# IEC 60335-2-87

Edition 3.0 2016-05

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE

colour inside

## Household and similar electrical appliances – Safety – Part 2-87: Particular requirements for electrical animal stunning equipment

## Appareils électrodomestiques et analogues – Sécurité – Partie 2-87: Exigences particulières pour les appareils électriques d'insensibilisation des animaux

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## Appareils électrodomestiques et analogues – Sécurité – Partie 2-87: Exigences 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

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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 third edition cancels and replaces the second edition published in 2002 including its Amendment 1 (2007) and its Amendment 2 (2012). This edition constitutes a technical revision.

The principal changes in this edition as compared with the second edition of IEC 60335-2-87 are as follows (minor changes are not listed):

- Warning sign ISO 7010-W012 has been introduced (7.1, 7.6, 7.12, 7.14).
- Reference to IEC 60068-2-32 has been replaced by reference to IEC 60068-2-31 (21.1).

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- Additional requirements for battery operated stunning have been transferred to Annex S (5.8.1, 7.1, 7.8, 7.12, 11.5, 16, 22.102, 25.5, 25.7, 25.20, 25.23, 25.101, 26.5).

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

| FDIS | Report on voting |
|---|---|
| 61H/321/FDIS | 61H/322/RVD |

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

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 fifth edition (2010) 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 electrical 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 the associated noun are also in bold.

A list of all parts of the IEC 60335 series, under the general title: *Household and similar electrical appliances – Safety*, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

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- withdrawn,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

NOTE 4 The attention of National Committees is drawn to the fact that equipment manufacturers and testing organizations may need a transitional period following publication of a new, amended or revised IEC publication in which to make products in accordance with the new requirements and to equip themselves for conducting new or revised tests.

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It is the recommendation of the committee that the content of the standard be adopted for implementation nationally not earlier than 12 months or later than 36 months from the date of publication.

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# 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 and takes into account the way in which electromagnetic phenomena can affect the safe operation of appliances.

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.

When a part 2 standard does not include additional requirements to cover hazards dealt with in Part 1, Part 1 applies.

NOTE 1 This means that the technical committees responsible for the part 2 standards have determined that it is not necessary to specify particular requirements for the appliance in question over and above the general requirements.

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.

NOTE 2 Horizontal and generic standards covering a hazard are not applicable since they have been taken into consideration when developing the general and particular requirements for the IEC 60335 series of standards. For example, in the case of temperature requirements for surfaces on many appliances, generic standards, such as ISO 13732-1 for hot surfaces, are not applicable in addition to Part 1 or part 2 standards.

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.

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# 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 part of IEC 60335 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.

NOTE 101 Battery-operated appliances and other d.c. supplied appliances are within the scope of this standard. Dual supply appliances, either mains-supplied or battery-operated, are regarded as **battery-operated appliances** when operated in the battery mode.

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 102 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 103 The following types of **electric animal-stunning equipment** are covered by this standard:

– manual, semi-automatic and automatic.

NOTE 104 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 105 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.

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## 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, *Safety of transformers, reactors, power supply units and similar products for supply voltages up to 1 100 V – Part 2-4: Particular requirements and tests for isolating transformers and power supply units incorporating isolating transformers*

ISO 7010:2011, *Graphical symbols – Safety colours and safety signs – Registered safety signs*

## 3 Terms and definitions

This clause of Part 1 is applicable except as follows.

**3.1.9** *Replacement:*
**normal operation**
oeration of the **electric animal-stunning equipment** 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 1 to entry: 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:*
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

Note 1 to entry: It may also cause irreversible cardiac arrest.

Note 2 to entry: 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

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Note 1 to entry: 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.

**5.101** *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:*

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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

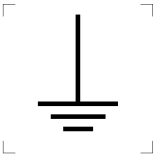
This clause of Part 1 is applicable except as follows.

**7.1** *Addition:*

**Stunning equipment** shall be marked with:

– duty cycle, if applicable;
– **output current**;
– no-load **output voltage**;
– “read the instructions” or with symbol ISO 7000-0790 (2004-01);
– a symbol indicating the presence of a dangerous voltage in accordance with symbol IEC 60417-5036 (2002-10) in conjunction with warning sign ISO 7010-W012 (2011-05);
– the stun **electrode** and return **electrode** terminals shall be identified by appropriate symbol IEC 60417-5036 (2002-10) and symbol IEC 60417-5017 (2006-08) respectively. If the return **electrode** is not grounded it need not be marked.

**7.6** *Addition:*



[symbol IEC 60417-5017 (2006-08)] earth (ground)

[warning sign ISO 7010-W012 (2011-05)] warning: Electricity

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

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If symbol IEC 60417-5017 (2006-08), symbol IEC 60417-5036 (2002-10) or warning sign ISO 7010-W012 (2011-05) are marked on the appliance its meaning shall be explained.

*Modification:*

The instructions concerning persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge and children playing with the appliance are not required.

**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.

**7.14** *Addition:*

The perpendicular height of the triangle in warning sign ISO 7010-W012 (2011-05) 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 IEC 60417-5017 (2006-08) and symbol IEC 60417-5036 (2002-10) shall have a height of at least 20 mm.

**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.*

## 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.

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## 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:*

***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.*

## 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.

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