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REDLINE VERSION

INTERNATIONAL STANDARD

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Household and similar electrical appliances – Safety – Part 2-86: Particular requirements for electric fishing machines

IEC 60335-2-86:2018-04 RLV(en)

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INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –

Part 2-86: Particular requirements for electric fishing machines

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 third edition cancels and replaces the second edition published in 2002, its Amendment 1 (2005) and its Amendment 2 (2012). This edition constitutes a technical revision.

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

– aligns the text with IEC 60335-1, Ed 5, and its Amendments 1 and 2;
– some notes have been converted to normative text (22.102, 22.113, 26.106);
– requirements for battery-operated electric fishing machines have been moved to Annex S.

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

FDIS	Report on voting
61H/363/FDIS	61H/365/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.

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

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.

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 fishing machines.

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.

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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 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
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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.

~~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.~~

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HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –

Part 2-86: Particular requirements for electric fishing machines

1 Scope

This clause of Part 1 is replaced by the following.

This part of IEC 60335 deals with the safety of **electric fishing machines** by means of which water may be electrified for the purpose of catching fish or for providing barriers to all animals living in water.

The **rated voltage** of ~~**portable**~~ **electric fishing machines** is not more than 250 V for single phase machines and 480 V for other machines, except that the **rated voltage** of ~~**fixed**~~ **electric fishing machines** for permanent connection to fixed wiring is not more than 1 000 V.

Electric fishing machines are appliances for scientific and commercial use.

Additional requirements for boat mounted **electric fishing machines** are given in Annex AA.

NOTE 101 Examples of **electric fishing machines** coming within the scope of this standard are:

– **mains-operated electric fishing machines** which include those supplied from portable or stationary generator sets;

– **battery-operated electric fishing machines**.

NOTE 102 Attention is drawn to the fact that

– for appliances intended to be used on board ships or boats, additional requirements ~~may~~ 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

– electric fence energizers (IEC 60335-2-76);

– electric animal stunning equipment (IEC 60335-2-87);

– shark deterrent devices that are carried by the user.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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*~~

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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*

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 101 to entry: The **rated voltage** is the rated input voltage.

3.1.6 *Addition:*

Note 102 to entry: The **rated current** is the rated input current.

3.1.9 *Replacement:*

normal operation
operation of the appliance under the following conditions:

The **electric fishing machine** is operated as in normal use when connected to the supply with an adjustable non-inductive resistor connected between its output terminals. The resistor is adjusted so as to give an **output current** just sufficient not to cause any **protective device** to operate

~~3.105~~ **3.1.101**
output voltage
voltage between the **electrodes**

~~3.106~~ **3.1.102**
output current
current in the **output circuit** that the **electric fishing machine** is designed to supply

~~3.108~~ **3.1.103**
pulsed voltage
voltage **impulse** of any form and any duration

~~3.107~~ **3.1.104**
impulse
that part of the **pulsed voltage** output that exceeds 12 V

3.5 Definitions relating to types of appliances

~~3.101~~ **3.5.101**
electric fishing machine
appliance, comprising **electrodes** and an energizer, that is designed or used for the control, taking, killing of any species of fish or invertebrate living in water or for the production of electronarcosis, by means of electric current

Note 1 to entry: An **electric fishing machine** may be used to provide a barrier effective for all animals living in water.

Note 2 to entry: A given **electric fishing machine** may only perform some of the functions specified.

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~~3.102~~ 3.5.102
mains-operated electric fishing machine
electric fishing machine designed for direct connection to a supply other than a battery supply at a voltage greater than **safety extra-low voltage**.

Note 1 to entry: It may also be supplied from a generator set.

~~3.109~~ 3.5.103
battery-operated electric fishing machine
electric fishing machine deriving its energy solely from non-rechargeable batteries, rechargeable batteries or other sources of energy, with a voltage meeting the requirements for **safety extra-low voltage**

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 batteries are replaced, even with the aid of a **tool**.

3.6.4 *Replacement:*

live part
conductive part that may cause an electric shock

~~3.103~~ 3.6.101
electrode
that part of an **electric fishing machine** that transfers the electric power into the water

Note 1 to entry: The catching **electrode** is the **electrode** used by the fisherman, the return **electrode** is the **electrode** trailed in the water.

Note 2 to entry: The catching **electrode** is usually the anode and the return **electrode** is usually the cathode.

Note 3 to entry: This does not preclude the return **electrode** being held by the user.

3.6.102
energizer
that part of an **electric fishing machine** that transfers the electric power into the **electrodes**

~~3.104~~ 3.6.103
output circuit
all conductive parts or components within an **electric fishing machine** that are connected or intended to be connected galvanically to the **electrode** terminals

3.7 Definitions relating to safety components

Addition:

3.7.101
biased-off switch
switch which automatically returns to the **off position** when its actuating member is released

4 General requirement

This clause of Part 1 is applicable.

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5 General conditions for the tests

This clause of Part 1 is applicable except as follows.

~~***5.8.1*** *Addition:*~~

~~*For* ***battery-operated electric fishing machines*** *where the supply terminals for the connection of the battery have no indication for polarity, the more unfavourable polarity is applied.*~~

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

5.102 ***Electric fishing machines*** *are tested as* ***motor-operated appliances****.*

6 Classification

This clause of Part 1 is applicable except as follows.

6.1 *Replacement:*

Electric fishing machines that are intended to be permanently connected to fixed wiring shall be **class I** or **class II** with respect to protection against electric shock. Other **electric fishing machines** shall be **class II** or **class III**.

Accessories intended to be supplied with **portable electric fishing machines** shall be **class III**.

Compliance is checked by inspection and by the relevant tests.

6.2 *Addition:*

Electric fishing machines intended for permanent connection to fixed wiring shall be at least IPX4. Other **electric fishing machines** shall be at least IPX5.

Hand-held parts of **electric fishing machines** shall be IPX7.

7 Marking and instructions

This clause of Part 1 is applicable except as follows.

7.1 *Addition:*

Electric fishing machines shall be marked with

– the words "Pulsed voltage machine", "Direct current machine", "Alternating current machine" as appropriate;

– the output current;

– the output voltage;

– “Read the instructions” or with symbol ~~1641 of ISO 7000~~ ISO 7000-0790 (2004-01);

– the catching **electrode** and return **electrode** terminals of alternating current machines and pulsed voltage machines using AC shall be identified by symbols IEC 60417-5036

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(2002-10) and IEC 60417-5017 (2006-08)~~ respectively~~ as appropriate. If the return **electrode** is not grounded it need not be marked.

– the catching **electrode** and return **electrode** terminals of direct current machines and pulsed voltage machines using DC shall be identified by symbols IEC 60417-5005 (2002-10) and IEC 60417-5006 (2002-10) as appropriate.

~~**Battery-operated electric fishing machines** shall be marked with the substance of the following:~~

~~WARNING: Do not connect to mains-operated equipment.~~

7.6 *Addition:*

~~[symbol 5036 of IEC 60417] Dangerous voltage~~

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

~~**7.8** *Addition:*~~

~~For **battery-operated electric fishing machines,** 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 for **battery-operated electric fishing machines** shall, in particular, emphasise the warning marked on the appliance that states the substance of the following:~~

~~WARNING: Do not connect to mains-operated equipment.~~

The instructions shall give details of the construction of the net that can be used with the appliance, in particular they shall indicate that net handles shall

– be constructed of non-conductive material,
– be of sufficient length to avoid hand contact with the water,
– not be wrapped or covered metallic handles,
– not have a metallic weighting chain extending beyond the bottom edge of the net proper.

If symbol IEC 60417-5017 (2006-08), symbol IEC 60417-5036 (2002-10) or symbol~~ 1641 of ISO 7000~~ ISO 7000-0790 (2004-01) are marked on the appliance, their meaning shall be explained.

7.12.1 *Addition:*

For **electric fishing machines** supplied by an isolating transformer, the instructions shall include details concerning the fixing and location of the transformer to prevent it from falling into the water and from being otherwise impaired by water.

The instructions for **electric fishing machines** that are supplied from a motor-generator set with an accessible neutral or incorporate a motor-generator set or generator with an accessible neutral shall contain the substance of the following warning.

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WARNING: Ensure the generator neutral is not connected to the enclosure of the motor-generator set or **electric fishing machine**.

7.12.9 Not applicable.

7.~~15~~14 *Addition:*

Markings required by the addition to 7.1 shall have a height not less than:

– 5 mm for headlines;

– 3 mm for other lettering.

Symbol IEC 60417-5017 (2006-08), symbol IEC 60417-5036 (2002-10) and symbol ~~1641 of ISO 7000~~ ISO 7000-0790 (2004-01) shall have a height of at least 25 mm.

8 Protection against access to live parts

This clause of Part 1 is applicable except as follows.

8.1.4 *Addition:*

The means for the connection of the **electrodes** is not a **live part**.

8.101 For **battery-operated electric fishing machines**, the parts in a battery compartment that become accessible when batteries are being replaced, even with the aid of a **tool**, shall not be live.

*Compliance is checked by inspection and by the test specified for determining if a part is 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 except as follows.

10.101 The measured **output voltage** shall not deviate from the **output voltage** marked on the machine by more than 10 %.

*Compliance is checked by measurement, the **electric fishing machine** being operated under conditions of **normal operation** and supplied at **rated voltage**.*

11 Heating

This clause of Part 1 is applicable except as follows.

11.5 *Replacement:*

~~***Electric fishing machines*** *are operated under* ***normal operation****, supplied as follows:*~~

~~– ***mains-operated electric fishing machines,*** *are supplied with the most unfavourable supply voltage between 0,85 and 1,1 times* ***rated voltage****;*~~

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~~– **battery-operated electric fishing machines,** are supplied with the most unfavourable supply voltage between~~

- ~~0,55 and 1,1 times **rated voltage**, if the **electric fishing machine** can be used with non-rechargeable batteries;~~
- ~~0,75 and 1,1 times **rated voltage**, if the **electric fishing machine** is designed for use with rechargeable batteries only.~~

~~The values specified in Table 101 for the internal resistance per 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.~~		

Electric fishing machines *are operated under* ***normal operation****, supplied with the most unfavourable supply voltage between 0,85 and 1,1 times* ***rated voltage****.*

11.7 *Replacement:*

The ***electric fishing machine*** *is operated 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:*

Instead of all ***electric fishing machines*** *being subjected to the tests of 13.2 and 13.3, the following applies.*

Compliance is checked by the tests of 13.2 and 13.3 for ***mains-operated electric fishing machines****.*

13.2 *Modification:*

The following leakage current value is applicable:

– *for* ***class II electric fishing machines*** *0,1 mA per 100 V of* ***output voltage*** *with a maximum of 0,7 mA.*

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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, 16.3 and 16.102 for* **mains-operated electric fishing machines**,~~

~~*– 16.101 and 16.102 for* **battery-operated electric fishing machines**.~~

~~**16.101** *For* **battery-operated electric fishing machines** *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.*~~

~~*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, the 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.*~~

For **mains-operated electric fishing machines**, *compliance is checked by the tests of 16.2, 16.3 and 16.101.*

16.~~102~~101 *Immediately after the test~~s~~ of 16.3~~ and 16.101~~, the output characteristics are measured as specified in 22.101.*

The values measured shall not deviate in an unfavourable way by more than 10 % from the values measured as specified in 22.101.

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.

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20 Stability and mechanical hazards

This clause of Part 1 is applicable.

21 Mechanical strength

This clause of Part 1 is applicable.

22 Construction

This clause of Part 1 is applicable except as follows.

22.12 *Addition:*

The requirement is not applicable to the **electric fishing machine** output terminal assembly including the terminal knobs and washers.

22.101 Under the conditions for **normal operation**, with the **electric fishing machine** supplied at **rated voltage**, the output characteristics shall not exceed the values given in Table ~~102~~ 101.

Table ~~102~~ 101 – Output characteristics

Characteristics	Pulsed voltage machine (peak value) V	Direct current machine V	Alternating current machine V
Value of **output voltage**			
stationary machine	3 000	1 500	400
portable machine	1 000	750	400

Compliance is checked by measurement.

22.102 Where the **energizer** is carried by the user during normal use,

- ~~a tilt switch shall be fitted that disables the **electric fishing machine** when it is tipped past 45° from the vertical;~~
- it shall be fitted with a tilt switch that disables the **electric fishing machine** when it is tipped more than 65° forward and 45° backwards from the vertical, while it is held as in normal use;
- the tilt switch ~~must~~ shall be of the type that needs to be manually reset by the user after it has operated;
- a two-position, manually operated on/off switch shall be fitted that disconnects both poles of the **output circuit**. The disconnection may be on the input side of a transformer supplying the **output circuit**.

~~NOTE This requirement does not preclude the disconnection being on the input side of a transformer supplying the **output circuit**.~~

Compliance is checked by inspection and test.

~~**22.103 Battery-operated electric fishing machines** shall be so designed that they are incapable of operation when the battery is charged through a battery charger connected to the supply mains.~~

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~~*Compliance is checked by inspection and test.*~~

22.~~104~~103 In **mains-operated electric fishing machines**~~, other than those supplied from a portable generator set~~, the **output circuit** shall be isolated from the mains supply by an incorporated isolating transformer or an isolating transformer for specific use complying with IEC 61558-2-4.

Isolating transformers for specific use shall have a protection index of IPX7.

Compliance is checked by inspection and, if necessary, by the relevant tests.

22.~~105~~104 For **mains-operated electric fishing machines**, transformers in the **output circuit** shall be placed in a separate compartment. This compartment shall not contain any part that is or can come in contact with the supply mains, with the exception of the input winding of the transformer. The compartment shall be filled with sealing compound, unless **clearances** and **creepage distances** within the compartment cannot be reduced below the values specified in Clause 29.

Compliance is checked by inspection and by the tests of the other clauses of this standard.

22.~~106~~105 In **class II electric fishing machines**, with a metal-encased **energizer**, the output terminals shall be placed so that external conductors connected to these terminals are not likely to come into contact with the enclosure.

Compliance is checked by inspection.

22.~~107~~106 The enclosure of **portable electric fishing machines** intended for catching fish shall be non-metallic.

Compliance is checked by inspection.

22.~~108~~107 Those parts of the **electrodes** that are held by the user in normal use shall be of electrical insulating material.

Compliance is checked by inspection.

22.~~109~~108 **Electric fishing machines** shall be so designed that

– the conductors for the connection of the electrodes can be easily connected;
– it is possible to actuate switches and other controls if this is necessary in normal use, after the appliance has been mounted and connected to the supply, without opening or removing any enclosure that provides protection against harmful ingress of water or unintended electric shock.

Compliance is checked by inspection.

22.~~110~~109 The presence of voltage between the **electrodes** is to be indicated by an audible or visual alarm on the control unit.

Compliance is checked by inspection and test.

22.~~111~~110 No net of any kind shall be attached to any **electrode**.

Compliance is checked by inspection.

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