

INTERNATIONAL STANDARD

IEC
60335-2-76

Second edition
2002-08

Household and similar electrical appliances – Safety –

Part 2-76: Particular requirements for electric fence energizers

*Appareils électrodomestiques et analogues –
Sécurité –*

*Partie 2-76:
Règles particulières pour les électrificateurs
de clôtures*



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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES –
SAFETY –**

Part 2-76: Particular requirements for electric fence energizers

FOREWORD

- 1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, the IEC publishes International Standards. Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. The IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of the IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested National Committees.
- 3) The documents produced have the form of recommendations for international use and are published in the form of standards, technical specifications, technical reports or guides and they are accepted by the National Committees in that sense.
- 4) In order to promote international unification, IEC National Committees undertake to apply IEC International Standards transparently to the maximum extent possible in their national and regional standards. Any divergence between the IEC Standard and the corresponding national or regional standard shall be clearly indicated in the latter.
- 5) The IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with one of its standards.
- 6) Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. The IEC shall not be held responsible for identifying any or all such patent rights.

This part of International Standard IEC 60335 has been prepared by subcommittee 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 1997 and its amendment 1 (1999). It constitutes a technical revision.

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

FDIS	Report on Voting
61H/173/FDIS	61H/174/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 fence energizers.

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:

- 6.101: Only energy limited energizers are allowed (Austria, Denmark, France, Germany, Netherlands, Norway, Switzerland and United Kingdom).

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

The contents of the corrigendum of August 2013 have been included in this copy.

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.

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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 International Standard 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, feral animal control 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;
- **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 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.

NOTE 103 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);
- 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, *Environmental testing – Part 2: Tests – Test Kb: Salt mist, cyclic (sodium chloride solution)*

3 Definitions

This clause of Part 1 is applicable except as follows.

3.1.1 *Addition:*

For **type D energizers**, the **rated voltage** of the **energizer** is the **rated voltage** for battery supply.

3.1.6 Addition:

For **battery-operated electric fence energizers** not for connection to the mains, it is the average input current assigned to the **energizer** by the manufacturer.

3.1.9 Replacement:**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

3.6.3 Addition:

NOTE 101 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.

3.6.4 Replacement:**live part**

conductive part that may cause an electric shock

3.101**electric fence energizer**

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

NOTE **Electric fence energizers** are hereinafter also referred to as **energizers**.

3.102**mains-operated energizer**

energizer designed for direct connection to the mains

3.103**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

3.104**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 **Type A energizers** are shown schematically in Figure 101.

3.105**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. For recharging the battery the impulse generating circuit is disconnected and rendered inoperable

NOTE **Type B energizers** are shown schematically in Figure 101.

3.106**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 separate **battery charger** or, in the case of a non-rechargeable battery, to replace it with a new battery

NOTE **Type C energizers** are shown schematically in Figure 101.

3.107**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, the impulse generating circuit being connected to the battery when the **energizer** is in operation and the **energizer** or the battery being connected to a separate **battery charger** for recharging the battery

NOTE **Type D energizers** are shown schematically in Figure 101.

3.108**battery-operated energizer**

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

3.109**battery charger**

appliance to be connected to the mains and intended for charging one or more batteries

3.110**fence**

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

3.111**fence circuit**

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

3.112**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

3.113**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

3.114**rated voltage for battery supply**

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

3.115**rated voltage range for battery supply**

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

3.116**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 $I(t)$ is the impulse current as a function of time.

3.117**output current**

r.m.s. value of the **output current** per impulse calculated over the impulse duration

3.118**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 the energy per impulse or **output current** in the 500Ω resistor, as applicable. The variable resistor is connected in series or parallel with the 500Ω resistor, whichever gives the more unfavourable result

3.119**electric fence**

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

3.120**connecting lead**

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

3.121**electric animal fence**

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

3.122**electric security fence**

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

3.123**physical barrier**

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

NOTE **Physical barriers** are typically constructed from vertical sheeting, rigid vertical bars, rigid mesh, rods or chainwire mesh.

3.124**public access area**

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

3.125**pulsed conductors**

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

3.126**secure area**

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

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 clause 5 and Clause 18. However, the tests of Clauses 22 to 28 may be made on separate samples.*

*For **types A and C energizers**, an additional sample is required for the test of Clause 18.*

Addition:

NOTE 101 Where **electronic circuits, electronic components** or other devices are normally encapsulated, specially prepared samples may be needed for the tests of 19.11 and 19.101.

5.3 Addition:

The measurements of 22.108 shall be carried out before the tests of Clause 14. The tests specified in 14.101 shall be carried out on all appliances.

*If any **electronic component** has been damaged during the tests of Clause 14, the tests of Clause 19 are made twice, once before and once after the damaged **electronic components** have been replaced by new **electronic components**.*

5.5 Addition:

*The **energizer** is mounted in a normal position such that the deviation from the position for which it is designed does not exceed 15°. However, if the **energizer** is provided with means for adjustment to the normal position, such as a spirit level, the **energizer** shall be adjusted to within ±2° of the normal position.*

*The earthing terminal of the **fence circuit** is connected to earth. However, if there is no indication as to which of the output terminals is to be connected to earth, the terminal that gives the most unfavourable result is earthed.*

5.8.1 Addition:

*For **types A, B, C and D energizers** where the terminals for the connection of the battery have no indication of polarity, the more unfavourable polarity of the voltage source replacing the battery shall be applied.*

*For **battery-operated energizers** where the supply terminals for the connection of the battery have no indication of polarity, the more unfavourable polarity shall be applied.*

*For **mains-operated energizers and battery-operated energizers suitable for connection to the mains**, the reference source impedance of the mains supply shall be $0,4 \Omega + j0,25 \Omega$.*

5.101 All energizers are tested as motor-operated appliances.

6 Classification

This clause of Part 1 is applicable except as follows.

6.1 Replacement:

Mains-operated energizers and battery-operated energizers suitable for connection to the mains shall be class II with respect to protection against electric shock.

Compliance is checked by inspection and by the relevant tests.

6.2 Addition:

Energizers shall be of at least IPX4.

6.101 Energizers are classified as being either **energy limited energizers** or **current limited energizers**.

Compliance is checked by the appropriate tests.

7 Marking and instructions

This clause of Part 1 is applicable except as follows.

7.1 Addition:

Energizers shall be marked with symbol 1641 of ISO 7000.

Types A, B and C energizers shall be marked with the **rated voltage for battery supply** or **rated voltage range for battery supply**, in volts.

Battery-operated energizers shall be marked with the substance of the following:

WARNING: Do not connect to mains-operated equipment.

Energy limited energizers that are marked with a maximum energy/impulse exceeding 5 J shall also be marked with the corresponding load resistance at which maximum energy/impulse is obtained.

7.6 Addition:



[symbol 5036 of IEC 60417] Dangerous voltage



[symbol 5017 of IEC 60417] Earth (ground)

The symbols for output (**Fence**) and output (Earth) shall be in accordance with symbols 5036 and 5017 of IEC 60417 respectively.