

INTERNATIONAL STANDARD

NORME INTERNATIONALE



**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

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

ICS 65.040.99

ISBN 978-2-8322-0852-6

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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

FOREWORD

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This consolidated version of IEC 60335-2-76 consists of the second edition (2002) [documents 61H/173/FDIS and 61H/174/RVD], its amendment 1 (2006) [documents 61H/229/FDIS and 61H/230/RVD], its amendment 2 (2013) [documents 61H/287/FDIS and 61H/289/RVD] and its corrigendum 1 (August 2013). It bears the edition number 2.2.

The technical content is therefore identical to the base edition and its amendments and has been prepared for user convenience. A vertical line in the margin shows where the base publication has been modified by amendments 1 and 2. Additions and deletions are displayed in red, with deletions being struck through.

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.

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

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 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).

The committee has decided that the contents of the base publication and its amendments 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.

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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.

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, **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;
- **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

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

IEC 60335-2-29, *Household and similar electrical appliances – Safety – Part 2-29: Particular requirements for battery chargers*

IEC 61204-7, *Low-voltage power supplies, d.c. output – Part 7: Safety requirements*

IEC 61558-2-16, *Safety of transformers, reactors, power supply units and similar products for voltages up to 1 100 V – Part 2-16: Particular requirements and tests for switch mode power supply units and transformers for switch mode power supply units*

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.

3.1.1 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, ~~or a separate supply unit, the impulse generating circuit being connected to the battery~~ when the **energizer** is in operation. ~~The impulse generating circuit and the energizer~~ or the battery may be connected to a separate **battery charger** for recharging the battery ~~when the energizer is in operation.~~

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

~~Note 1 to entry: Examples of separate supply units are power supply units and uninterruptible power supplies.~~

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 connection of a battery have no indication of polarity, the more unfavourable polarity shall be applied.

For ~~mains-operated energizer tests and battery-operated energizers suitable for that require a connection to the mains supply~~, 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. This requirement does not apply to separate supply units of type D energizers.

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 7000-0790 (2004-01).

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 symbol for "connection to mains-operated equipment prohibited"** or with the substance of the following warning:

WARNING: Do not connect to mains-operated equipment **including battery chargers**

The rules for a prohibition sign in ISO 3864-1, except for colours, apply to the symbol for "connection to mains-operated equipment prohibited".

A **Type D Energizer** shall be marked with symbol IEC 60417-6181 (2013-03) and the references of the separate supply units that may be used to supply the impulse generating circuit.

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.