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Safety technical requirements of charger for electric bicycles

电动自行车用充电器安全技术要求

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1 Scope

GB 42296-2022 is the Chinese national standard on safety technical requirements of charger for electric bicycles, in the field of road vehicles engineering. It carries no /T suffix, which in the Chinese system means compliance is mandatory: a product or a practice within its scope has to meet it to be lawfully made, sold or carried out in China. It was issued on 29 December 2022 by the State Administration for Market Regulation; Standardization Administration of China, and has been in force since 1 July 2023. Classification: ICS 43.140, CCS Y14. This page is published from the official record of the standard held by the Chinese standards administration: the identification, the dates, the

classification and the issuing body are taken from there. The clause text, the tables and the numeric limits are in the document itself, which is delivered complete in English translation.

This document stipulates the technical requirements for electric shock protection categories, safety, signs, warnings, instructions for use of electric bicycle chargers; describes the corresponding test methods. This document applies to chargers for electric bicycles, that comply with GB 17761. This document does not apply to charging facilities, such as on-board chargers, charging/swapping cabinets, charging piles, fast charging stations for electric bicycles.

2 Normative references

The contents of the following documents constitute essential provisions of this document through normative references in the text. Among them, for dated reference documents, only the version corresponding to the date applies to this document; for undated reference documents, the latest version (including all amendments) applies to this document.

GB/T 1002 Single phase plugs and socket-outlets for household and similar purposes - Types, basic parameters and dimensions

GB/T 2099.1 Plugs and socket-outlets for household and similar purposes - Part 1: General requirements

GB/T 2423.1 Environmental testing - Part 2: Test methods - Tests A: Cold

GB/T 2423.2 Environmental testing - Part 2: Test methods - Tests B: Dry heat

GB/T 2423.3 Environmental testing - Part 2: Testing method - Test Cab: Damp heat, steady state

GB/T 2423.10-2019 Environmental testing - Part 2: Test methods - Test Fc: Vibration (sinusoidal)

GB/T 4208-2017 Degrees of protection provided by enclosure (IP code)

GB 4343.1 Electromagnetic compatibility requirements for household appliances, electric tools and similar apparatus - Part 1: Emission

GB 4706.1-2005 Household and similar electrical appliances - Safety - Part 1: The state of the charger, where it works based on normal use, when it is connected to the power source.

Note: Including high efficient charging, high voltage charging, trickle charging and other states, as well as the maximum charging current and voltage states stated in the instructions.

4 Categories of electric shock protection

4.1 Category I charger Protection against electric shock not only relies on basic insulation,

but also includes a charger with additional safety measures. The charger's protection measure is to connect the accessible live parts to the ground protective conductor in the fixed parts of the facility, so that the basic insulation fails, whilst the accessible live parts will not become live. This type of charger has a protective ground.

Note: This protection measure includes protective conductors in power cords. Category I chargers may contain category II structures. Example: The input terminal is a single-phase two-pole charger, which has a grounded plug.

4.2 Category II charger Electric shock protection not only relies on basic insulation, but also chargers that provide additional safety measures, such as double insulation or reinforced insulation. This type of charger has no protective grounding. Example: A charger with a single-phase two-pole plug as the input terminal.

5.1 Machinery safety and structure

5.1.1 Enclosure shock After testing according to the method specified in 6.1.1, the charger shall comply with the provisions of

21.1 in GB 4706.1-2005.

5.1.2 Drop After testing according to the method specified in 6.1.2, the charger shall comply with the provisions of 8.1, 15.1.1, 16.3, Chapter 29 of GB 4706.1-2005.

5.1.3 Vibration After testing according to the method specified in 6.1.3, the charger shall meet the following requirements:

- a) All relevant parts are not deformed or fallen off;
- b) Comply with the provisions of 5.2.2;
- c) Can work normally.

5.1.4 Structure

5.1.4.1 The structure of the charger shall meet the following requirements:

- a) Eliminate rough or sharp edges, that pose a hazard to the user during normal use or user maintenance;
- b) Power the output circuit, through an isolation device (transformer, etc.);
- c) Wood, cotton, silk, plain paper and similar fibrous or hygroscopic materials shall not be used as insulating materials, unless otherwise impregnated.

5.1.4.2 The protective impedance shall consist of at least two separate components, the impedance of which shall not change significantly, during the lifetime of the appliance. If any of these components is short-circuited or open-circuited, the value specified in

8.1.4 of GB 4706.1-2005 shall not be exceeded.

Note: Resistors complying with

5.5.6 in GB 4943.1-2022 and Y-class capacitors complying with GB/T 6346.14-2015 are considered to be sufficiently stable impedance components.

5.1.4.3 Appliances connected to the power supply through a plug shall be constructed, so that when the pins of the plug are touched during normal use, there will be no risk of electric shock due to overcharged capacitors.

Note: Capacitors with a rated capacitance of no greater than 0.1 μF are not considered to cause an electric shock hazard.

5.1.5 Internal wiring The internal wiring of the charger shall meet the following requirements.

- a) When bushings are used as additional insulation for internal wiring, hold it in place by a reliable means.
- b) The wiring path is smooth and has no sharp edges.
- c) The wiring is protected, so that it does not come into contact with burrs, cooling fins or similar objects, that may cause damage to the insulation. There is a metal hole through which insulated wires pass; it has a flat, smooth surface or an insulating sleeve. Test according to the method specified in 6.2.4. The structure and casing of the charger shall provide adequate protection against accidental contact with live parts.

5.2.5 Abnormal operation

5.2.5.1 Wrong connection Carry out the test according to the method specified in 6.2.5.1. The charger shall have no current output; there is no electric shock, fire or mechanical hazard. The charger shall work properly, when connected correctly.

5.2.5.2 Short circuit Carry out the test according to the method specified in 6.2.5.2. The charger shall be free of any faults, electric shock, fire, mechanical hazards.

5.2.5.3 Fan stalling The charger, which is equipped with a fan, is tested according to the method specified in 6.2.5.3; meanwhile it shall comply with the requirements of 5.2.2.

5.2.5.4 Component failure Conduct the test according to the method specified in 6.2.5.4. Any component in the charger circuit, that is short-circuited or open-circuited (except components that meet the requirements of basic insulation, supplementary insulation, reinforced insulation), shall not have the following phenomena:

- a) Electric shock, fire, mechanical hazards;
- b) Lithium-ion battery chargers produce an output voltage, that is 15% higher than the rated maximum output voltage; lead-acid battery chargers produce an output voltage, that is 20%