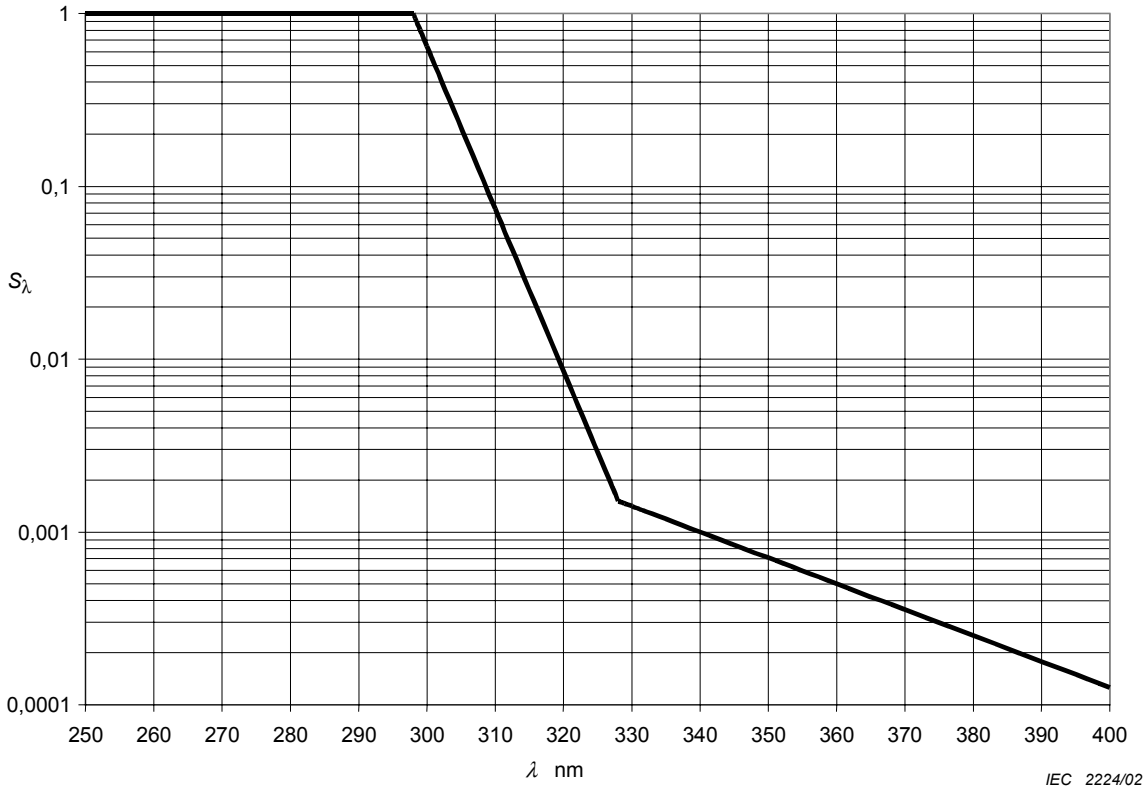
S_λ is the relative spectral effectiveness according to Figure 101 (weighting factor);

E_λ is the spectral irradiance in W/m^{2}nm;

Δ_λ is the bandwidth in nm.

*The **effective irradiance** for each wavelength is calculated from the UV action spectrum of Figure 101.*

*The total **effective irradiance** is determined and shall not exceed 1 mW/m^2.*



The UV action spectrum is defined as follows.

Wavelength (λ) nm	**Weighting factor** (S_λ)
$\lambda \leq 298$	1
$298 < \lambda \leq 328$	$10^{0,094(298-\lambda)}$
$328 < \lambda \leq 400$	$10^{0,015(140-\lambda)}$

Weighting factors for some wavelengths.

Wavelength (λ) nm	**Weighting factor** (S_λ)
250-298	1,0
300	0,65
310	$7,4 \times 10^{-2}$
320	$8,6 \times 10^{-3}$
330	$1,4 \times 10^{-3}$
340	$1,0 \times 10^{-3}$
350	$7,1 \times 10^{-4}$
360	$5,0 \times 10^{-4}$
370	$3,5 \times 10^{-4}$
380	$2,5 \times 10^{-4}$
390	$1,8 \times 10^{-4}$
400	$1,3 \times 10^{-4}$

Figure 101 – UV action spectrum

Annexes

The annexes of Part 1 are applicable.

Bibliography

The bibliography of Part 1 is applicable.

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