IEC 60335-2-29

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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)

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IEC Central Office
3, rue de Varembé
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
Fax: +41 22 919 03 00
info@iec.ch
www.iec.ch

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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

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –

Part 2-29: Particular requirements for battery chargers

FOREWORD

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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.

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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).

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- 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).

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INTRODUCTION

It has been assumed in the drafting of this International Standard that the execution of its provisions is entrusted to appropriately qualified and experienced persons.

This standard recognizes the internationally accepted level of protection against hazards such as electrical, mechanical, thermal, fire and radiation of appliances when operated as in normal use taking into account the manufacturer's instructions. It also covers abnormal situations that can be expected in practice and takes into account the way in which electromagnetic phenomena can affect the safe operation of appliances.

This standard takes into account the requirements of IEC 60364 as far as possible so that there is compatibility with the wiring rules when the appliance is connected to the supply mains. However, national wiring rules may differ.

If an appliance within the scope of this standard also incorporates functions that are covered by another part 2 of IEC 60335, the relevant part 2 is applied to each function separately, as far as is reasonable. If applicable, the influence of one function on the other is taken into account.

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

NOTE 1 This means that the technical committees responsible for the part 2 standards have determined that it is not necessary to specify particular requirements for the appliance in question over and above the general requirements.

This standard is a product family standard dealing with the safety of appliances and takes precedence over horizontal and generic standards covering the same subject.

NOTE 2 Horizontal and generic standards covering a hazard are not applicable since they have been taken into consideration when developing the general and particular requirements for the IEC 60335 series of standards. For example, in the case of temperature requirements for surfaces on many appliances, generic standards, such as ISO 13732-1 for hot surfaces, are not applicable in addition to Part 1 or part 2 standards.

An appliance that complies with the text of this standard will not necessarily be considered to comply with the safety principles of the standard if, when examined and tested, it is found to have other features that impair the level of safety covered by these requirements.

An appliance employing materials or having forms of construction differing from those detailed in the requirements of this standard may be examined and tested according to the intent of the requirements and, if found to be substantially equivalent, may be considered to comply with the standard.

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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:

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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

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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.

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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

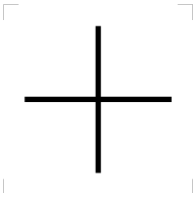
– the maximum "on" time;

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

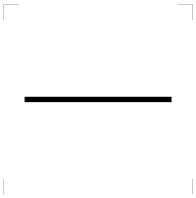
7.4 *Addition:*

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.

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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.

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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*

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*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.

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