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INTERNATIONAL STANDARD

colour inside

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

IEC 60335-2-29:2016-06 RLV(en)

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INTERNATIONAL
ELECTROTECHNICAL
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INTERNATIONAL ELECTROTECHNICAL COMMISSION

HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –

Part 2-29: Particular requirements for battery chargers

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of 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, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). 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. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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This redline version of the official IEC Standard allows the user to identify the changes made to the previous edition. A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text.

This part of International Standard IEC 60335 has been prepared by IEC technical committee 61: Safety of household and similar electrical appliances.

This fifth edition cancels and replaces the fourth edition published in 2002 including its Amendment 1 (2004) and its Amendment 2 (2009). It constitutes a technical revision.

The principal changes in this edition as compared with the fourth edition of IEC 60335-2-29 are as follows (minor changes are not listed):

- Revised the drop test to refer to IEC 60068-2-31 (21.101);
- Requirements for supply cords on battery chargers used at low temperatures (25.7);
- Requirements for battery chargers having an output voltage exceeding SELV have been added (1, 3.2.2, 3.4.3, 10.101, 24.4, 25.5, 25.7, 25.8, 25.15. 26.5);
- A classification for battery chargers used outdoors has been added (6.2, 29.2);
- Some notes in Clause 1, Subclauses 7.1 and 22.102, Figure 101 and Annex AA 11.8 have been converted to normative text.

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

FDIS	Report on voting
61/5142/FDIS	61/5173/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 battery chargers.

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.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC website 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.

It is the recommendation of the committee that the content of this standard 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.

– 3.1.9: The artificial load may not be used (USA).
– 11.2: The appliance is not placed in a test corner (USA).
– 21.101: The drop test is carried out differently on outdoor direct plug-in battery chargers (USA).
– 21.102: The test is different (USA).
– 22.26: Basic insulation is allowed between live parts and SELV circuits (USA).
– Annex AA, 11.8: Higher temperature rises are allowed (USA).
– Annex AA, Clause 17: Higher temperature rises are allowed (USA).
– Annex AA, 19.13: Higher temperature rises are allowed (USA).

IMPORTANT – The "colour inside" logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this publication using a colour printer.

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 2-29: Particular requirements for battery chargers

1 Scope

This clause of Part 1 is replaced by the following.

This part of IEC 60335 deals with the safety of electric battery chargers for household and similar use having an output ~~at **safety extra-low voltage**~~ not exceeding 120 V ripple-free direct current, their **rated voltage** being not more than 250 V.

Battery chargers intended for charging batteries in a household end use application outside the scope of the IEC 60335 series of standards are within the scope of this standard.

Requirements for battery chargers for use by children at least 8 years old without supervision are given in Annex AA.

Battery chargers not intended for normal household use, but which nevertheless may be a source of danger to the public, such as battery chargers intended for use in garages, shops, light industry and on farms, are within the scope of this standard.

As far as is practicable, this standard deals with the common hazards presented by appliances that are encountered by all persons in and around the home. However, in general, it does not take into account

– ~~the use of appliances by young~~ persons (including children) ~~or infirm persons~~ whose
  - physical, sensory or mental capabilities; or
  - lack of experience and knowledge

  prevents them from using the appliance safely without supervision or instruction;
– children playing with the appliance ~~by young children~~.

NOTE 101 Attention is drawn to the fact that

– for appliances intended to be used in vehicles or 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 and similar authorities.

NOTE 102 This standard does not apply to

– built-in battery chargers, except those for installing in caravans and similar vehicles;
– battery chargers that are part of an appliance, the battery of which is not accessible to the user;
– battery chargers intended exclusively for industrial purposes;
– battery chargers intended to be used in locations where special conditions prevail, such as the presence of a corrosive or explosive atmosphere (dust, vapour or gas);
– ~~battery chargers comprising more than one unit;~~
– battery chargers for ~~toys~~ emergency lighting (IEC 60598-2-22);
– supply units for electronic equipment.
– ~~battery chargers and supply units for electronic flash apparatus for photographic purposes (IEC 60491);~~
– ~~battery chargers intended for use in electric vehicles (IEC 61851).~~

2 Normative references

This clause of Part 1 is applicable except as follows.

Addition:

IEC 60068-2-6, *Environmental testing – Part 2-6: Tests – Test Fc: Vibration (sinusoidal)* ~~— *Basic safety publication*~~

IEC 61558-2-7:2007, *Safety of power transformers, power supplies, reactors and similar products – Part 2-7: Particular requirements and tests for transformers and power supplies for toys*

3 Terms and definitions

This clause of Part 1 is applicable except as follows.

3.1.1 *Addition:*

The **rated voltage** is the rated input voltage.

3.1.6 *Addition:*

The **rated current** is the rated input current.

3.1.9 *Replacement:*

normal operation
operation of the appliance under the following conditions:

Battery chargers for charging lead-acid batteries, and other battery chargers having a **rated DC output current** not exceeding 20 A, are connected to the circuit of Figure 101. The variable resistor is adjusted so that the current in the circuit is the **rated DC output current** when the battery charger is supplied at **rated voltage**.

When the charging current is controlled by the state of charge of the battery, the variable resistor and the capacitor are replaced by a discharged battery of the type and having the largest capacity specified in the instructions.

Other battery chargers are connected to a discharged battery of the type and having the largest capacity specified in the instructions.

~~NOTE 101 Batteries are considered to be discharged when~~

~~– for lead-acid batteries, the specific gravity of the electrolyte is less than 1,16;~~

~~– for nickel-cadmium batteries, the voltage per cell is less than 0,9 V.~~

3.2.2 *Addition:*

Output flexible cords are not considered to be interconnection cords.

3.4.3 *Replacement:*

safety isolating transformer
transformer, the input winding of which is electrically separated from the output winding by an insulation at least equivalent to **double insulation** or **reinforced insulation**, that is intended to supply a battery charging circuit having an output voltage not exceeding 120 V ripple-free direct current

Note 1 to entry: Ripple-free means an r.m.s. ripple voltage not exceeding 10 % of the DC component.

3.101
rated DC output voltage
output voltage assigned to the battery charger by the manufacturer

3.102
rated DC output current
output current assigned to the battery charger by the manufacturer

3.103
DC distribution board
panel having circuits for distributing DC power to socket-outlets or terminals

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 *Addition:*

If the test of 21.101 is carried out, two additional battery chargers are required.

5.101 *Battery chargers are tested as* ***motor-operated appliances****.*

6 Classification

This clause of Part 1 is applicable except as follows.

6.2 *Addition:*

Battery chargers for outdoor use shall be at least IPX4.

7 Marking and instructions

This clause of Part 1 is applicable except as follows.

7.1 *Addition:*

Battery chargers shall be marked with

– **rated DC output voltage**, in volts;
– **rated DC output current**, in amperes,

~~NOTE 101~~ however no other output current ~~is to~~ shall be marked;

– the rated current, in amperes, of **protective devices** incorporated in a **DC distribution board**;

– the polarity of the output terminals unless incorrect polarity connection is prevented. The positive terminal shall be indicated by ~~the colour red or the symbol + and the negative terminal by the colour black or the symbol –~~ symbol IEC 60417-5005 (2002-10) and the negative terminal by symbol IEC 60417-5006 (2002-10);

~~NOTE 102 Marking of the polarity is not required for battery chargers if incorrect polarity connection is prevented.~~

– the time-current characteristic of fuse-links of the time-lag type;

– the substance of the following, if the output is at least 20 VA:

- before charging, read the instructions;
- for indoor use, or do not expose to rain (unless the battery charger is at least IPX4);

– the substance of the following, if the output is at least 20 VA and the battery charger is for charging lead-acid batteries:

- disconnect the supply before making or breaking the connections to the battery;
- WARNING: Explosive gases. Prevent flames and sparks. Provide adequate ventilation during charging.

Battery chargers incorporating an engine-cranking switch that allows the battery charger to supply a supplementary starting current for the engine shall be marked with

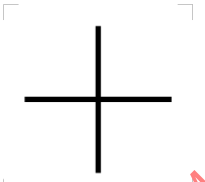
– the maximum "on" time;

– the minimum "off" time or the maximum ratio between the "on" time and the "off" time.

7.4 *Addition:*

If the battery charger can be adjusted to different **rated DC output voltages**, the output voltage to which the battery charger is adjusted shall be clearly discernible.

7.6 *Addition:*



[symbol IEC 60417-5005 (2002-10)] plus; positive polarity

[symbol IEC 60417-5006 (2002-10)] minus; negative polarity

7.12 *Addition:*

The instructions shall

– specify the types, the number of ~~cells~~ batteries and the rated capacity of the batteries that can be charged;

– include a warning against recharging non-rechargeable batteries;

– state that during charging, the battery must be placed in a well-ventilated area (for chargers for ~~lead-acid~~ vented batteries);

– state that the battery charger must only be plugged into an earthed socket-outlet (for **portable class I battery chargers** for outdoor use);
– explain the automatic function, stating any limitation (for automatic battery chargers).

The instructions for battery chargers for charging automobile batteries shall include the substance of the following:

– the battery terminal not connected to the chassis has to be connected first. The other connection is to be made to the chassis, remote from the battery and fuel line. The battery charger is then to be connected to the supply mains;
– after charging, disconnect the battery charger from the supply mains. Then remove the chassis connection and then the battery connection.

7.12.1 *Addition:*

The instructions for battery chargers for installation in caravans and similar vehicles shall state that the connection to the supply mains is to be in accordance with the national wiring rules.

7.101 DC distribution boards shall be marked with

– the maximum output current, in amperes, for each output circuit;
– the types of any additional power supply that may be connected.

Compliance is checked by inspection.

8 Protection against access to live parts

This clause of Part 1 is applicable except as follows.

8.1 *Addition:*

*During insertion or removal of batteries having a battery voltage exceeding 42,4 V, protection against contact with **live parts** of the battery or of the battery charger shall be ensured.*

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 no-load DC output voltage shall not exceed ~~42,4~~ 120 V.

*Compliance is checked by supplying the battery charger at **rated voltage** and measuring the no load DC output voltage.*

10.102 The arithmetic mean value of the output current shall not deviate from the **rated DC output current** by more than 10 %.

*Compliance is checked by connecting the battery charger to the circuit of Figure 101. The battery charger is supplied at **rated voltage** and the variable resistor is adjusted to obtain the **rated DC output voltage**. The output current is then measured.*

11 Heating

This clause of Part 1 is applicable except as follows.

11.2 *Modification:*

Battery chargers are placed in the test corner as specified for ***heating appliances****.*

11.5 *Modification:*

Battery chargers are only supplied at 1,06 times ***rated voltage****.*

11.7 *Replacement:*

Battery chargers are operated until steady conditions are established.

12 Void

13 Leakage current and electric strength at operating temperature

This clause of Part 1 is applicable.

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.

17 Overload protection of transformers and associated circuits

This clause of Part 1 is applicable except as follows.

Addition:

The output terminals of the battery charger are short-circuited.

18 Endurance

This clause of Part 1 is not applicable.

19 Abnormal operation

This clause of Part 1 is applicable except as follows.

19.1 *Modification:*

Instead of the ~~lists~~ tests specified, battery chargers are subjected to the tests of 19.11, 19.12 and 19.101 to 19.103, as applicable.

19.13 *Addition:*

During the tests, the values of Table 8 apply.

There shall be no rupture of the battery.

19.101 *Battery chargers are supplied at **rated voltage** and operated under **normal operation**, any control that operates during the test of Clause 11 being short-circuited.*

19.102 *The battery charger is connected to a fully charged battery, the connections being in reverse to normal use. The battery is to have the largest capacity of the types specified in the instructions, the capacity of a lead-acid battery, however, being 70 Ah. The battery charger is operated while supplied at **rated voltage**.*

19.103 *Battery chargers intended to be used with a DC **distribution board** are supplied at **rated voltage** and operated under **normal operation** until steady conditions are established. The load is increased to raise the output current by 10 % until steady conditions are again established. This procedure is repeated until the **protective device** operates or short-circuit conditions are established.*

20 Stability and mechanical hazards

This clause of Part 1 is applicable.

21 Mechanical strength

This clause of Part 1 is applicable except as follows.

21.1 *Modification:*

The impact energy is increased to 1,0 J ± 0,05 J.

Addition:

Compliance is also checked by the test of 21.101.

21.101 *Battery chargers, other than **built-in battery chargers**, having a mass not exceeding 5 kg are subjected to the ~~following~~ test free-fall – procedure 1, of IEC 60068-2-31, which is carried out on three appliances.*

The battery chargers are dropped from a height of 1 m ~~onto a concrete floor~~, each appliance being dropped from a different position.

After the test the battery chargers shall show no damage that could impair compliance with 8.1, 15.1.1, 16.3 and Clause 29.

21.102 *Battery chargers for installing in caravans and similar vehicles shall withstand vibrations to which they may be subjected.*

Compliance is checked by carrying out the vibration tests specified in IEC 60068-2-6 under the following conditions:

– *the battery charger is built into an enclosure made from plywood approximately 20 mm thick, the internal dimensions being the minimum stated in the installation instructions;*
– *the enclosure is strapped to the vibration generator with the battery charger in its normal position of use;*
– *the direction of vibration is vertical;*
– *the amplitude of vibration is 0,35 mm;*
– *the sweep frequency range is 10 Hz to 55 Hz;*
– *the duration of the test is 30 min.*

The battery charger shall show no damage that could impair compliance with 8.1, 15.1.1, 16.3 and Clause 29, and connections shall not have worked loose.

22 Construction

This clause of Part 1 is applicable except as follows.

22.26 *Replacement:*

The output circuit shall be supplied through a **safety isolating transformer** and shall not be connected to **accessible metal parts** or an earthing terminal. The insulation between parts operating at **safety extra-low voltage** and **live parts** shall comply with the requirements for **double insulation** or **reinforced insulation**.

*Compliance is checked by inspection and by the tests specified for **double insulation** or **reinforced insulation**.*

~~**22.101** The conductor for connection to the positive terminal of the battery shall be coloured red and that for connection to the negative terminal shall be coloured black.~~

~~This requirement does not apply if~~

~~– the output conductors are provided with a polarized connector;~~
~~– the polarity of the connection is automatically determined by the battery charger;~~
~~– the insulation of the conductor or its terminal for connection to the positive terminal of the battery is permanently identified by marking which is visible when making the connection to the battery.~~

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

22.101 Each circuit supplied from a **DC distribution board** shall incorporate an overload **protective device**.

Compliance is checked by inspection.

22.102 Battery chargers for installing in caravans and similar vehicles shall be constructed so that they can be securely fixed to a support.

~~NOTE~~ Keyhole slots, hooks and similar means, without any further means to prevent the battery charger from being inadvertently lifted off the support, are not considered to be ~~adequate means for fixing the battery charger securely to the support~~ securely fixed.

Compliance is checked by inspection.

23 Internal wiring

This clause of Part 1 is applicable.

24 Components

This clause of Part 1 is applicable except as follows.

24.4 *Addition:*

The requirement is also applicable to plugs, connectors, socket-outlets and appliance outlets in the battery charger output circuit.

25 Supply connection and external flexible cords

This clause of Part 1 is applicable except as follows.

25.5 *Addition:*

The requirement is also applicable to output flexible cords for battery chargers having a **rated output voltage** exceeding 42,4 V.

25.7 *Addition:*

The requirement is also applicable to output flexible cords for battery chargers having a **rated output voltage** exceeding 42,4 V.

Battery chargers for charging ~~automobile~~ vehicle batteries shall not be fitted with natural rubber-sheathed **supply cords**.

For battery chargers intended for use at low temperatures, the **supply cord** shall have properties not less than those specified for ordinary polychloroprene sheathed cords (code designation 60245 IEC 57).

25.8 *Addition:*

The requirement is also applicable to output flexible cords for battery chargers having a **rated output voltage** exceeding 42,4 V.

25.15 *Addition:*

The requirement is also applicable to output flexible cords for battery chargers having a **rated output voltage** exceeding 42,4 V.

26 Terminals for external conductors

This clause of Part 1 is applicable except as follows.

26.5 *Modification:*

This requirement does not apply to the terminals of the output circuit having a no-load voltage not exceeding 42,4 V.

27 Provision for earthing

This clause of Part 1 is applicable.

28 Screws and connections

This clause of Part 1 is applicable.

29 Clearances, creepage distances and solid insulation

This clause of Part 1 is applicable except as follows.

29.2 *Addition*:

For battery chargers for outdoor use, the microenvironment is pollution degree 3 unless the insulation is enclosed or located so that it is unlikely to be exposed to pollution during normal use of the appliance.

30 Resistance to heat and fire

This clause of Part 1 is applicable except as follows.

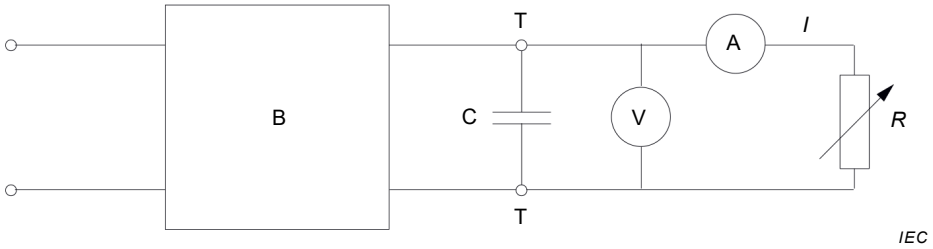
30.2.2 Not applicable.

31 Resistance to rusting

This clause of Part 1 is applicable.

32 Radiation, toxicity and similar hazards

This clause of Part 1 is applicable.



Key

A mean reading ammeter

B battery charger

C capacitor having a capacitance, in farads, given by: $12{,}5 \frac{I_r}{p \times f \times U_r}$

where

I_r = **rated DC output current**, in amperes;

p = 1, for half-wave rectification and 2, for full-wave rectification;

f = supply frequency, in hertz;

U_r = **rated DC output voltage**, in volts.

I output current

R variable resistor

T output terminals of the battery charger

V mean reading voltmeter

NOTE 1 The capacitor ~~may~~ can have a capacitance deviating from the calculated values of ±20 %.

NOTE 2 The capacitor may have to be precharged before the battery charger can operate.

Figure 101 – Circuit for testing battery chargers

Annexes

The annexes of Part 1 are applicable except as follows.

Annex A
(informative)

Routine tests

A.2 Electric strength test

Addition:

An electric strength test is carried out between the input and output circuits, the test voltage being

– *2 000 V, for battery chargers having a **rated voltage** not exceeding 150 V;*
– *2 500 V, for other battery chargers.*

Annex AA
(normative)

Battery chargers for use by children

Battery chargers intended to be used by children at least eight years old without supervision shall comply with this standard but as modified by this annex. The battery chargers have a DC output at **safety extra-low voltage** not exceeding 30 V and a rated output not exceeding 50 VA.

NOTE 1 Battery chargers covered by this annex are not considered to be toys.

NOTE 2 Additional subclauses and notes in the annex are numbered starting with 201.

5 General conditions for the tests

5.201 *When batteries are used, the generally available rechargeable batteries giving the most unfavourable conditions are used.*

6 Classification

6.1 *Modification:*

Battery chargers suitable for outdoor use shall be **class III**. Other battery chargers shall be **class II** or **class III**.

6.2 *Addition*:

Battery chargers suitable for outdoor use shall be at least IPX7.

6.201 Enclosures shall be classified at least IP3X with regard to protection against ingress of solid foreign objects.

Compliance is checked by inspection.

7 Marking and instructions

7.1 *Addition:*

Battery chargers for indoor use only shall be marked with symbol IEC 60417-5957 (2004-12) or with the substance of the following:

For indoor use only.

Battery chargers shall be marked with the IP number according to the degree of protection against ingress of solid foreign objects.

Battery chargers shall be marked with the smiling face symbol together with 8+.

7.6 *Addition*:

[symbol IEC 60417-5957 (2004-12)] For indoor use only

8+  [smiling face] Suitable for use by children at least 8 years old

7.12 *Addition:*

The instructions shall include the substance of the following:

– CAUTION: Only allow children at least 8 years old to use the battery charger. Give sufficient instruction so that the child is able to use the battery charger in a safe way and explain that it is not a toy and must not be played with.

– instruct the child not to try and recharge non-rechargeable batteries because of the danger of eruption;

– examine the battery charger regularly for damage, especially the cord, plug and enclosure. If the battery charger is damaged, it must not be used until it has been repaired.

The instructions for **class III battery chargers** shall state that they must be supplied from a transformer for toys.

7.14 *Addition:*

The height of symbols marked on the appliance shall be at least 10 mm. The height of lettering shall be at least 3 mm.

Compliance is checked by measurement.

8 Protection against access to live parts

8.1.1 *Modification:*

*It shall not be possible to gain access to **live parts** or to metal parts separated from **live parts** by **basic insulation** only, even after a **tool** has been used to remove parts of the enclosure.*

Test probe 18 of IEC 61032 is also applied, as specified for test probe B.

10 Power input and current

10.101 *Addition:*

The output voltage shall not exceed 42,4 V peak.

11 Heating

11.8 *Addition:*

The temperature rise for the surface of batteries that can be touched by test probe 18 of IEC 61032 shall not exceed 25 K.

For all other surfaces that can be touched by test probe 18 of IEC 61032 shall not exceed the following values;

- *25 K, if of metal;*
- *35 K, if of other material.*

17 Overload protection of transformers and associated circuits

Addition:

The temperature rises of parts that can be touched by test probe 18 of IEC 61032 shall not exceed the following values:

- *45 K, if of metal;*
- *55 K, if of other material.*

19 Abnormal operation

19.13 *Addition:*

The temperature rises of parts that can be touched by test probe 18 of IEC 61032 shall not exceed the following values:

- *45 K, if of metal;*
- *55 K, if of other material.*

21 Mechanical strength

21.1 *Addition:*

Compliance is also checked by the test of 21.201.

21.201 *The battery charger is subjected to test Ehb in accordance with IEC 60068-2-75. The impact energy shall be 2 J. For rectangular shaped battery chargers, the four sides and four edges are subjected to an impact. For other battery chargers, the enclosure is subjected to eight impacts equally spaced over the periphery.*

The battery charger is then subjected to test Ec, Procedure 1 – Free fall, in accordance with IEC 60068-2-31. The height of the fall is 500 mm. The battery charger is orientated in its normal position of use prior to being dropped.

The battery charger shall not be damaged to such an extent that compliance with this standard is impaired; in particular, **live parts** shall not become accessible.

22 Construction

22.201 Battery chargers shall have only one **rated voltage** or **rated voltage range**. They shall not incorporate means for manually adjusting the output voltage.

Compliance is checked by inspection.

22.202 Battery chargers shall be constructed so that reverse charging is prevented, regardless of the state of charge of the battery. This applies even if the battery is inserted with the wrong polarity.

Compliance is checked by inspection and by measurement.

24 Components

24.201 *The relevant standard for transformers for toys is IEC 61558-2-7. If they have to be tested, they are tested in accordance with Subclauses 7.2, 20.7.1 and 20.101 and Clause 15 of IEC 61558-2-7: 2007.*

25 Supply connection and external flexible cords

25.1 *Modification:*

Battery chargers shall not be provided with an appliance inlet.

25.5 *Modification:*

Battery chargers shall have **type Y attachment** or **type Z attachment**.

Bibliography

The bibliography of Part 1 is applicable except as follows.

Addition:

~~IEC 60491, *Safety requirements for electronic flash apparatus for photographic purposes*~~

IEC 60598-2-22, *Luminaires – Part 2-22: Particular requirements – Luminaires for emergency lighting*

~~IEC 61851 (all parts), *Electric vehicle conductive charging system*~~

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IEC 60335-2-29

Edition 5.0 2016-06

INTERNATIONAL STANDARD

NORME INTERNATIONALE

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

Appareils électrodomestiques et analogues – Sécurité –
Partie 2-29: Exigences particulières pour les chargeurs de batterie

IEC 60335-2-29:2016-06(en-fr)

CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –

Part 2-29: Particular requirements for battery chargers

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of 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, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). 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. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. 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 IEC technical committee 61: Safety of household and similar electrical appliances.

This fifth edition cancels and replaces the fourth edition published in 2002 including its Amendment 1 (2004) and its Amendment 2 (2009). It constitutes a technical revision.

The principal changes in this edition as compared with the fourth edition of IEC 60335-2-29 are as follows (minor changes are not listed):

- Revised the drop test to refer to IEC 60068-2-31 (21.101);
- Requirements for supply cords on battery chargers used at low temperatures (25.7);
- Requirements for battery chargers having an output voltage exceeding SELV have been added (1, 3.2.2, 3.4.3, 10.101, 24.4, 25.5, 25.7, 25.8, 25.15. 26.5);
- A classification for battery chargers used outdoors has been added (6.2, 29.2);
- Some notes in Clause 1, Subclauses 7.1 and 22.102, Figure 101 and Annex AA 11.8 have been converted to normative text.

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

FDIS	Report on voting
61/5142/FDIS	61/5173/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 battery chargers.

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.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC website 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.

It is the recommendation of the committee that the content of this standard 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.

– 3.1.9: The artificial load may not be used (USA).

– 11.2: The appliance is not placed in a test corner (USA).

– 21.101: The drop test is carried out differently on outdoor direct plug-in battery chargers (USA).
– 21.102: The test is different (USA).
– 22.26: Basic insulation is allowed between live parts and SELV circuits (USA).
– Annex AA, 11.8: Higher temperature rises are allowed (USA).
– Annex AA, Clause 17: Higher temperature rises are allowed (USA).
– Annex AA, 19.13: Higher temperature rises are allowed (USA).

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 2-29: Particular requirements for battery chargers

1 Scope

This clause of Part 1 is replaced by the following.

This part of IEC 60335 deals with the safety of electric battery chargers for household and similar use having an output not exceeding 120 V ripple-free direct current, their **rated voltage** being not more than 250 V.

Battery chargers intended for charging batteries in a household end use application outside the scope of the IEC 60335 series of standards are within the scope of this standard.

Requirements for battery chargers for use by children at least 8 years old without supervision are given in Annex AA.

Battery chargers not intended for normal household use, but which nevertheless may be a source of danger to the public, such as battery chargers intended for use in garages, shops, light industry and on farms, are within the scope of this standard.

As far as is practicable, this standard deals with the common hazards presented by appliances that are encountered by all persons in and around the home. However, in general, it does not take into account

– persons (including children) whose
  - physical, sensory or mental capabilities; or
  - lack of experience and knowledge

  prevents them from using the appliance safely without supervision or instruction;
– children playing with the appliance.

NOTE 101 Attention is drawn to the fact that

– for appliances intended to be used in vehicles or 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 and similar authorities.

NOTE 102 This standard does not apply to

– built-in battery chargers, except those for installing in caravans and similar vehicles;
– battery chargers that are part of an appliance, the battery of which is not accessible to the user;
– battery chargers intended exclusively for industrial purposes;
– battery chargers intended to be used in locations where special conditions prevail, such as the presence of a corrosive or explosive atmosphere (dust, vapour or gas);
– battery chargers for emergency lighting (IEC 60598-2-22);
– supply units for electronic equipment.

2 Normative references

This clause of Part 1 is applicable except as follows.

Addition:

IEC 60068-2-6, *Environmental testing – Part 2-6: Tests – Test Fc: Vibration (sinusoidal)*

IEC 61558-2-7:2007, *Safety of power transformers, power supplies, reactors and similar products – Part 2-7: Particular requirements and tests for transformers and power supplies for toys*

3 Terms and definitions

This clause of Part 1 is applicable except as follows.

3.1.1 *Addition:*

The **rated voltage** is the rated input voltage.

3.1.6 *Addition:*

The **rated current** is the rated input current.

3.1.9 *Replacement:*

normal operation
operation of the appliance under the following conditions:

Battery chargers for charging lead-acid batteries, and other battery chargers having a **rated DC output current** not exceeding 20 A, are connected to the circuit of Figure 101. The variable resistor is adjusted so that the current in the circuit is the **rated DC output current** when the battery charger is supplied at **rated voltage**.

When the charging current is controlled by the state of charge of the battery, the variable resistor and the capacitor are replaced by a discharged battery of the type and having the largest capacity specified in the instructions.

Other battery chargers are connected to a discharged battery of the type and having the largest capacity specified in the instructions.

3.2.2 *Addition:*

Output flexible cords are not considered to be interconnection cords.

3.4.3 *Replacement:*

safety isolating transformer
transformer, the input winding of which is electrically separated from the output winding by an insulation at least equivalent to **double insulation** or **reinforced insulation**, that is intended to supply a battery charging circuit having an output voltage not exceeding 120 V ripple-free direct current

Note 1 to entry: Ripple-free means an r.m.s. ripple voltage not exceeding 10 % of the DC component.

3.101
rated DC output voltage
output voltage assigned to the battery charger by the manufacturer

3.102
rated DC output current
output current assigned to the battery charger by the manufacturer

3.103
DC distribution board
panel having circuits for distributing DC power to socket-outlets or terminals

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 *Addition:*

If the test of 21.101 is carried out, two additional battery chargers are required.

5.101 *Battery chargers are tested as* ***motor-operated appliances****.*

6 Classification

This clause of Part 1 is applicable except as follows.

6.2 *Addition:*

Battery chargers for outdoor use shall be at least IPX4.

7 Marking and instructions

This clause of Part 1 is applicable except as follows.

7.1 *Addition:*

Battery chargers shall be marked with

– **rated DC output voltage**, in volts;
– **rated DC output current**, in amperes, however no other output current shall be marked;
– the rated current, in amperes, of **protective devices** incorporated in a **DC distribution board**;
– the polarity of the output terminals unless incorrect polarity connection is prevented. The positive terminal shall be indicated by symbol IEC 60417-5005 (2002-10) and the negative terminal by symbol IEC 60417-5006 (2002-10);
– the time-current characteristic of fuse-links of the time-lag type;
– the substance of the following, if the output is at least 20 VA:
  - before charging, read the instructions;
  - for indoor use, or do not expose to rain (unless the battery charger is at least IPX4);
– the substance of the following, if the output is at least 20 VA and the battery charger is for charging lead-acid batteries:
  - disconnect the supply before making or breaking the connections to the battery;
  - WARNING: Explosive gases. Prevent flames and sparks. Provide adequate ventilation during charging.

Battery chargers incorporating an engine-cranking switch that allows the battery charger to supply a supplementary starting current for the engine shall be marked with

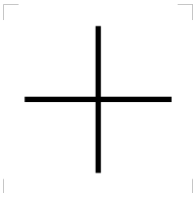
– the maximum "on" time;

– the minimum "off" time or the maximum ratio between the "on" time and the "off" time.

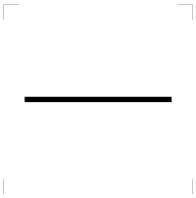
7.4 *Addition:*

If the battery charger can be adjusted to different **rated DC output voltages**, the output voltage to which the battery charger is adjusted shall be clearly discernible.

7.6 *Addition:*



[symbol IEC 60417-5005 (2002-10)] plus; positive polarity



[symbol IEC 60417-5006 (2002-10)] minus; negative polarity

7.12 *Addition:*

The instructions shall

– specify the types, the number of batteries and the rated capacity of the batteries that can be charged;

– include a warning against recharging non-rechargeable batteries;

– state that during charging, the battery must be placed in a well-ventilated area (for chargers for vented batteries);

– state that the battery charger must only be plugged into an earthed socket-outlet (for **portable class I battery chargers** for outdoor use);

– explain the automatic function, stating any limitation (for automatic battery chargers).

The instructions for battery chargers for charging automobile batteries shall include the substance of the following:

– the battery terminal not connected to the chassis has to be connected first. The other connection is to be made to the chassis, remote from the battery and fuel line. The battery charger is then to be connected to the supply mains;

– after charging, disconnect the battery charger from the supply mains. Then remove the chassis connection and then the battery connection.

7.12.1 *Addition:*

The instructions for battery chargers for installation in caravans and similar vehicles shall state that the connection to the supply mains is to be in accordance with the national wiring rules.

7.101 DC distribution boards shall be marked with

– the maximum output current, in amperes, for each output circuit;
– the types of any additional power supply that may be connected.

Compliance is checked by inspection.

8 Protection against access to live parts

This clause of Part 1 is applicable except as follows.

8.1 *Addition:*

*During insertion or removal of batteries having a battery voltage exceeding 42,4 V, protection against contact with **live parts** of the battery or of the battery charger shall be ensured.*

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 no-load DC output voltage shall not exceed 120 V.

*Compliance is checked by supplying the battery charger at **rated voltage** and measuring the no load DC output voltage.*

10.102 The arithmetic mean value of the output current shall not deviate from the **rated DC output current** by more than 10 %.

*Compliance is checked by connecting the battery charger to the circuit of Figure 101. The battery charger is supplied at **rated voltage** and the variable resistor is adjusted to obtain the **rated DC output voltage**. The output current is then measured.*

11 Heating

This clause of Part 1 is applicable except as follows.

11.2 *Modification:*

*Battery chargers are placed in the test corner as specified for **heating appliances**.*

11.5 *Modification:*

*Battery chargers are only supplied at 1,06 times **rated voltage**.*

11.7 *Replacement:*

Battery chargers are operated until steady conditions are established.

12 Void

13 Leakage current and electric strength at operating temperature

This clause of Part 1 is applicable.

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.

17 Overload protection of transformers and associated circuits

This clause of Part 1 is applicable except as follows.

Addition:

The output terminals of the battery charger are short-circuited.

18 Endurance

This clause of Part 1 is not applicable.

19 Abnormal operation

This clause of Part 1 is applicable except as follows.

19.1 *Modification:*

Instead of the tests specified, battery chargers are subjected to the tests of 19.11, 19.12 and 19.101 to 19.103, as applicable.

19.13 *Addition:*

During the tests, the values of Table 8 apply.

There shall be no rupture of the battery.

19.101 *Battery chargers are supplied at* ***rated voltage*** *and operated under* ***normal operation****, any control that operates during the test of Clause 11 being short-circuited.*

19.102 *The battery charger is connected to a fully charged battery, the connections being in reverse to normal use. The battery is to have the largest capacity of the types specified in the*

instructions, the capacity of a lead-acid battery, however, being 70 Ah. The battery charger is operated while supplied at ***rated voltage****.*

19.103 *Battery chargers intended to be used with a DC* ***distribution board*** *are supplied at* ***rated voltage*** *and operated under* ***normal operation*** *until steady conditions are established. The load is increased to raise the output current by 10 % until steady conditions are again established. This procedure is repeated until the* ***protective device*** *operates or short-circuit conditions are established.*

20 Stability and mechanical hazards

This clause of Part 1 is applicable.

21 Mechanical strength

This clause of Part 1 is applicable except as follows.

21.1 *Modification:*

The impact energy is increased to 1,0 J ± 0,05 J.

Addition:

Compliance is also checked by the test of 21.101.

21.101 *Battery chargers, other than* ***built-in battery chargers****, having a mass not exceeding 5 kg are subjected to the test free-fall – procedure 1, of IEC 60068-2-31, which is carried out on three appliances.*

The battery chargers are dropped from a height of 1 m, each appliance being dropped from a different position.

After the test the battery chargers shall show no damage that could impair compliance with 8.1, 15.1.1, 16.3 and Clause 29.

21.102 *Battery chargers for installing in caravans and similar vehicles shall withstand vibrations to which they may be subjected.*

Compliance is checked by carrying out the vibration tests specified in IEC 60068-2-6 under the following conditions:

- *the battery charger is built into an enclosure made from plywood approximately 20 mm thick, the internal dimensions being the minimum stated in the installation instructions;*
- *the enclosure is strapped to the vibration generator with the battery charger in its normal position of use;*
- *the direction of vibration is vertical;*
- *the amplitude of vibration is 0,35 mm;*
- *the sweep frequency range is 10 Hz to 55 Hz;*
- *the duration of the test is 30 min.*

The battery charger shall show no damage that could impair compliance with 8.1, 15.1.1, 16.3 and Clause 29, and connections shall not have worked loose.

22 Construction

This clause of Part 1 is applicable except as follows.

22.26 *Replacement:*

The output circuit shall be supplied through a **safety isolating transformer** and shall not be connected to **accessible metal parts** or an earthing terminal. The insulation between parts operating at **safety extra-low voltage** and **live parts** shall comply with the requirements for **double insulation** or **reinforced insulation**.

*Compliance is checked by inspection and by the tests specified for **double insulation** or **reinforced insulation**.*

22.101 Each circuit supplied from a **DC distribution board** shall incorporate an overload **protective device**.

Compliance is checked by inspection.

22.102 Battery chargers for installing in caravans and similar vehicles shall be constructed so that they can be securely fixed to a support. Keyhole slots, hooks and similar means, without any further means to prevent the battery charger from being inadvertently lifted off the support, are not considered to be securely fixed.

Compliance is checked by inspection.

23 Internal wiring

This clause of Part 1 is applicable.

24 Components

This clause of Part 1 is applicable except as follows

24.4 *Addition:*

The requirement is also applicable to plugs, connectors, socket-outlets and appliance outlets in the battery charger output circuit.

25 Supply connection and external flexible cords

This clause of Part 1 is applicable except as follows.

25.5 *Addition:*

The requirement is also applicable to output flexible cords for battery chargers having a **rated output voltage** exceeding 42,4 V.

25.7 *Addition:*

The requirement is also applicable to output flexible cords for battery chargers having a **rated output voltage** exceeding 42,4 V.

Battery chargers for charging vehicle batteries shall not be fitted with natural rubber-sheathed **supply cords**.

For battery chargers intended for use at low temperatures, the **supply cord** shall have properties not less than those specified for ordinary polychloroprene sheathed cords (code designation 60245 IEC 57).

25.8 *Addition:*

The requirement is also applicable to output flexible cords for battery chargers having a **rated output voltage** exceeding 42,4 V.

25.15 *Addition:*

The requirement is also applicable to output flexible cords for battery chargers having a **rated output voltage** exceeding 42,4 V.

26 Terminals for external conductors

This clause of Part 1 is applicable except as follows.

26.5 *Modification:*

This requirement does not apply to the terminals of the output circuit having a no-load voltage not exceeding 42,4 V.

27 Provision for earthing

This clause of Part 1 is applicable.

28 Screws and connections

This clause of Part 1 is applicable.

29 Clearances, creepage distances and solid insulation

This clause of Part 1 is applicable except as follows.

29.2 *Addition*:

For battery chargers for outdoor use, the microenvironment is pollution degree 3 unless the insulation is enclosed or located so that it is unlikely to be exposed to pollution during normal use of the appliance.

30 Resistance to heat and fire

This clause of Part 1 is applicable except as follows.

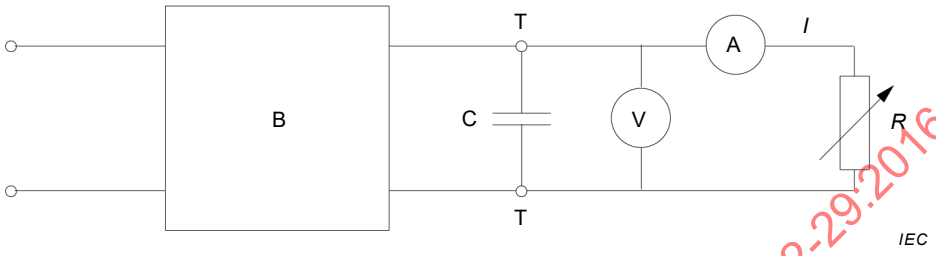
30.2.2 Not applicable.

31 Resistance to rusting

This clause of Part 1 is applicable.

32 Radiation, toxicity and similar hazards

This clause of Part 1 is applicable.



Key

A mean reading ammeter

B battery charger

C capacitor having a capacitance, in farads, given by: $12{,}5 \frac{I_r}{p \times f \times U_r}$

where

I_r = **rated DC output current**, in amperes;

p = 1, for half-wave rectification and 2, for full-wave rectification;

f = supply frequency, in hertz;

U_r = **rated DC output voltage**, in volts.

I output current

R variable resistor

T output terminals of the battery charger

V mean reading voltmeter

NOTE 1 The capacitor can have a capacitance deviating from the calculated values of ±20 %.

NOTE 2 The capacitor may have to be precharged before the battery charger can operate.

Figure 101 – Circuit for testing battery chargers

Annexes

The annexes of Part 1 are applicable except as follows.

Annex A
(informative)

Routine tests

A.2 Electric strength test

Addition:

An electric strength test is carried out between the input and output circuits, the test voltage being

– *2 000 V, for battery chargers having a **rated voltage** not exceeding 150 V;*
– *2 500 V, for other battery chargers.*

Annex AA
(normative)

Battery chargers for use by children

Battery chargers intended to be used by children at least eight years old without supervision shall comply with this standard but as modified by this annex. The battery chargers have a DC output at **safety extra-low voltage** not exceeding 30 V and a rated output not exceeding 50 VA.

NOTE 1 Battery chargers covered by this annex are not considered to be toys.

NOTE 2 Additional subclauses and notes in the annex are numbered starting with 201.

5 General conditions for the tests

5.201 *When batteries are used, the generally available rechargeable batteries giving the most unfavourable conditions are used.*

6 Classification

6.1 *Modification:*

Battery chargers suitable for outdoor use shall be **class III**. Other battery chargers shall be **class II** or **class III**.

6.2 *Addition*:

Battery chargers suitable for outdoor use shall be at least IPX7.

6.201 Enclosures shall be classified at least IP3X with regard to protection against ingress of solid foreign objects.

Compliance is checked by inspection.

7 Marking and instructions

7.1 *Addition:*

Battery chargers for indoor use only shall be marked with symbol IEC 60417-5957 (2004-12) or with the substance of the following:

For indoor use only.

Battery chargers shall be marked with the IP number according to the degree of protection against ingress of solid foreign objects.

Battery chargers shall be marked with the smiling face symbol together with 8+.

7.6 *Addition*:

[symbol IEC 60417-5957 (2004-12)] For indoor use only

8+  [smiling face] Suitable for use by children at least 8 years old

7.12 *Addition:*

The instructions shall include the substance of the following:

– CAUTION: Only allow children at least 8 years old to use the battery charger. Give sufficient instruction so that the child is able to use the battery charger in a safe way and explain that it is not a toy and must not be played with.

– instruct the child not to try and recharge non-rechargeable batteries because of the danger of eruption;

– examine the battery charger regularly for damage, especially the cord, plug and enclosure. If the battery charger is damaged, it must not be used until it has been repaired.

The instructions for **class III battery chargers** shall state that they must be supplied from a transformer for toys.

7.14 *Addition:*

The height of symbols marked on the appliance shall be at least 10 mm. The height of lettering shall be at least 3 mm.

Compliance is checked by measurement.

8 Protection against access to live parts

8.1.1 *Modification:*

*It shall not be possible to gain access to **live parts** or to metal parts separated from **live parts** by **basic insulation** only, even after a **tool** has been used to remove parts of the enclosure.*

Test probe 18 of IEC 61032 is also applied, as specified for test probe B.

10 Power input and current

10.101 *Addition:*

The output voltage shall not exceed 42,4 V peak.

11 Heating

11.8 *Addition:*

The temperature rise for the surface of batteries that can be touched by test probe 18 of IEC 61032 shall not exceed 25 K.

For all other surfaces that can be touched by test probe 18 of IEC 61032 shall not exceed the following values;

- *25 K, if of metal;*
- *35 K, if of other material.*

17 Overload protection of transformers and associated circuits

Addition:

The temperature rises of parts that can be touched by test probe 18 of IEC 61032 shall not exceed the following values:

- *45 K, if of metal;*
- *55 K, if of other material.*

19 Abnormal operation

19.13 *Addition:*

The temperature rises of parts that can be touched by test probe 18 of IEC 61032 shall not exceed the following values:

- *45 K, if of metal;*
- *55 K, if of other material.*

21 Mechanical strength

21.1 *Addition:*

Compliance is also checked by the test of 21.201.

21.201 *The battery charger is subjected to test Ehb in accordance with IEC 60068-2-75. The impact energy shall be 2 J. For rectangular shaped battery chargers, the four sides and four edges are subjected to an impact. For other battery chargers, the enclosure is subjected to eight impacts equally spaced over the periphery.*

The battery charger is then subjected to test Ec, Procedure 1 – Free fall, in accordance with IEC 60068-2-31. The height of the fall is 500 mm. The battery charger is orientated in its normal position of use prior to being dropped.

The battery charger shall not be damaged to such an extent that compliance with this standard is impaired; in particular, **live parts** shall not become accessible.

22 Construction

22.201 Battery chargers shall have only one **rated voltage** or **rated voltage range**. They shall not incorporate means for manually adjusting the output voltage.

Compliance is checked by inspection.

22.202 Battery chargers shall be constructed so that reverse charging is prevented, regardless of the state of charge of the battery. This applies even if the battery is inserted with the wrong polarity.

Compliance is checked by inspection and by measurement.

24 Components

24.201 *The relevant standard for transformers for toys is IEC 61558-2-7. If they have to be tested, they are tested in accordance with Subclauses 7.2, 20.7.1 and 20.101 and Clause 15 of IEC 61558-2-7: 2007.*

25 Supply connection and external flexible cords

25.1 *Modification:*

Battery chargers shall not be provided with an appliance inlet.

25.5 *Modification:*

Battery chargers shall have **type Y attachment** or **type Z attachment**.

Bibliography

The bibliography of Part 1 is applicable except as follows.

Addition:

IEC 60598-2-22, *Luminaires – Part 2-22: Particular requirements – Luminaires for emergency lighting*

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SOMMAIRE

COMMISSION ÉLECTROTECHNIQUE INTERNATIONALE

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APPAREILS ÉLECTRODOMESTIQUES ET ANALOGUES – SÉCURITÉ –

Partie 2-29: Exigences particulières pour les chargeurs de batterie

AVANT-PROPOS

1) La Commission Electrotechnique Internationale (IEC) est une organisation mondiale de normalisation composée de l'ensemble des comités électrotechniques nationaux (Comités nationaux de l'IEC). L'IEC a pour objet de favoriser la coopération internationale pour toutes les questions de normalisation dans les domaines de l'électricité et de l'électronique. À cet effet, l'IEC – entre autres activités – publie des Normes internationales, des Spécifications techniques, des Rapports techniques, des Spécifications accessibles au public (PAS) et des Guides (ci-après dénommés "Publication(s) de l'IEC"). Leur élaboration est confiée à des comités d'études, aux travaux desquels tout Comité national intéressé par le sujet traité peut participer. Les organisations internationales, gouvernementales et non gouvernementales, en liaison avec l'IEC, participent également aux travaux. L'IEC collabore étroitement avec l'Organisation Internationale de Normalisation (ISO), selon des conditions fixées par accord entre les deux organisations.
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8) L'attention est attirée sur les références normatives citées dans cette publication. L'utilisation de publications référencées est obligatoire pour une application correcte de la présente publication.
9) L'attention est attirée sur le fait que certains des éléments de la présente Publication de l'IEC peuvent faire l'objet de droits de brevet. L'IEC ne saurait être tenue pour responsable de ne pas avoir identifié de tels droits de brevets et de ne pas avoir signalé leur existence.

La présente partie de la Norme internationale IEC 60335 a été établie par le comité d'études 61 de l'IEC: Sécurité des appareils électrodomestiques et analogues.

Cette cinquième édition annule et remplace la quatrième édition parue en 2002, son Amendement 1 (2004) et son Amendement 2 (2009). Cette édition constitue une révision technique.

Cette édition inclut les modifications majeures suivantes par rapport à la quatrième édition de l'IEC 60335-2-29 (les modifications mineures ne sont pas répertoriées):

- Révision de l'essai de chute pour faire référence à l'IEC 60068-2-31 (21.101);
- Exigences relatives aux câbles d'alimentation sur les chargeurs de batterie utilisés à basse température (25.7);

- Ajout d'exigences relatives aux chargeurs de batterie ayant une tension de sortie supérieure à la TBTS (1, 3.2.2, 3.4.3, 10.101, 24.4, 25.5, 25.7, 25.8, 25.15. 26.5);
- Ajout d'une classification pour les chargeurs de batterie utilisés à l'extérieur (6.2, 29.2);
- Conversion de certaines notes dans l'Article 1, les Paragraphes 7.1 et 22.102, la Figure 101 et l'Annexe AA 11.8 en texte normatif.

Le texte de cette norme est issu des documents suivants:

FDIS	Rapport de vote
61/5142/FDIS	61/5173/RVD

Le rapport de vote indiqué dans le tableau ci-dessus donne toute information sur le vote ayant abouti à l'approbation de cette norme.

Cette publication a été rédigée selon les Directives ISO/IEC, Partie 2.

La présente partie 2 doit être utilisée conjointement avec la dernière édition de l'IEC 60335-1 et ses amendements. Elle a été établie sur la base de la cinquième édition (2010) de cette norme.

NOTE 1 L'expression "Partie 1" utilisée dans la présente norme fait référence à l'IEC 60335-1.

La présente partie 2 complète ou modifie les articles correspondants de l'IEC 60335-1, de façon à transformer cette publication en norme IEC: Exigences de sécurité pour les chargeurs de batterie.

Lorsqu'un paragraphe particulier de la Partie 1 n'est pas mentionné dans cette partie 2, ce paragraphe s'applique pour autant qu'il est raisonnable. Lorsque la présente norme spécifie "addition", "modification" ou "remplacement", le texte correspondant de la Partie 1 doit être adapté en conséquence.

NOTE 2 Le système de numérotation suivant est utilisé:

– paragraphes, tableaux et figures: ceux qui sont numérotés à partir de 101 sont complémentaires à ceux de la Partie 1;
– notes: à l'exception de celles qui sont dans un nouveau paragraphe ou de celles qui concernent des notes de la Partie 1, les notes sont numérotées à partir de 101, y compris celles figurant dans un article ou paragraphe remplacé;
– annexes: les annexes supplémentaires sont désignées AA, BB, etc.

NOTE 3 Les caractères d'imprimerie suivants sont employés:

– exigences: en caractères romains;
– *spécifications d'essais: en italique;*
– notes: en petits caractères romains.

Les mots en **gras** dans le texte sont définis à l'Article 3. Lorsqu'une définition concerne un adjectif, l'adjectif et le nom associé figurent également en gras.

Le comité a décidé que le contenu de cette publication ne sera pas modifié avant la date de stabilité indiquée sur le site web de l'IEC sous "http://webstore.iec.ch" dans les données relatives à la publication recherchée. A cette date, la publication sera

- reconduite,
- supprimée,
- remplacée par une édition révisée, ou
- amendée.

NOTE 4 L'attention des Comités Nationaux est attirée sur le fait que les fabricants d'appareils et les organismes d'essai peuvent avoir besoin d'une période transitoire après la publication d'une nouvelle publication IEC, ou d'une publication amendée ou révisée, pour fabriquer des produits conformes aux nouvelles exigences et pour adapter leurs équipements aux nouveaux essais ou aux essais révisés.

Le comité recommande que le contenu de cette norme soit entériné au niveau national au plus tôt 12 mois et au plus tard 36 mois après la date de publication.

Les différences suivantes existent dans les pays indiqués ci-après.

– 3.1.9: La charge artificielle peut ne pas être utilisée (États-Unis).
– 11.2: L'appareil n'est pas placé dans un coin d'essai (États-Unis).
– 21.101: L'essai de chute est effectué de façon différente sur les chargeurs de batterie à branchement direct pour usage extérieur (États-Unis).
– 21.102: L'essai est différent (États-Unis).
– 22.26: Une isolation principale est permise entre des parties actives et les circuits alimentés en TBTS (États-Unis).
– Annexe AA, 11.8: Des échauffements supérieurs sont autorisés (États-Unis).
– Annexe AA, Article 17: Des échauffements supérieurs sont autorisés (États-Unis).
– Annexe AA, 19.13: Des échauffements supérieurs sont autorisés (États-Unis).

INTRODUCTION

Il a été considéré en établissant la présente Norme internationale que l'exécution de ses dispositions était confiée à des personnes expérimentées et ayant une qualification appropriée.

La présente norme reconnaît le niveau de protection internationalement accepté contre les dangers tels que les dangers électriques, mécaniques, thermiques, liés au feu et au rayonnement des appareils, lorsqu'ils fonctionnent comme en usage normal en tenant compte des instructions du fabricant. Elle couvre également les situations anormales auxquelles on peut s'attendre dans la pratique et prend en considération les phénomènes électromagnétiques qui peuvent affecter le fonctionnement en toute sécurité des appareils.

Cette norme tient compte autant que possible des exigences de l'IEC 60364, de façon à rester compatible avec les règles d'installation quand l'appareil est raccordé au réseau d'alimentation. Cependant, des règles nationales d'installation peuvent être différentes.

Si un appareil compris dans le domaine d'application de cette norme comporte également des fonctions qui sont couvertes par une autre partie 2 de l'IEC 60335, la partie 2 correspondante est appliquée à chaque fonction séparément, dans la limite du raisonnable. Si cela est applicable, il est tenu compte de l'influence d'une fonction sur les autres fonctions.

Lorsqu'une partie 2 ne comporte pas d'exigences complémentaires pour couvrir les dangers traités dans la Partie 1, la Partie 1 s'applique.

NOTE 1 Cela signifie que les comités d'études responsables pour les parties 2 ont déterminé qu'il n'était pas nécessaire de spécifier des exigences particulières pour l'appareil en question en plus des exigences générales.

Cette norme est une norme de famille de produits traitant de la sécurité d'appareils et a préséance sur les normes horizontales et génériques couvrant le même sujet.

NOTE 2 Les normes horizontales et génériques couvrant un danger ne sont pas applicables parce qu'elles ont été prises en considération lorsque les exigences générales et particulières ont été étudiées pour la série de normes IEC 60335. Par exemple, dans le cas des exigences de température de surface pour de nombreux appareils, des normes génériques, comme l'ISO 13732-1 pour les surfaces chaudes, ne sont pas applicables en plus de la Partie 1 ou des parties 2.

Un appareil conforme au texte de la présente norme ne sera pas nécessairement jugé conforme aux principes de sécurité de la norme si, lorsqu'il est examiné et soumis aux essais, il apparaît qu'il présente d'autres caractéristiques qui compromettent le niveau de sécurité visé par ces exigences.

Un appareil utilisant des matériaux ou présentant des modes de construction différents de ceux décrits dans les exigences de cette norme peut être examiné et soumis aux essais en fonction de l'objectif poursuivi par ces exigences et, s'il est jugé pratiquement équivalent, il peut être estimé conforme à la présente norme.

APPAREILS ÉLECTRODOMESTIQUES ET ANALOGUES – SÉCURITÉ –

Partie 2-29: Exigences particulières pour les chargeurs de batterie

1 Domaine d'application

L'article de la Partie 1 est remplacé par l'article ci-après.

La présente partie de l'IEC 60335 traite de la sécurité des chargeurs de batterie électriques pour usages domestiques et analogues, dont la tension de sortie ne dépasse pas 120 V en courant continu lisse et dont la **tension assignée** n'est pas supérieure à 250 V.

Les chargeurs de batterie destinés au chargement de batteries dans une application finale à usage domestique non couverte par le domaine d'application de la série de normes IEC 60335 sont compris dans le domaine d'application de la présente norme.

Les exigences relatives aux chargeurs de batterie destinés à être utilisés par des enfants âgés de 8 ans au moins sans surveillance sont décrites dans l'Annexe AA.

Les chargeurs de batterie destinés à un usage domestique normal, mais qui néanmoins peuvent constituer une source de danger pour le public, tels que les chargeurs de batterie destinés à être utilisés dans des garages, dans des magasins, chez des artisans et dans des fermes, sont compris dans le domaine d'application de la présente norme.

Dans la mesure du possible, la présente norme traite des dangers ordinaires présentés par les appareils, encourus par tous les individus à l'intérieur et autour de l'habitation. Cependant, cette norme ne tient pas compte en général

- des personnes (y compris des enfants) dont
  - les capacités physiques, sensorielles ou mentales; ou
  - le manque d'expérience et de connaissance

  les empêchent d'utiliser l'appareil en toute sécurité sans surveillance ou instruction;
- de l'utilisation de l'appareil comme jouet par des enfants.

NOTE 101 L'attention est attirée sur le fait que

– pour les appareils destinés à être utilisés dans des véhicules ou à bord de navires ou d'avions, des exigences supplémentaires peuvent être nécessaires;

– dans de nombreux pays, des exigences supplémentaires sont imposées par les organismes nationaux de la santé publique, par les organismes nationaux responsables de la protection des travailleurs et par des organismes similaires.

NOTE 102 La présente norme ne s'applique pas

– aux chargeurs de batterie encastrés, à l'exception de ceux destinés à être montés dans les caravanes ou véhicules analogues;

– aux chargeurs de batterie qui font partie d'un appareil dont la batterie n'est pas accessible à l'utilisateur;

– aux chargeurs de batterie prévus exclusivement pour les usages industriels;

– aux chargeurs de batterie destinés à être utilisés dans des locaux présentant des conditions particulières, par exemple, des atmosphères corrosives ou explosives (poussières, vapeur ou gaz);

– aux chargeurs de batteries pour éclairage de secours (IEC 60598-2-22);

– aux modules d'alimentation pour les équipements électroniques.

2 Références normatives

L'article de la Partie 1 est applicable avec l'exception suivante.

Addition:

IEC 60068-2-6, *Essais d'environnement – Partie 2-6: Essais – Essai Fc: Vibrations (sinusoïdales)*

IEC 61558-2-7:2007, *Sécurité des transformateurs, alimentations, bobines d'inductance et produits analogues – Partie 2-7: Règles particulières et essais pour transformateurs et alimentations pour jouets*

3 Termes et définitions

L'article de la Partie 1 est applicable, avec les exceptions suivantes.

3.1.1 *Addition:*

La **tension assignée** est la tension d'entrée assignée.

3.1.6 *Addition:*

Le **courant assigné** est le courant d'entrée assigné.

3.1.9 *Remplacement:*

conditions de fonctionnement normal
fonctionnement de l'appareil dans les conditions suivantes:

Les chargeurs de batterie pour charger les batteries au plomb et les chargeurs de batteries pour charger les autres batteries et ayant un **courant de sortie continu assigné** n'excédant pas 20 A sont connectés au circuit de la Figure 101. La résistance réglable est réglée de façon telle que le courant dans le circuit soit le **courant de sortie continu assigné** lorsque le chargeur de batterie est alimenté sous la **tension assignée**.

Lorsque le courant de charge est contrôlé par l'état de charge de la batterie, la résistance réglable et le condensateur sont remplacés par une batterie déchargée du type et de la capacité la plus grande indiqués dans les instructions.

Les autres chargeurs de batterie sont connectés à une batterie déchargée du type et de la capacité la plus grande indiqués dans les instructions.

3.2.2 *Addition:*

Les câbles souples de sortie ne sont pas considérés comme des câbles d'interconnexion.

3.4.3 *Remplacement:*

transformateur de sécurité
transformateur dont l'enroulement primaire est séparé électriquement des enroulements secondaires par une isolation au moins équivalente à la **double isolation** ou à l'**isolation renforcée** et qui est destiné à alimenter un circuit de charge de batterie dont la tension de sortie ne dépasse pas 120 V en courant continu lisse

Note 1 à l'article: Lisse signifie que la tension d'ondulation efficace n'excède pas 10 % de la composante de courant continu.

3.101
tension de sortie assignée en courant continu
tension de sortie attribuée au chargeur de batterie par le fabricant

3.102
courant de sortie continu assigné
courant de sortie attribué au chargeur de batterie par le fabricant

3.103
tableau de distribution de courant continu
panneau comportant des circuits pour distribuer le courant continu à des socles de prises de courant ou à des bornes

4 Exigences générales

L'article de la Partie 1 est applicable.

5 Conditions générales d'essais

L'article de la Partie 1 est applicable avec les exceptions suivantes.

5.2 *Addition:*

Si l'essai de 21.101 est effectué, deux chargeurs de batterie supplémentaires sont nécessaires.

5.101 *Les chargeurs de batterie sont soumis aux essais comme des* ***appareils à moteur****.*

6 Classification

L'article de la Partie 1 est applicable avec l'exception suivante.

6.2 *Addition:*

Les chargeurs de batterie pour usage extérieur doivent être au moins IPX4.

7 Marquage et instructions

L'article de la Partie 1 est applicable avec les exceptions suivantes.

7.1 *Addition:*

Les chargeurs de batterie doivent porter par marquage les indications suivantes:

– la **tension de sortie assignée en courant continu**, en volts;
– le **courant de sortie continu assigné**, en ampères; cependant, aucune autre valeur du courant de sortie ne doit être apposée par marquage;
– le courant assigné, en ampères, des **dispositifs de protection** incorporés dans un **tableau de distribution de courant continu**;

– la polarité des bornes de sortie à moins qu'une connexion erronée des polarités soit impossible. La borne positive doit être repérée par le symbole IEC 60417-5005 (2002-10) et la borne négative par le symbole IEC 60417-5006 (2002-10);
– la caractéristique temps/courant des fusibles du type temporisé;
– en substance, pour les chargeurs de batterie délivrant au moins 20 VA:
  • avant la charge, lire les instructions;
  • pour usage à l'intérieur ou ne pas exposer à la pluie (sauf si le chargeur de batterie est au moins IPX4);
– en substance, pour les chargeurs de batterie délivrant au moins 20 VA et destinés à charger les batteries au plomb:
  • déconnecter l'alimentation avant de brancher ou de débrancher les connexions sur la batterie;
  • MISE EN GARDE: Gaz explosifs. Eviter les flammes et les étincelles. Assurer une aération suffisante pendant la charge.

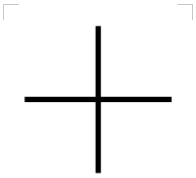
Les chargeurs de batterie comportant un interrupteur de démarrage, qui permet au chargeur de batterie de délivrer un courant supplémentaire pour le démarrage du moteur, doivent porter le marquage:

– de la durée maximale de «marche»;
– la durée minimale d'«arrêt» ou la valeur maximale du rapport «marche/arrêt».

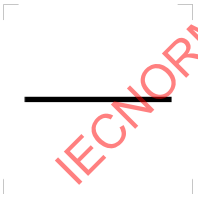
7.4 *Addition:*

Si le chargeur de batterie peut être réglé à différentes **tensions de sortie assignées en courant continu**, la tension de sortie à laquelle le chargeur de batterie est réglé doit pouvoir être clairement distinguée.

7.6 *Addition:*



[symbole IEC 60417-5005 (2002-10)] plus; polarité positive



[symbole IEC 60417-5006 (2002-10)] moins; polarité négative

7.12 *Addition:*

Les instructions doivent

– indiquer les types et le nombre de batteries ainsi que la capacité assignée des batteries qui peuvent être chargées;
– comporter une mise en garde contre la recharge de batteries non-rechargeables;
– indiquer que, pendant la charge, la batterie doit être placée en un emplacement bien aéré (pour les chargeurs des batteries ouvertes);

– indiquer, pour les **chargeurs de batterie mobiles de classe I** pour usage à l'extérieur, qu'ils ne doivent être branchés que dans un socle de prise de courant relié à la terre;
– pour les chargeurs de batterie automatiques, expliquer la fonction automatique et indiquer toute limitation éventuelle;

Les instructions pour les chargeurs de batterie prévus pour charger les batteries d'automobiles doivent comporter en substance les indications suivantes:

– la borne de la batterie non reliée au châssis doit être connectée la première. L'autre connexion doit être effectuée sur le châssis loin de la batterie et de la canalisation de combustible. Le chargeur de batterie doit alors être raccordé au réseau;
– après l'opération de charge, débrancher le chargeur de batterie du réseau puis retirer la connexion du châssis et enfin la connexion de la batterie.

7.12.1 *Addition:*

Les instructions pour les chargeurs de batterie destinés à être montés dans des caravanes et véhicules analogues doivent indiquer que le raccordement au réseau d'alimentation doit être effectué conformément aux règles d'installation nationales.

7.101 Les tableaux de distribution de courant continu doivent porter les marquages suivants:

– le courant de sortie maximal, en ampères, pour chaque circuit de sortie;
– les types de toutes les sources d'alimentation supplémentaires qui peuvent être raccordées.

La vérification est effectuée par examen.

8 Protection contre l'accès aux parties actives

L'article de la Partie 1 est applicable avec l'exception suivante.

8.1 *Addition:*

*Durant l'insertion ou le retrait des batteries dont la tension ne dépasse pas 42,4 V, une protection contre le contact avec les **parties actives** de la batterie ou du chargeur de batterie doit être assurée.*

9 Démarrage des appareils à moteur

L'article de la Partie 1 n'est pas applicable.

10 Puissance et courant

L'article de la Partie 1 est applicable avec les exceptions suivantes.

10.101 La tension de sortie en courant continu à vide ne doit pas dépasser 120 V.

*La vérification est effectuée en mesurant la tension de sortie en courant continu à vide lorsque le chargeur de batterie est alimenté sous la **tension assignée**.*

10.102 La valeur moyenne arithmétique du courant de sortie ne doit pas dépasser le **courant de sortie continu assigné** de plus de 10 %.