

INTERNATIONAL STANDARD

NORME INTERNATIONALE



Household and similar electrical appliances – Safety –
Part 2-76: Particular requirements for electric fence energizers
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Appareils électrodomestiques et analogues – Sécurité
Partie 2-76: Exigences particulières pour les électrificateurs de clôtures
IEC 60335-2-76:2018
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Part 2-76: Particular requirements for electric fence energizers

Appareils électrodomestiques et analogues – Sécurité
Partie 2-76: Exigences particulières pour les électrificateurs de clôtures

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HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –**Part 2-76: Particular requirements for electric fence energizers****FOREWORD**

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This part of International Standard IEC 60335 has been prepared by subcommittee 61H: Safety of electrically-operated farm appliances, of IEC technical committee 61: Safety of household and similar electrical appliances.

This bilingual version (2019-02) corresponds to the monolingual English version, published in 2018-06.

This third edition cancels and replaces the second edition published in 2002, Amendment 1:2006 and Amendment 2:2013. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- the text has been aligned with Edition 5.2 of Part 1;
- additional requirements for security fence energizers have been introduced (Clauses 3, 7, 19, 22, Figures and Annex BB);

- specific requirements for battery operated energizers have been moved to Annex S.

The text of this International Standard is based on the following documents:

FDIS	Report on voting
61H/366/FDIS	61H/367/RVD

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

The French version of this standard has not been voted upon.

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

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

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 electric fence energizers.

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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.

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.

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

The following differences exist in the countries indicated below:

6.101: Only energy limited energizers are allowed (All EU and EFTA counties).

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

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

The contents of the corrigendum of November 2018 have been included in this copy.

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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.

NOTE 1 Throughout this publication, when "Part 1" is mentioned, it refers to IEC 60335-1.

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

NOTE 2 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 3 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.

HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –

Part 2-76: Particular requirements for electric fence energizers

1 Scope

This clause of Part 1 is replaced by the following.

This part of IEC 60335 deals with the safety of **electric fence energizers**, the **rated voltage** of which is not more than 250 V and by means of which **fence** wires in agricultural, domestic or feral animal control **fences** and **security fences** may be electrified or monitored.

NOTE 101 Examples of **electric fence energizers** coming within the scope of this standard are:

- **mains-operated energizers**;
- **battery-operated electric fence energizers suitable for connection to the mains**, as shown in Figure 101 and Figure 102;
- **electric fence energizers** operated by non-rechargeable batteries either incorporated or separate.

This standard does not in general take into account

- the use of appliances by young children or infirm persons without supervision;
- the playing with appliances by young children.

NOTE 102 Attention is drawn to the fact that

- for appliances intended to be used on board ships or aircraft, additional requirements can 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.

NOTE 103 This standard does not apply to

- electromagnetically coupled animal trainer collars;
- 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);
- separate battery chargers (IEC 60335-2-29);
- electric fishing machines (IEC 60335-2-86);
- electric animal-stunning equipment (IEC 60335-2-87);
- appliances for medical purposes (IEC 60601).

2 Normative references

This clause of Part 1 is applicable except as follows.

Addition:

IEC 60068-2-52:2017, *Environmental testing – Part 2: Tests – Test Kb: Salt mist, cyclic (sodium chloride solution)*

IEC 60320-3, *Appliance couplers for household and similar general purposes – Part 3: Standard sheets and gauges*

ISO 3864-1, *Graphical symbols – Safety colours and safety signs – Part 1: Design principles for safety signs and safety markings*

3 Terms and definitions

This clause of Part 1 is applicable except as follows.

3.1 Definitions relating to physical characteristics

3.1.1 Addition:

Note 1 to entry: For **type D energizers**, the **rated voltage** of the **energizer** is the **rated voltage** for battery supply.

Replacement:

3.1.9 normal operation

operation of the appliance under the following conditions: the **electric fence energizer** is operated as in normal use when connected to the supply, with no load connected to the output terminals

3.1.101 prospective peak voltage

peak output voltage of the impulse generator specified in Clause 14 that would be obtained with the **energizer** not connected to the test circuit

3.1.102 rated voltage for battery supply

voltage for battery supply, for **type A energizers**, **type B energizers**, **type C energizers** and **type D energizers** assigned to the **energizer** by the manufacturer

3.1.103 rated voltage range for battery supply

voltage range for battery supply, for **type A energizers**, **type B energizers**, **type C energizers** and **type D energizers** assigned to the **energizer** by the manufacturer, expressed by its lower and upper limits

3.1.104 impulse duration

duration of that part of the impulse that contains 95 % of the overall energy and is the shortest interval of integration of $I^2(t)$ that gives 95 % of the integration of $I^2(t)$ over the total impulse

Note 1 to entry: $I(t)$ is the impulse current as a function of time.

3.1.105 output current

RMS value of the **output current** per impulse calculated over the impulse duration

3.5 Definitions relating to types of appliances

3.5.101 electric fence energizer

appliance that is intended to deliver periodically voltage impulses to a **fence** connected to it

Note 1 to entry: **Electric fence energizers** are hereinafter also referred to as **energizers**.

3.5.102 mains-operated energizer energizer designed for direct connection to the mains

3.5.103

battery-operated energizer suitable for connection to the mains energizer

- operated by batteries and having, or being designed for connection to, facilities for charging these batteries from the mains, or
- designed for operation from the mains and from batteries

3.5.104

type A energizer

battery-operated energizer suitable for connection to the mains consisting of an impulse generating circuit, a battery charging circuit and a battery, the impulse generating circuit being connected to the mains or the battery when the energizer is in operation

Note 1 to entry: **Type A energizers** are shown schematically in Figure 101.

3.5.105

type B energizer

battery-operated energizer suitable for connection to the mains consisting of an impulse generating circuit, a battery charging circuit and a battery, the impulse generating circuit being connected to the battery and disconnected from the battery charging circuit and the mains when the **energizer** is in operation.

Note 1 to entry: For recharging the battery, the impulse generating circuit is disconnected and rendered inoperable.

Note 2 to entry: **Type B energizers** are shown schematically in Figure 101.

3.5.106

type C energizer

battery-operated energizer suitable for connection to the mains consisting of an impulse generating circuit and a battery, the impulse generating circuit being connected to the mains or the battery when the energizer is in operation, and where it is necessary to remove the battery to recharge it using a battery charger or, in the case of a non-rechargeable battery, to replace it with a new battery

Note 1 to entry: **Type C energizers** are shown schematically in Figure 101.

3.5.107

type D energizer

battery-operated energizer suitable for connection to the mains consisting of an impulse generating circuit intended to be powered by a battery, or a **detachable supply unit**, when the **energizer** is in operation. The impulse generating circuit or the battery may be connected to a **detachable supply unit** with or without incorporated battery charging circuitry for recharging the battery when the **energizer** is in operation.

Note 1 to entry: Examples of **Type D energizers** are shown schematically in Figure 102.

3.5.108

battery-operated energizer

energizer deriving its energy solely from batteries or other sources of energy and not designed for connection to the mains

3.5.109

security electric fence energizer

energizer containing **fence circuits** that are intended to periodically deliver voltage impulses into **electric security fences**

Note 1 to entry: A **security electric fence energizer** is hereinafter also referred to as a **security energizer**.

3.5.110**independently timed security energizer**

security energizer that includes an internal **impulse timing signal source** to set the timing of the periodic voltage impulses it delivers to an **electric security fence**

Note 1 to entry: An **independently timed security energizer** is hereinafter also referred to as **an independent security energizer**.

3.5.111**dependently timed security energizer**

security energizer that is dependent on an external **impulse timing signal** to set the timing of the periodic voltage impulses it delivers to an **electric security fence**

Note 1 to entry: A **dependently timed security energizer** is hereinafter also referred to as **dependent security energizer**.

Note 2 to entry: Some types of **security energizer** may be configured either as an **independent security energizer** or a **dependent security energizer** at the time of installation.

3.5.112**security energizer group**

one or two **security energizers** with a group total of two **fence circuits** used to supply adjacent **electric security fences** in a **security energizer fence system** that allows the two **fence circuits** to be contacted at the same time

Note 1 to entry: The **fence circuits** in a **security energizer group** may be galvanically connected.

3.5.113**type R security energizer**

security energizer with one or two **fence circuits** that is suitable for use in a **type R security energizer group**

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3.5.114**type R security energizer group**

security energizer group containing only **type R security energizers**

3.5.115**type S security energizer**

security energizer with one or two **fence circuits** that is suitable for use in a **type S security energizer group**

3.5.116**type S security energizer group**

security energizer group containing at least one **type S security energizer**

Note 1 to entry: A **type S security energizer group** may contain a **type R security energizer**.

3.6 Definitions relating to parts of an appliance**3.6.3 Addition:**

Note 101 to entry: It also includes terminals for the connection of the battery and other metal parts in a battery compartment that become accessible when replacing batteries even with the aid of a **tool**.

Replacement:

3.6.4**live part**

conductive part that may cause an electric shock

3.6.101**fence circuit**

all conductive parts or components within an **energizer**, that are connected or intended to be connected galvanically to the output terminals

3.6.102**security energizer impulse timing signal**

signal that is used to determine the timing of the periodic voltage impulses delivered by a **security energizer** to an **electric security fence**

Note 1 to entry: A **security energizer impulse timing signal** is hereinafter also referred to as an **impulse timing signal**.

Note 2 to entry: Examples of a **security energizer impulse timing signal** include wired (RS-485), wired with latency (internet clock, secure TCP/IP), wireless with latency (LAN, PAN), optical, GPS.

3.6.103**impulse timing signal source**

signal source that generates the **impulse timing signal** required by a **dependent security energizer** to set the timing of the periodic voltage impulses it delivers to an **electric security fence**

Note 1 to entry: An **impulse timing signal source** may be used by one or more **dependent security energisers**.

Note 2 to entry: An example of an **impulse timing signal source** is an impulse signal from an adjacent **electric security fence** that is powered by an **independent security energizer** that belongs to the same **security energizer fence system**.

Note 3 to entry: An impulse signal from an adjacent **electric security fence** powered by an **independent security energizer** not belonging to the same **security energizer fence system** is not an example of a possible **impulse timing signal source**.

3.8 Definitions relating to miscellaneous matters**3.8.101****standard load**

load consisting of a non-inductive resistor of $500\ \Omega \pm 2,5\ \Omega$ and a variable resistor that is adjusted so as to maximize for

- **energy limited energizers**, the energy per impulse in the $500\ \Omega$ resistor;
- **current limited energizers**, the **output current** in the $500\ \Omega$ resistor.

Note 1 to entry: The variable resistor is connected in series or parallel with the $500\ \Omega$ resistor, whichever gives the more unfavourable result.

3.8.102**earth electrode**

metal structure that is driven into the ground near an **energizer** and connected electrically to the output earth terminal of the **energizer**, and that is independent of other earthing arrangements

3.8.103**pulsed conductors**

conductors that are subjected to high voltage pulses by the **energizer**

3.8.104**connecting lead**

electric conductor, used to connect the **energizer** to the **electric fence** or the **earth electrode**

3.8.105**fence**

barrier for animals or for security purposes, comprising one or more conductors, such as metal wires, rods or rails

3.8.106**electric fence**

barrier that includes one or more electric conductors, insulated from earth, to which electric pulses are applied by an **energizer**

3.8.107**electric animal fence**

electric fence used to contain animals within or exclude animals from a particular area

3.8.108**electric security fence**

fence used for security purposes that comprises an **electric fence** and a physical barrier electrically isolated from the **electric fence**

3.8.109**physical barrier**

barrier not less than 1,5 m high intended to prevent inadvertent contact with the **pulsed conductors** of the **electric fence**

Note 1 to entry: **Physical barriers** are typically constructed from vertical sheeting, rigid vertical bars, rigid mesh, rods or chain-wire mesh.

3.8.110**public access area**

any area where persons are protected from inadvertent contact with **pulsed conductors** by a **physical barrier**

3.8.111**secure area**

area where a person is not separated from **pulsed conductors** below 1,5 m by a **physical barrier**

3.8.112**security energizer fence system**

electric security fence installation where the **fences** are energized by one or more **security energizers** containing one or more **security energizer groups** that can be **type R security energizer groups** or **type S security energizers groups**

Note 1 to entry: An **independent impulse timing signal source** used in a **security energizer fence system** may be used to set the timing of **dependent security energizers** in multiple **security energizer groups**.

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.

5.2 Modification:

Replace the test specification by the following:

*The tests are made on two **energizers** as delivered, one being subjected to all the tests with the exception of that of Clause 18, and the other to the tests of 22.108 and Clause 18. However, the tests of Clauses 22 to 28 may be made on separate samples.*