

INTERNATIONAL STANDARD

IEC
60335-2-87

Second edition
2002-03

Household and similar electrical appliances – Safety –

Part 2-87: Particular requirements for electrical animal- stunning equipment

Appareils électrodomestiques et analogues –

Sécurité –

*Partie 2-87:
Règles particulières pour les appareils électriques
d'insensibilisation des animaux*



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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES –
SAFETY –****Part 2-87: Particular requirements for
electrical animal-stunning equipment**

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.
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- 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 sub-committee 61H: Safety of electrically-operated farm appliances, of IEC technical committee 61: Safety of household and similar electrical appliances.

This second edition cancels and replaces the first edition published in 1998. It constitutes a technical revision.

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

FDIS	Report on voting
61H/167/FDIS	61H/172/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 animal-stunning equipment.

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 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:

- 25.7: Ordinary PVC sheathed supply cords are permitted (Australia, New Zealand).

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 which 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 2-87: Particular requirements for electrical animal-stunning equipment

1 Scope

This clause of Part 1 is replaced by the following.

This standard deals with the safety of **electric animal-stunning equipment** the **rated voltage** of which is not more than 250 V for single-phase appliances and 480 V for other appliances.

This standard is applicable to **electric animal-stunning equipment** for industrial or commercial use, for use on farms or for use in areas where they may be a source of danger to the public.

So far as is practical, this standard deals with the common hazards presented by these types of appliances.

NOTE 101 Examples of **electric animal-stunning equipment** within the scope of this standard are those used to stun:

- bovines such as cattle, calves, cows, heifers and bulls;
- ovines such as sheep and lambs;
- caprines such as goats;
- cervids such as deer;
- solipeds such as horses, donkeys and mules;
- birds such as chickens, turkeys and guinea fowl;
- porcines such as pigs;
- fur animals such as foxes, chinchilla, rabbits and possums;
- mustelids such as mink and polecats;
- other ruminants such as camels.

NOTE 102 The following types of **electric animal-stunning equipment** are covered by this standard:

- manual, semi-automatic and automatic.

NOTE 103 Attention is drawn to the fact that:

- for **electric animal-stunning equipment** intended to be used on board ships, 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, the national water supply authorities and similar authorities;
- in many countries, additional requirements are specified concerning the humane slaughter of animals.

NOTE 104 This standard does not apply to:

- 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);
- electric fence energizers (see IEC 60335-2-76);
- electric fishing machines (see IEC 60335-2-86);
- meat tenderizers, carcass immobilizers, carcass stiffeners, spinal discharge equipment or similar equipment.

2 Normative references

This clause of Part 1 is applicable except as follows.

Addition:

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

IEC 61558-2-4:1997, *Safety of power transformers, power supply units and similar – Part 2: Particular requirements for isolating transformers for general use*

ISO 3864, *Safety colours and safety signs*

3 Definitions

This clause of Part 1 is applicable except as follows.

3.1.9 Replacement:

normal operation

the **electric animal-stunning equipment** is operated as in normal use when connected to the supply with **electrodes** connected to the output terminals of the **stunning equipment**. An adjustable non-inductive resistor is connected between the **electrodes**. The resistor is adjusted so that **output current** can flow

3.6.3 Addition:

NOTE It also includes terminals for the connection of the batteries and other metal parts in a battery compartment that become accessible when replacing batteries even with the aid of a **tool**.

3.6.4 Replacement:

live part

a conductive part that may cause an electric shock

3.101

electric animal-stunning equipment

appliance that is designed or used to cause electronarcosis in an animal by means of an electric current. It may also cause irreversible cardiac arrest

NOTE In this standard, for convenience, this term is abbreviated to **stunning equipment**.

3.102

mains-operated stunning equipment

stunning equipment designed for direct connection to a supply, other than a battery supply or a **safety extra-low voltage** supply

3.103

battery-operated stunning equipment

stunning equipment deriving its energy solely from chargeable or non-rechargeable batteries

3.104

electrode

parts of **stunning equipment** that transfer the electric current to the animal

NOTE The **stun electrode** is the **electrode** used to apply the stun voltage, the **return electrode** is the other **electrode**.

3.105

stunning circuit

conductive parts or components within **stunning equipment**, that are connected or intended to be connected galvanically to the **electrode** terminals

3.106

output voltage

voltage required to sustain the **output current** under **normal operation**

3.107

output current

current in the **stunning circuit** that the **stunning equipment** is designed to supply

3.108

biased-off switch

switch that automatically returns to the **off position** when its actuating member is released

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.

5.8.1 Addition:

*For **battery-operated stunning equipment** where the supply terminals for the connection of the batteries have no indication for polarity, the application of the more unfavourable polarity is used.*

5.101 *If there is no indication as to which of the output terminals is to be connected to the stun **electrode**, the terminal that gives the most unfavourable result is connected to the return **electrode**.*

5.102 ***Stunning equipment** is tested as a **motor-operated appliance**.*

6 Classification

This clause of Part 1 is applicable except as follows.

6.1 Replacement:

Stunning equipment that is suitable for connection to the supply mains shall be of **class I**, **class II** or **class III** with respect to protection against electric shock.

Stunning equipment that is suitable for connection to the supply mains and that is directly connected to the water supply mains shall be of **class I** with respect to protection against electric shock.

Portable and **hand-held stunning equipment** shall be **class II** or **class III** with respect to protection against electric shock.

Compliance is checked by inspection and by the relevant tests.

6.2 Addition:

Parts of **stunning equipment** that contain electrical components and that may be cleaned with a water jet according to the instructions, shall be at least IPX5.

Hand-held stunning equipment shall be at least IPX5.

7 Marking and instructions

This clause of Part 1 is applicable except as follows.

7.1 Addition:

Stunning equipment shall be marked with:

- duty cycle, if applicable;
- **output current**;
- no-load **output voltage**;
- WARNING – Read full instructions before use;
- a symbol indicating the presence of a dangerous voltage in accordance with symbol number 5036 of IEC 60417.

NOTE 101 This symbol forms a warning sign for which the rules in ISO 3864 are applicable.

- the stun **electrode** and return **electrode** terminals shall be identified by appropriate symbols 5036 and 5017 of IEC 60417 respectively. If the return **electrode** is not grounded it need not be marked.

Battery-operated stunning equipment shall also be marked with:

- the **rated input current** in amperes;
- WARNING: Do not connect to mains-operated equipment.
- the type of battery, unless the type is irrelevant for the operation of the stunning equipment, distinguishing between chargeable and non-rechargeable batteries if necessary.

7.6 Addition:

[symbol 5036 of IEC 60417] Dangerous voltage



[symbol 5017 of IEC 60417] Earth (ground)

7.8 Addition:

For **battery-operated stunning equipment** the supply terminals for connection of the battery shall be clearly indicated by the symbol "+" or the colour red if of positive polarity, and by the symbol "-" or the colour black if of negative polarity, unless the polarity is irrelevant.

7.12 Addition:

The instructions shall contain the substance of the following:

- for **stunning equipment** parts of which are hand-held, the power supply switch shall be visible from any point that the piece held in the hand may be used;
- for **stunning equipment** parts of which are hand-held, the hand-held sub-assembly when not in use shall be kept in a holder placed alongside the supply unit, or be otherwise suspended at a minimum height of 1,6 m;
- the **supply cord** shall be placed such that it is not accessible to animals;
- recommendations concerning functional tests to be carried out to ensure the continuing correct operation of safety controls and interlocks;
- the stunner shall be disconnected from the power supply during cleaning;
- isolate the **stunning equipment** from the power supply when it is not in use.

The instructions for **battery-operated stunning equipment** shall in particular emphasize the warning marked on the **stunning equipment** that states:

WARNING: Do not connect to mains-operated equipment.

The instructions for **class III portable stunners**, shall state that the stunner shall only be used with the isolating transformer with which it is supplied.

If symbol 5017 of IEC 60417 or symbol 5036 of IEC 60417 are marked on the appliance its meaning shall be explained

7.12.1 Addition:

The instructions shall include the substance of the following:

- a wiring diagram;
- for **fixed stunning equipment**, the installation shall be integrated into an effective equipotential bonding system;
- parts that are not marked IPX5 shall be installed in a location where they are not likely to be cleaned with the aid of a water jet;
- the stunner shall be installed in a well drained position;
- the **stunning equipment** is to be installed according to the relevant sections of the wiring rules and health and safety rules.

NOTE 101. Attention is drawn to IEC 60364-7-705.

7.101 Hand-pieces of **stunning equipment**, that are detachable from the rest of the **stunning equipment**, shall be marked with:

- name, trade mark or identification mark of the manufacturer or responsible vendor;
- model or type reference of the hand-piece;
- **rated voltage, rated current** and duty cycle if applicable;
- IP rating.

Compliance is checked by inspection.

7.15 Addition:

The perpendicular height of the triangle containing the symbol 5036 of IEC 60417 indicating the presence of a dangerous voltage shall be not less than 120 mm, however for the hand-piece of **hand-held stunning equipment** the height shall not be less than 20 mm. In other cases the symbol 5017 of IEC 60417 and symbol 5036 of IEC 60417 shall have a height of at least 20 mm.

8 Protection against access to live parts

This clause of Part 1 is applicable except as follows.

8.1.4 Addition:

The **electrodes** are not considered to be a **live part**.

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.

11.5 Replacement:

Stunning equipment is operated under **normal operation** supplied as follows:

- for **mains-operated stunning equipment**, supplied with the most unfavourable supply voltage between 0,94 and 1,06 times **rated voltage**;
- for **battery-operated stunning equipment** when it is supplied with the most unfavourable supply voltage between:
 - 0,55 and 1,1 times **rated voltage**, if the **stunning equipment** can be used with non-rechargeable batteries;
 - 0,75 and 1,1 times **rated voltage**, if the **stunning equipment** is designed for use with rechargeable batteries only.

The values specified in Table 101 for the internal resistance/cell of the battery shall be taken into account.

Table 101 – Battery source impedance

Supply to the terminals for the connection of the battery	Internal resistance/cell Ω	
	Non-rechargeable batteries	Rechargeable batteries
1,1 times rated voltage	0,08	0,0012
1,0 times rated voltage	0,10	0,0015
0,75 times rated voltage	0,75	0,0060
0,55 times rated voltage	2,00	–
NOTE For determining the internal resistance of a battery, two or more cells connected in parallel are considered to be one cell.		

11.7 Replacement:

Stunning equipment that, according to the instructions, requires a rest period between stuns is operated at the duty cycle marked on the equipment until steady conditions are established. Other **stunning equipment** is operated continuously until steady conditions are established.

12 Void**13 Leakage current and electric strength at operating temperature**

This clause of Part 1 is applicable except as follows.

13.1 Modification:

The requirement and tests are only applicable to **mains-operated stunning equipment**.

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 except as follows.

16.1 Modification:

Compliance is checked by the tests of:

- 16.2 and 16.3 for **stunning equipment** suitable for connection to the supply mains;
- 16.101 for **battery-operated stunning equipment**.

16.101 For **battery-operated stunning equipment** the supply terminals are connected for 10 min to a voltage between 1,1 and 1,5 times **rated voltage**, that is so chosen that the **output voltage**, without a load connected, has the maximum value, protective spark gaps, if any, being disconnected.

The insulation between the poles of the supply circuit is then subjected for 1 min to a d.c. voltage of approximately 500 V. Before this test is made, capacitors, resistors, inductors, transformer windings and **electronic components** that are connected between the poles of the supply circuit are disconnected. When a capacitor forms part of an integrated circuit and cannot be disconnected separately, the circuit as a whole is disconnected.

No breakdown shall occur during the test.

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 Addition:

Compliance is also checked by the test of 19.101.

19.13 Addition:

The **stunning equipment** shall automatically be disconnected within 50 ms after a fault that causes a no-load voltage exceeding 24 V to appear between the **electrodes**.

19.101 The **stunning equipment** is operated under **normal operation** and supplied at **rated voltage**. The following defects are applied in turn:

- the **stunning electrodes** are short-circuited;
- level switches and other devices used to control the water level in a water bath are short-circuited or rendered inoperative;
- fuses accessible to the user without the aid of a **tool** are short-circuited;
- **stunning equipment** with a duty cycle of less than 100 % is operated continuously.

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:

*Except for **hand-held equipment**, external surfaces of enclosures, the failure of which would give access to hazardous parts, are tested as follows.*

Enclosures are subject to tests Eha or Ehc of IEC 60068-2-75 as appropriate. The impact energy is 5J. One impact is applied on each point likely to be exposed to an impact in normal use.

NOTE 101 The test is not applied to glass surfaces.

***Hand-held equipment** and other parts of **stunning equipment** that are carried in use are subject to the free fall test described in IEC 60068-2-32, test Ed, the equipment being dropped from a height of 1 m a total of three times.*

After the tests, the appliance shall show no damage within the meaning of this standard; in particular, compliance with 8.1, 15.1, 16.3 and Clause 29 shall not be impaired.

22 Construction

This clause of Part 1 is applicable except as follows.

22.101 Where the **stunning equipment** is carried by the user during operation, a tilt switch shall be fitted that disconnects the **stunning circuit** when the **stunning equipment** is tipped past 45° from the vertical. A manual operation shall be required to reconnect the **stunning circuit**.

Compliance is checked by inspection and manual test.

22.102 Battery-operated stunning equipment shall be so designed that connection to the supply mains, either directly or indirectly through a battery charger, is not possible.

Compliance is checked by inspection.

NOTE External clips and crocodile clips are not considered to be supply-mains connectors.

22.103 For **stunning equipment** suitable for connection to the supply mains, internal connections shall be so fixed or protected and **stunning equipment** shall be so designed that, even in the event of loosening or breaking of wires, a conductive connection cannot be formed between the mains supply and the **stunning circuit**, nor can any other hazardous condition arise.

For **stunning equipment** suitable for connection to the supply mains, the **stunning circuit** shall be isolated from the supply circuit by means of an isolating transformer.

Compliance is checked by inspection, by the tests of the other clauses of this standard and by the tests of IEC 61558-2-4, if applicable.

22.104 Only one pair of electrodes shall be supplied from each isolating transformer associated with the **stunning equipment**.

Compliance is checked by inspection.

22.105 The actuator of any switch or control that is operated in normal use shall be accessible without opening or removing any part of the enclosure that provides protection against harmful ingress of water or unintended electric shock.

Compliance is checked by inspection.

22.106 In **stunning equipment** where the **electrodes** are connected in normal use after the **stunning equipment** has been installed and connected to the supply mains, the terminals for connection of the **electrodes** shall be accessible without opening or removing any part of the enclosure that provides protection against harmful ingress of water or unintended electric shock.

Compliance is checked by inspection.

22.107 The presence of a voltage exceeding 24 V peak between the **electrodes** is to be indicated by a visual means able to be seen from any direction of approach to the **stunning equipment**.

Compliance is checked by inspection and test.

22.108 A visual indication shall be provided to show when the power supply is connected to the **stunning equipment**.

Compliance is checked by inspection.

NOTE For **stunning equipment** used for pest control purposes in areas accessible to the public, this may be achieved by the use of warning signs attached to barriers erected to restrict access to the appliance.

22.109 All hand-pieces of **hand-held stunning equipment** shall either:

- be fitted with two **biased-off switches**, not able to be switched on by using one hand, both of which shall be closed to provide current in the **stun circuit**; or shall
- comply with the requirement of 22.111.

Compliance is checked by inspection and the appropriate tests.

22.110 **Stunning equipment** not complying with 22.109 and other **stunning equipment** where animals are individually stunned, shall incorporate a control unit that prevents application of a voltage between the **electrodes** exceeding 24 V peak if the **electrode** load impedance exceeds a limiting value.

The magnitude of the **electrode load** impedance shall be checked at least every 20 ms and the **electrode** voltage shall be reduced to the no-load value within 30 ms of the load impedance exceeding the limiting value.

*Compliance is checked by measurement and the following test that is carried out with the **stunning equipment** supplied at **rated voltage**.*

*The no-load value of the voltage appearing between the **electrodes** is measured. A variable resistor is then connected between the **electrodes** and is adjusted so that the voltage appearing between the **electrodes** exceeds the no-load voltage.*

The minimum value of the resistor at which the voltage appearing between the **electrodes** exceeds the no-load voltage shall not exceed the limiting value given by the curve of Figure 101.

The resistance is then increased and the voltage appearing between the **electrodes** shall be reduced to the no-load value within 30 ms of the resistance between the **electrodes** exceeding the limiting resistance given by the curve in Figure 101.

22.111 The control circuit operated by the two switches used to comply with 22.109, shall be such that:

- the second switch shall be closed within 5 s of closure of the first switch to allow current to flow in the **stun circuit**;
- in semi-automatic **stunning equipment**, release of one switch after initiation of the stun, will cause voltage to be removed from the **electrodes** after a time sufficient to complete the stun;
- both switches shall be released to reset the **stunning equipment** for further use.

Compliance is checked by inspection and test.

22.112 Stunning equipment, other than that connected to the supply by a **supply cord** and plug, shall be provided with a switch that isolates the equipment from all power sources and that is capable of being locked in the **off position**. The switch shall have a contact separation in all poles that provide full disconnection under overvoltage category III conditions.

Compliance is checked by inspection and test.

22.113 Stunning equipment shall be so designed that an interruption and restoration of the power supply cannot result in voltage being applied to the **electrodes** without a further manual action being taken.

Compliance is checked by inspection and test.

22.114 For water bath **stunning equipment** it shall not be possible to energize the **stunning equipment** when draining water from the bath.

For water bath **stunning equipment** it shall not be possible to energize the **stunning equipment** when filling the bath unless this is carried out by using water supplied automatically from a separate tank.

Compliance is checked by inspection and test.

22.115 Appliances connected to the water mains shall withstand the water pressure expected in normal use.

*Compliance is checked by connecting the **stunning equipment** to a water supply having a static pressure equal to twice the maximum permissible inlet water pressure or 1,5 MPa whichever is the higher, for a period of 5 min.*

There shall be no leakage from any part, including the inlet water hose.

22.116 For **stunning equipment** directly connected to the water supply mains, the point of connection between the **stunning equipment** and the water supply shall be metallic and shall be connected to the **stunning equipment** protective earth.

Compliance is checked by inspection and the test of 27.5.

22.117 It shall not be possible to make unintentional contact with **electrodes**.

For other than **hand-held stunning equipment**, if unintentional contact is prevented by the use of distance or barriers, there shall be a minimum distance of 1,25 m between the enclosure of the **stunning equipment** or barrier and the **electrodes**.

Hand pieces of **hand-held stunning equipment** shall incorporate barriers that reduce the risk of the hand of the user making contact with the **electrodes**.

Compliance is checked by inspection, measurement and test.

22.118 If access to the area containing the **electrodes** is necessary then an interlock shall be fitted to the door giving access to the area to ensure that the **electrodes** are not energized while the door is open. It shall only be possible to reset the **stunning equipment** from outside the enclosure. The position from which the **stunning equipment** is reset shall be in sight of the **electrodes**.

Compliance is checked by inspection.

23 Internal wiring

This clause of Part 1 is applicable.

24 Components

This clause of Part 1 is applicable.

25 Supply connection and external flexible cords

This clause of Part 1 is applicable except as follows.

25.1 Replacement:

Mains-operated stunning equipment, other than those intended to be permanently connected to fixed wiring, shall be provided with a **supply cord** fitted with a plug.

Compliance is checked by inspection.

25.3 Modification:

Delete the third dash item referring to supply leads.

25.5 Addition:

The flexible leads or cord used to connect the battery in **battery-operated stunning equipment** shall be assembled with the **stunning equipment** by a **type X attachment**.

25.7 Replacement:

Supply cords, other than the flexible leads or cord connecting an external battery or battery box with **stunning equipment**, shall not be lighter than heavy polychloroprene sheathed cord (code designation 60245 IEC 66).

Compliance is checked by inspection.

25.20 Addition:

The requirement is not applicable to the flexible leads or cord connecting an external battery or battery box with **stunning equipment**.

25.23 Addition:

For **battery-operated stunning equipment**, if the battery is placed in a separate box, the flexible leads or cord connecting the box with the **stunning equipment** are considered to be an **interconnection cord**.

25.101 Battery-operated stunning equipment shall have suitable means for connection of the battery.

If the type of battery is marked on the **stunning equipment**, the means for connection shall be suitable for this type of battery.

Compliance is checked by inspection.

26 Terminals for external conductors

This clause of Part 1 is applicable except as follows.

26.5 Addition:

Terminals in **stunning equipment** for the connection of the flexible leads or cord with **type X attachment** connecting an external battery or battery box shall be so located or shielded that there is no risk of accidental connection between terminals.

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 due to normal use of the appliance.

30 Resistance to heat, and fire

This clause of Part 1 is applicable except as follows.

30.2.2 Not applicable

31 Resistance to rusting

This clause of Part 1 is applicable except as follows.

Replacement:

Metallic enclosures of **class II stunning equipment** shall be adequately protected against corrosion.

Compliance is checked by the salt mist test of IEC 60068-2-52, severity (2) is 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 a top angle of 40°, its tip being rounded with a radius of 0,25 mm $\pm$ 0,02 mm. The pin is so loaded that the force exerted along its axis is 10 N $\pm$ 0,5 N. The scratches are made by drawing the pin along the surface of the coating at a speed of about 20 mm/s. Five scratches are made at least 5 mm apart and at least 5 mm from the edge.

After the test, the enclosure shall not have deteriorated to such an extent that compliance with this standard is impaired. The coating shall not have broken and shall not have loosened from the metal surface.

32 Radiation, toxicity and similar hazards

This clause of Part 1 is applicable.

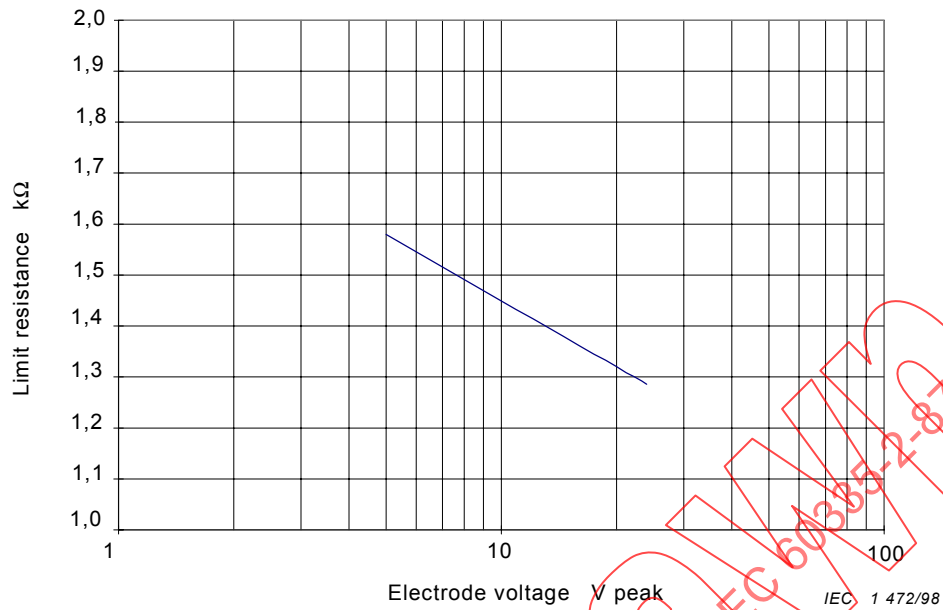


Figure 101 – Limiting resistance curve for stunning equipment