INTERNATIONAL STANDARD

IEC 60335-2-27

Fourth edition
2002-09

Household and similar electrical appliances – Safety –

Part 2-27: Particular requirements for appliances for skin exposure to ultraviolet and infrared radiation

Appareils électrodomestiques et analogues – Sécurité –

Partie 2-27: Règles particulières pour les appareils d'exposition de la peau aux rayonnements ultraviolets et infrarouges

Reference number
IEC 60335-2-27:2002(E)

Publication numbering

As from 1 January 1997 all IEC publications are issued with a designation in the 60000 series. For example, IEC 34-1 is now referred to as IEC 60034-1.

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International Electrotechnical Commission, 3, rue de Varembé, PO Box 131, CH-1211 Geneva 20, Switzerland
Telephone: +41 22 919 02 11 Telefax: +41 22 919 03 00 E-mail: inmail@iec.ch Web: www.iec.ch

Commission Electrotechnique Internationale
International Electrotechnical Commission
Международная Электротехническая Комиссия

PRICE CODE L

For price, see current catalogue

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –

Part 2-27: Particular requirements for appliances for skin exposure to ultraviolet and infrared radiation

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.
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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 fourth edition cancels and replaces the third edition published in 1995 and its amendment 1 (2000). It constitutes a technical revision.

The text of this part of IEC 60335 is based on the following documents:

FDIS	Report on voting
61/2181/FDIS	61/2262/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 appliances for skin exposure to ultraviolet and infrared radiation.

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.

– 7.1: The markings are different (USA).

– 10.1: The deviations are different (USA).

– 10.2: The deviations are different (USA).

– 19.101: The test is different (USA).

– 20.1: The test is carried out at an angle of 8° (USA).

– Clause 22: Series resistors are to be incorporated in some UV emitters (Australia).

– 22.107: The requirement is not applicable (USA).

– 22.108: The maximum timer setting is shorter (USA).

– 32.101: The irradiance limits and the tests are different (USA).

– 32.102: The requirements for protective goggles are different (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 2-27: Particular requirements for appliances for skin exposure to ultraviolet and infrared radiation

1 Scope

This clause of Part 1 is replaced by the following.

This International Standard deals with the safety of electrical appliances incorporating emitters for exposing the skin to ultraviolet or infrared radiation, for household and similar use, their **rated voltage** being not more than 250 V for single-phase appliances and 480 V for other appliances.

Appliances not intended for normal household use but which nevertheless may be a source of danger to the public, such as appliances intended to be used in tanning salons, beauty parlours and similar premises, are also within the scope of this standard.

As far as 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;
– IEC 60598-1 is applicable as far as is reasonable.

NOTE 102 This standard does not apply to

– appliances for medical purposes;
– 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).

2 Normative references

This clause of Part 1 is applicable.

3 Definitions

This clause of Part 1 is applicable except as follows.

3.101
ultraviolet emitter (UV emitter)
radiating source constructed to emit non-ionizing electromagnetic energy at wavelengths of 400 nm or less

3.102
UV type 1 appliance
appliance having a **UV emitter** such that the biological effect is caused by radiation having wavelengths longer than 320 nm and characterized by a relatively high irradiance in the range 320 nm to 400 nm

3.103
UV type 2 appliance
appliance having a **UV emitter** such that the biological effect is caused by radiation having wavelengths both shorter and longer than 320 nm and characterized by a relatively high irradiance in the range of 320 nm to 400 nm

3.104
UV type 3 appliance
appliance having a **UV emitter** such that the biological effect is caused by radiation having wavelengths both shorter and longer than 320 nm and characterized by a limited irradiance over the whole UV radiation band

3.105
UV type 4 appliance
appliance having a **UV emitter** such that the biological effect is mainly caused by radiation having wavelengths shorter than 320 nm

3.106
infrared emitter (IR emitter)
radiating source constructed to emit electromagnetic energy at wavelengths of 800 nm or longer

3.107
effective irradiance
irradiance of electromagnetic radiation weighted according to a specified action spectrum

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.

5.1 *Addition:*

*Appliances with **UV emitters** are tested as **motor-operated appliances**.*

*Appliances with **IR emitters** only are tested as **heating appliances**.*

6 Classification

This clause of Part 1 is applicable except as follows.

6.101 Appliances shall be one of the following types with respect to the type of ultraviolet radiation:

– **UV type 1 appliance**;
– **UV type 2 appliance**;
– **UV type 3 appliance**;
– **UV type 4 appliance**.

Compliance is checked by inspection and by the relevant tests.

NOTE **UV type 1 appliances** and **UV type 2 appliances** are intended to be used in tanning salons, beauty parlours and similar premises, under supervision of appropriately trained persons.

UV type 3 appliances may be used by unskilled persons.

UV type 4 appliances are intended to be used following medical advice.

7 Marking and instructions

This clause of Part 1 is applicable except as follows.

7.1 *Addition:*

Appliances having **UV emitters** shall be marked with the appropriate UV type number in the following form:

UV type X

NOTE 101 X is replaced by the appropriate number.

Appliances having replaceable **UV emitters** shall be marked with the type reference of the emitters that are recommended for use.

Appliances having **UV emitters** shall be marked with the substance of the following:

WARNING**:** Ultraviolet radiation may cause injury to eyes and skin, such as skin aging and eventually skin cancer. Read instructions carefully. Wear the protective goggles provided. Certain medicines and cosmetics may increase sensitivity.

NOTE 102 For appliances having **UV emitters** intended only for use in tanning salons, beauty parlours and similar premises, this warning may be given on a permanent label intended to be fixed on the wall adjacent to the UV appliance. The wording "Read instructions carefully" may be replaced by "Consult the attendant for further information".

UV type 4 appliances shall be marked with the substance of the following:

WARNING: Only to be used following medical advice.

Appliances having **UV emitters** with a luminance exceeding 100 000 cd/m² shall be marked with the substance of the following:

WARNING: Intense light. Do not stare at the emitter.

NOTE 103 The method of measuring luminance is given in Annex AA.

NOTE 104 If these warnings are combined, the word “warning” need not be repeated.

7.12 *Addition:*

The instructions shall give clear information with regard to the proper use of the appliance.

The instructions for appliances having **UV emitters** shall include the substance of the following:

– a statement that UV appliances are not to be used by persons whose skin burns without tanning when exposed to the sun, by persons suffering from sunburn, by children or by persons suffering from or previously suffering from skin cancer or predisposed to skin cancer;

– information concerning the intended exposure distance (unless this is controlled by the construction of the UV appliance);

– recommended schedule of exposure specifying duration and intervals (based on the **UV emitter** characteristics, distances and skin sensitivity);

NOTE 101 The recommended exposure time for the first session for untanned skin is not to be less than 1 min. It is to correspond to a dose not exceeding 100 J/m^2, weighted according to the UV action spectrum of Figure 101, or to the result of a test on a small area of the skin.

– recommended number of exposures that should not be exceeded in one year;

NOTE 102 The recommended number of exposures for each part of the body is to be based upon a maximum yearly dose of 15 kJ/m^2, weighted according to the UV action spectrum of Figure 101 and taking into account the recommended schedule of exposure.

– a statement that the appliance must not be used if the timer is faulty or the filter is broken or removed;

– identification of alternative components that may influence the ultraviolet radiation, such as filters and reflectors;

– identification of replaceable **UV emitters** and a statement that they are only to be replaced by the types marked on the appliance, or an instruction that the replacement of lamps must only be carried out after taking advice from an authorized service agent.

The instructions for appliances having **UV emitters** shall contain the substance of the following information and precautions:

– ultraviolet radiation from the sun or UV appliances can cause skin or eye damage. These biological effects depend upon the quality and quantity of the radiation as well as the skin and eye sensitivity of the individual;

– the skin may develop sunburn after an excessive exposure. Excessively repeated exposures to ultraviolet radiation from the sun or UV appliances may lead to premature aging of the skin as well as increased risk of development of skin tumours;

– the unprotected eye may develop surface inflammation and in some cases, for example after a cataract operation, damage may occur to the retina after excessive exposure. Cataracts may develop after many repeated exposures;

– special care is necessary in cases of pronounced individual sensitivity to ultraviolet radiation and in cases where certain medicines or cosmetics are used;

– the following precautions must be taken:

  - always use the protective goggles provided;
  - remove cosmetics well in advance of exposure and do not apply any sunscreens;
  - do not undergo exposure when taking medicines that increase sensitivity to ultraviolet radiation. If in doubt, take medical advice;
  - allow at least 48 hours between the first two exposures;
  - do not sunbathe and use the appliance on the same day;
  - follow the recommendations concerning exposure durations, exposure intervals and distances from the lamp;
  - seek medical advice if persistent lumps or sores appear on the skin, or if there are changes in pigmented moles.

For appliances having a lid that has to be opened in normal use, the instructions shall include a warning that the appliance must not be switched on with the lid in the closed position and that, before closing the lid for storage, the appliance must be disconnected from the supply and allowed to cool down.

NOTE 103 This warning is not required if the appliance complies with the tests of 19.2 and 19.3.

The instructions for appliances having **IR emitters** shall include advice for the protection of the eyes against exposure to infrared radiation and advise that adequate precautions must be taken to safeguard the user against the dangers of excessive exposure.

7.15 *Addition:*

The warnings specified in 7.1 shall be visible after the appliance has been installed and without removal of a cover.

8 Protection against access to live parts

This clause of Part 1 is applicable except as follows.

NOTE 101 Compliance with the relevant requirements of Section 8 of IEC 60598-1 is to be maintained during the replacement of emitters, unless the instructions forbid replacement by the user and **tools** are needed.

8.1.3 Not applicable.

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 except as follows.

10.1 *Modification:*

The following deviations apply:

– *appliances having **UV emitters** only:* *+ 10 %;*

– *other appliances:* $^{+\,5}_{-10}$ *%*

10.2 *Modification:*

The following deviations apply:

– *appliances having **UV emitters** only:* *+ 10 %;*

– *other appliances:* $^{+\,5}_{-10}$ *%*

11 Heating

This clause of Part 1 is applicable except as follows.

11.2 *Modification:*

Appliances normally placed on a floor or table are placed on the floor of the test corner with their back as near as possible to one of the walls and away from the other wall.

If the direction of the radiation is adjustable, the appliance is adjusted to the most unfavourable position of normal use.

11.7 *Replacement:*

The appliance is operated until steady conditions are established.

NOTE 101 If necessary, timers are reset immediately.

Parts operated by motors in appliances for wall mounting or ceiling mounting are fully raised and lowered five times without rest periods, or for 5 min, whichever is shorter.

11.8 *Addition:*

The temperatures of ballast windings and their associated wiring shall not exceed the values specified in subclause 12.4 of IEC 60598-1, when measured under the conditions stated.

The temperature rises for surfaces in contact with the skin shall not exceed those specified for handles that are continuously held in the hand.

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.

16 Leakage current and electric strength

This clause of Part 1 is applicable.

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 except as follows.

19.1 *Modification:*

Instead of the tests specified, appliances are subjected the tests of 19.4 to 19.12, 19.101 and 19.102, as applicable.

In addition, 19.2 and 19.3 are applicable for appliances having a lid but without a warning in the instructions that the appliance must not be switched on with the lid closed.

19.2 *Replacement:*

Appliances having a lid that is opened in normal use are tested with the lid closed.

*The test is carried out under the conditions specified in Clause 11. Appliances having **UV emitters** are supplied at 0,94 times **rated voltage** and other appliances are operated at 0,85 times **rated power input**.*

19.3 *Replacement:*

*The test of 19.2 is repeated but appliances having **UV emitters** are supplied at 1,1 times **rated voltage** and other appliances are operated at 1,24 times **rated power input**.*

19.9 Not applicable.

19.101 *Appliances, other than those for mounting at a height more than 1,8 m above the floor, are supplied at **rated voltage** and operated as specified in Clause 11. When steady conditions are established, a piece of dry bleached cotton flannelette having a specific mass of 130 g/m² to 165 g/m², a width of 100 mm and long enough to pass over the front of the appliance, is stretched over the appliance in the most unfavourable position*.

The flannelette shall not smoulder or ignite within 10 s.

NOTE If smouldering has started, a hole will have formed in the material with its edge glowing red. Blackening without smouldering is ignored.

19.102 *Appliances having discharge lamps are operated under the fault conditions specified in subclause 12.5.1 a), d) and e) of IEC 60598-1, the appliance being supplied at **rated voltage**.*

The temperatures of ballast or transformer windings shall not exceed the values specified in subclause 12.5 of IEC 60598-1.

20 Stability and mechanical hazards

This clause of Part 1 is applicable.

21 Mechanical strength

This clause of Part 1 is applicable except as follows.

Addition:

For emitters, including adjacent glass parts and any lens that protrude from the enclosure, the impact energy is reduced to 0,35 J ± 0,04 J.

NOTE 101 The test is carried out on emitters and on glass parts that do not hit the floor if the appliance is dropped.

21.101 Guards intended to prevent inadvertent ignition of flammable material shall have adequate mechanical strength.

Compliance is checked by the following test.

The appliance is placed so that the central part of the guard is horizontal. A flat disc having a diameter of 10 cm and a mass of 2,5 kg, is placed on the centre of the guard for 1 min.

After the test, the guard shall show no significant permanent deformation.

21.102 Parts of the appliance that are intended to support a person shall have adequate mechanical strength.

Compliance is checked by the following test.

A mass of 135 kg, evenly distributed over an area of 30 cm x 50 cm, is placed on the surface intended to support a person for 1 min.

After removal of the load, the appliance shall not be damaged to such an extent that compliance with this standard, in particular with Clause 29, is impaired.

NOTE In case of doubt, **supplementary insulation** and **reinforced insulation** are subjected to the electric strength test of 16.3.

22 Construction

This clause of Part 1 is applicable except as follows.

22.24 *Replacement:*

Bare heating elements shall be supported to prevent excessive displacement occurring during normal use. The rupture of a heating element shall not give rise to a hazard.

Compliance is checked by inspection and by the following test.

The heating element is cut in the most unfavourable place. The conductors shall not come into contact with ***accessible metal parts*** *or fall out of the appliance.*

22.35 *Modification:*

The relaxation for **stationary appliances** is not applicable.

22.101 Appliances having a lid that has to be opened in normal use shall be constructed so that the lid does not close inadvertently.

Compliance is checked by the following test.

The appliance is placed in any normal position of use on a plane inclined at an angle of 15° to the horizontal.

The lid shall remain in the open position.

22.102 Appliances incorporating parts that are suspended or intended to be raised and lowered over a person shall incorporate a safety device to prevent injury if the suspension means fails or there is excessive travel of the part.

Compliance is checked by inspection and by manual test.

22.103 UV emitters intended for full body exposure and used over a person shall be protected against accidental damage.

Compliance is checked by inspection and by the following test.

A cylindrical rod, having a diameter of 100 mm ± 1 mm and a hemispherical end, is applied with a force of 5 N.

It shall not be possible to touch the emitter with the rod.

22.104 Fixed appliances intended to be used over a person shall have means for fixing that are protected against loosening.

Compliance is checked by inspection and by manual test.

22.105 Appliances having **UV emitters** intended to be used by a person lying down shall be constructed so that the emission of ultraviolet radiation is automatically stopped if the timer fails.

Compliance is checked by the following test.

*The appliance is supplied at **rated voltage** and operated under **normal operation**. A fault in the timer is simulated. The emission of ultraviolet radiation shall cease before the exposure time has exceeded 110 % of the set value.*

NOTE Appliances having **UV emitters** that are intended to be used when inclined at an angle more than 35° to the vertical are considered to be appliances for use by a person lying down.

22.106 UV appliances shall incorporate a timer that terminates the emission of ultraviolet radiation and has a maximum setting up to

– 60 min for **UV type 1**, **UV type 2** and **UV type 3 appliances**;
– 30 min for **UV type 4 appliances**.

The settings marked on the timer shall be compatible with the times specified in the recommended schedule of exposure.

Compliance is checked by inspection.

NOTE For appliances intended for permanent connection to fixed wiring, the timer may be supplied for incorporation in the wiring system.

22.107 Metal parts in contact with the skin and which support the body in normal use shall not be earthed.

NOTE Hinges and other parts of the enclosure that could be touched during mounting and dismounting may be earthed.

*Compliance is checked by inspection and by the tests specified for **double insulation** or **reinforced insulation**.*

22.108 Appliances intended to be fixed to a wall by screws or other permanent fixing devices shall be constructed so that the method of fixing is obvious or specified in the installation instructions.

Compliance is checked by inspection.

22.109 Guards intended to prevent inadvertent ignition of flammable material shall be securely attached to the appliance so that it is not possible to detach them completely without the aid of a **tool**.

Compliance is checked by inspection and by manual test.

23 Internal wiring

This clause of Part 1 is applicable except as follows.

23.3 *Addition:*

The number of flexings for conductors that are only flexed when the appliance is stored is 5 000. The number of flexings for conductors flexed in normal use is increased to 50 000.

24 Components

This clause of Part 1 is applicable except as follows.

24.1 *Addition:*

*If the current flowing through the terminals of lampholders or ballasts exceeds the rated value, the terminal shall comply with subclause 15.6 of IEC 60598-1. The current for the test is 1,1 times the current measured when the appliance is operated at **rated voltage**.*

24.2 *Modification:*

Switches controlling a motor for raising or lowering part of the appliance, and switches of **portable appliances** having a **rated current** not exceeding 2 A, may be fitted in flexible cords.

25 Supply connection and external flexible cords

This clause of Part 1 is applicable except as follows.

25.5 *Addition:*

Type Z attachment is allowed for appliances having a mass not exceeding 3 kg.

25.7 *Addition:*

Supply cords having a rubber sheath or a sheath of other material likely to be affected by ultraviolet radiation shall not be used.

NOTE 101 The emitter and the reflector are not considered to be parts that the **supply cord** is likely to touch in normal use.

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.

29.3 *Addition:*

The requirement does not apply if the insulation is provided by the envelope of an **UV emitter** or by the glass envelope of an **IR emitter**.

30 Resistance to heat and fire

This clause of Part 1 is applicable except as follows.

30.2.3 Not applicable.

31 Resistance to rusting

This clause of Part 1 is applicable.

32 Radiation, toxicity and similar hazards

This clause of Part 1 is replaced by the following.

32.101 Appliances shall not present a toxic or similar hazard. Appliances having **UV emitters** shall not emit radiation in hazardous amounts and their **effective irradiance** shall comply with the values specified in Table 101.

Table 101 – Limits of effective irradiance

UV type appliance	Effective irradiance W/m²	
	250 nm < λ < 320 nm	320 nm < λ < 400 nm
1	<0,0005	≥0,15
2	0,0005 to 0,15	≥0,15
3	<0,15	<0,15
4	≥0,15	<0,15
λ is the wavelength of the radiation		

Compliance is checked by the following test.

*The appliance is provided with **UV emitters** that have been aged by supplying them at **rated voltage** for a period of*

– *5 h ± 15 min for fluorescent lamps;*

– *1 h ± 15 min for high-intensity discharge lamps.*

NOTE 1 A high-intensity discharge lamp is an electric discharge lamp in which the radiation-producing arc is stabilized by the wall temperature and the arc has a bulb wall loading in excess of 3 W/cm².

*The appliance is supplied at **rated voltage** and operated for approximately half the maximum exposure time allowed by the timer. The irradiance is then measured at the shortest recommended exposure distance, the measuring instrument being positioned so that the highest radiation is recorded. However, the irradiance of facial guns is measured at a distance of 100 mm ± 2 mm and calculated for the recommended exposure distance.*

*The exposure distance of **UV emitters** that are located over a person is the distance between the emitter and the supporting surface, reduced by 0,3 m.*

NOTE 2 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 3 For appliances having upper and lower radiating surfaces, each part is measured separately while the other part is covered or removed. If the distance between two radiating surfaces is less than 0,3 m, the measurement is made at the surface of the upper panel.

NOTE 4 The total **effective irradiance** is given by

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

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/m²nm;

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** for each band above and below 320 nm is determined and shall comply with the values specified in Table 101.*

32.102 UV appliances shall be supplied with at least two pairs of protective goggles ensuring adequate protection for the eyes.

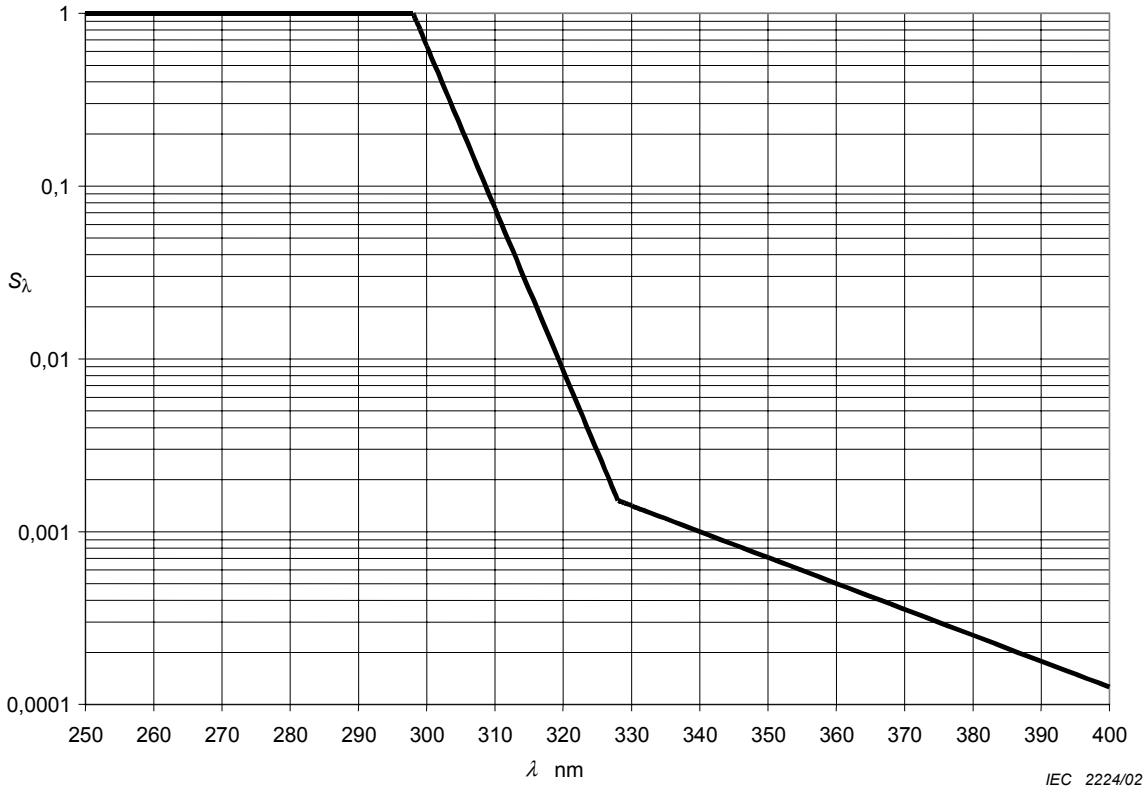
Compliance is checked by the following test that is carried out on each pair of goggles.

The transmission is measured at the centre of each ocular by means of a spectrophotometer having a bandwidth not exceeding 2,5 nm. A beam of light having a diameter of approximately 5 mm is used. The transmission is measured between 240 nm and 550 nm at intervals of 5 nm.

The transmission shall not exceed the values specified in Table 102.

Table 102 – Maximum transmission of the goggles

Wavelength λ	**Maximum transmission** %
$250 < \lambda \leq 320$	0,1
$320 < \lambda \leq 400$	1
$400 < \lambda \leq 550$	5



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 except as follows.

Annex AA
(normative)

Measurement of luminance

Luminance is measured by means of collimating optics. The measurement is made at the shortest possible distance from the light source, but not less than 0,2 m. At the point of measurement the optics shall collect all light passing through the entrance aperture within the solid angle of acceptance, the corresponding plane angle being 1°.

During the measurement the appliance is operated at ***rated voltage****.*

Bibliography

The bibliography of Part 1 is applicable.

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Standards Survey

The IEC would like to offer you the best quality standards possible. To make sure that we continue to meet your needs, your feedback is essential. Would you please take a minute to answer the questions overleaf and fax them to us at +41 22 919 03 00 or mail them to the address below. Thank you!

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Switzerland

or

Fax to: **IEC**/CSC at +41 22 919 03 00

Thank you for your contribution to the standards-making process.

A Prioritaire

Nicht frankieren
Ne pas affranchir

Non affrancare
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RÉPONSE PAYÉE

SUISSE

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Q1 Please report on **ONE STANDARD** and **ONE STANDARD ONLY**. Enter the exact number of the standard: *(e.g. 60601-1-1)*

.....

Q2 Please tell us in what capacity(ies) you bought the standard *(tick all that apply).* I am the/a:

purchasing agent ❑
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researcher ❑
design engineer ❑
safety engineer ❑
testing engineer ❑
marketing specialist ❑
other.....

Q3 I work for/in/as a: *(tick all that apply)*

manufacturing ❑
consultant ❑
government ❑
test/certification facility ❑
public utility ❑
education ❑
military ❑
other.....

Q4 This standard will be used for: *(tick all that apply)*

general reference ❑
product research ❑
product design/development ❑
specifications ❑
tenders ❑
quality assessment ❑
certification ❑
technical documentation ❑
thesis ❑
manufacturing ❑
other.....

Q5 This standard meets my needs: *(tick one)*

not at all ❑
nearly ❑
fairly well ❑
exactly ❑

Q6 If you ticked NOT AT ALL in Question 5 the reason is: *(tick all that apply)*

standard is out of date ❑
standard is incomplete ❑
standard is too academic ❑
standard is too superficial ❑
title is misleading ❑
I made the wrong choice ❑
other .....

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(1) unacceptable,
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French text only ❑
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both English and French texts ❑

Q9 Please share any comment on any aspect of the IEC that you would like us to know:

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ISBN 2-8318-6606-5

ICS 13.120; 97.170

Typeset and printed by the IEC Central Office
GENEVA, SWITZERLAND