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Technical specification for charger of electric vehicle battery swap station

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Technical specification for charger of electric vehicle battery swap station

1 Scope

This standard specifies the basic composition, functional requirements, technical requirements, test methods, inspection rules, and marking, packaging, transportation and storage for charger of electric vehicle battery swap station.

This standard is applicable to the off-board charger which charges the battery swap station of electric vehicle (hereinafter referred to as the charger).

2 Normative references

The following documents are essential to the application of this document. For the dated documents, only the versions with the dates indicated are applicable to this document; for the undated documents, only the latest version (including all the amendments) are applicable to this standard.

GB/T 2423.1-2008 Environmental testing - Part 2: Test methods - Tests A: Cold

GB/T 2423.2-2008 Environmental testing - Part 2: Test methods - Tests B: Dry heat

GB/T 2423.4-2008 Environmental testing for electric and electronic products - Part 2: Test method - Test Db: Damp heat, cyclic (12h+12h cycle)

GB/T 2900.1 Electrotechnical terminology - Fundamental terms

GB 4208-2008 Degrees of protection provided by enclosure (IP code)

GB 9254 Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement

GB/T 13384 General specifications for packing of mechanical and electrical product

GB/T 16821-2007 General test methods of power supply equipment for telecommunications

GB 17625.1 Electromagnetic compatibility - Limits - Limits for harmonic

current emissions (equipment input current ≤ 16 A per phase)

GB/Z 17625.6 Electromagnetic compatibility - Limits - Limitation of emission of harmonic currents in low-voltage power supply systems for equipment with rated current greater than 16A

GB/T 17626.2-2006 Electromagnetic compatibility (EMC) - Testing and measurement techniques - Electrostatic discharge immunity test

GB/T 17626.3-2006 Electromagnetic compatibility - Testing and measurement techniques - Radiated radio-frequency electromagnetic field immunity test

GB/T 17626.4-2008 Electromagnetic compatibility - Testing and measurement techniques - Electrical fast transient/burst immunity test

GB/T 17626.5-2008 Electromagnetic compatibility - Testing and measurement techniques - Surge immunity test

GB/T 18487.1-2001 Electric vehicle conductive charging system - Part 1: General requirements

GB/T 29317 Terminology of electric vehicle charging/battery swap infrastructure

NB/T 33008.1-2013 Inspection and test specifications for electric vehicle charging equipment - Part 1: Off-board charger

3 Terms and definitions

The terms and definitions as defined in GB/T 2900.1 and GB/T 29317 as well as the following terms and definitions apply to this document.

3.1

Battery electrical control unit

An electronic device in the battery swap station for collecting and monitoring electrical and thermal data of a single battery or battery module, and having a communication function. Electronic components that achieve uniformity of the individual cells can also be included if necessary.

4 Basic composition

The basic structure of the charger includes a power unit, a control unit, an electrical interface, a human-machine interface, and the like.

undervoltage occurs, the charger shall be able to automatically cut off the DC output and issue an alarm.

6.8.2 The charger shall have overvoltage and short circuit protection on the DC output side. When there is DC output over-current or over-voltage, the charger shall be able to automatically cut off the DC output and send an alarm signal; when the DC output is short-circuited, the charger shall automatically enter the current-limit output state.

6.8.3 The charger shall have an over temperature protection function. When the power unit is over temperature, the charger shall be able to automatically cut off the DC output and send an alarm signal.

6.8.4 During the charging process, the charging voltage and charging current of the battery swap station shall not exceed the allowable value.

6.8.5 During the charging process, when the voltage and temperature of the battery exceed the allowable value, the charger shall stop charging.

6.8.6 During the charging process, when it is detected that the communication with the battery electronic control unit is interrupted, the charger shall stop charging.

6.8.7 The charger shall have the battery polarity detection function. When the charger is connected to the battery swap station, the DC output of the charger is allowed to be connected to the power circuit of the battery swap station after detecting the correct polarity of the battery.

6.8.8 The charger shall have the battery connection confirmation function. When the charger is connected to the battery swap station, the charger is allowed to start the charging process after detecting that the battery is connected correctly; when the charger detects that the connection with the battery swap station is abnormal, it shall immediately cut off the DC output.

6.8.9 After the charging is completed, the DC output of the charger and the power circuit of the battery swap station shall be disconnected.

6.8.10 The charger shall have obvious status indication and text prompts to prevent personnel from mishandling.

6.9 Output performance requirements

6.9.1 Output voltage

In accordance with the voltage range of the battery swap station, the rated output voltage of the charger can be divided into 5 levels:

30V ~ 50V, 50V ~ 70V, 70V ~ 100V, 100V ~ 250V, 250V ~ 500V.

voltage;

- b) When the charger is running in the constant voltage state, if the output DC current exceeds the current limit setting value, it shall immediately enter the current limiting state to automatically limit the increase of its output current.

6.10 Startup performance requirements

6.10.1 Soft start time

Under the rated input voltage and the output 100% rated load, the process time range from the start of the charger to the output DC voltage rising to the rated setting is (3 ~ 8) s.

6.10.2 Input surge current

Under the rated input voltage and output 100% rated load, the peak value of the input shock (surge) current caused by the start-up process of the charger shall not exceed 120% of the rated input current.

6.10.3 Output overshoot voltage

Under the rated input voltage and output no-load, 50% rated load, 100% rated load, the peak value of the output overshoot voltage caused by the start-up process of the charger shall not exceed 110% of the steady-state output voltage.

6.11 Efficiency

At the rated input voltage, when the output power is 50% ~ 100% of the rated power, the efficiency of the charger shall not be less than 90%.

6.12 Power factor

Under the rated input voltage, when the output power is 50% ~ 100% of the rated power, the power factor of the charger shall not be less than 0.90.

6.13 Noise

Under the rated load and the condition that ambient noise is not more than 40 dB, at a point 1 m from the horizontal position of the charger, the measured noise maximum value shall not be greater than 65 dB.

6.14 Temperature rise

Under normal test conditions, when the AC input is rated and it is continuously operated under rated load for a long period of time, the temperature rise of each heating component and each part inside the charger shall not exceed the requirements of Table 4.

It is tested in accordance with the method specified in 5.6.6 of NB/T 33008.1-2013.

7.7.7 Pressure limiting characteristic test

The charger is connected to the load and set to operate in a constant current state. The load is adjusted to increase the output voltage, when the output DC voltage reaches the voltage limit setting value, the charger shall automatically reduce the output current, thereby limiting the increase of the output DC voltage; when the output DC voltage is adjusted back below the voltage limit setting value, the charger resumes the constant current state operation.

7.7.8 Current limiting characteristic test

The charger is connected to the load and set to operate under constant voltage state. The load is adjusted to increase the output current, when the output DC current reaches the current limit setting value, the charger shall automatically reduce the output voltage, thereby limiting the increase of the output DC current; when the output DC current is adjusted back below the current limit setting value, the charger resumes the constant voltage state operation.

7.8 Start performance test

7.8.1 Soft start time test

It is tested in accordance with the method specified in 5.6.1 of GB/T 16821-2007.

7.8.2 Input impulse current test

It is tested in accordance with the method specified in 5.6.2 of GB/T 16821-2007.

7.8.3 Output overshoot voltage test

It is tested in accordance with the method specified in 5.6.4 of GB/T 16821-2007.

7.9 Efficiency test

It is tested in accordance with the method specified in 5.6.7 of NB/T 33008.1-2013.

7.10 Power factor test

It is tested in accordance with the method specified in 5.6.8 of NB/T 33008.1-2013.

7.11 Noise test

monitoring system at any time to obtain the charging parameters and charging real-time data instantly.

7.16.4 Display function test

The charger is connected to the battery swap station for charging operation, the display function of the charger is checked under various conditions. The charger shall be able to display the relevant information specified in 5.3.1, the display characters are clear and complete, and free from defect.

7.16.5 Input function test

Set the charging parameters of the charger manually and check that the charger shall respond correctly.

7.16.6 Charging status indication function test

Connect externally the charging status indication port of the charger to the signal indicator, start the charger to perform charging operation. Control the charger to enter three status: standby, charging, and full charging, the corresponding signal indicator shall indicate correctly.

7.17 Safety protection test

7.17.1 Input overvoltage protection test

The charger is connected to the load and set to operate under rated load conditions. When adjusting the input power supply voltage to exceed the input overvoltage protection action value, the charger input overvoltage protection shall be activated, to immediately cut off the DC output and issue an alarm.

7.17.2 Input undervoltage protection test

The charger is connected to the load and set to operate under rated load conditions. When adjusting the input power supply voltage to be lower than the input undervoltage protection action value, the charger input undervoltage protection shall be activated, to immediately cut off the DC output and issue an alarm.

7.17.3 Output overvoltage protection test

Disconnect the voltage feedback adjustment circuit, connect the charger to the load, and set it to run in the constant current state. When the load is adjusted so that the output DC voltage exceeds the overvoltage protection action value, the charger output overvoltage protection shall be started to immediately cut off the DC output and issue an alarm.

7.17.4 Output short circuit protection test

automatically restored:

- c) The function or performance is temporarily reduced or lost, but requires operator intervention or system reset:
- d) Reduction or loss of self-restoration function due to damage of element or software or data loss.

7.18.2 Qualification judgment

- a) If the result of 7.18.1 a) or b) appears in the test, it is judged as qualified;
- b) If the result of 7.18.1 c) or d) appears in the test, it is judged as disqualified.

7.18.3 Electrostatic discharge immunity test

The electrostatic discharge immunity test is performed in accordance with the method specified in GB/T 17626.2-2006.

7.18.4 Radio frequency electromagnetic field radiated immunity test

The radio frequency electromagnetic field radiated immunity test is performed in accordance with the method specified in GB/T 17626.3-2006.

7.18.5 Electrical fast transient burst immunity test

The electrical fast transient burst immunity test is performed in accordance with the method specified in GB/T 17626.4-2008.

7.18.6 Surge (impact) immunity test

The surge (impact) immunity test is performed in accordance with the method specified in GB/T 17626.5-2008.

7.19 Electromagnetic emission test

7.19.1 Working conditions

In the electromagnetic emission test, the AC input voltage is the rated value, the charger operates in the constant voltage state, the DC output voltage is the rated value, the output current is the rated value (resistive load) and 0.5 times the rated value (resistive load).

7.19.2 Qualification judgment

It is judged as qualified if the electromagnetic emission limit does not exceed the rated value and shall not exceed the limits specified in Tables 5 and 6. If it exceeds the specified value, it is judged as disqualified.

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