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Translated by: www.ChineseStandard.net

Email: Sales@ChineseStandard.net

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**NATIONAL STANDARD
OF THE PEOPLE'S REPUBLIC OF CHINA
GB/T 24347-2009**

**The DC/DC converter for electric vehicles
电动汽车 DC/DC 变换器**

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Foreword

This Standard was proposed by National Development and Reform Commission.

This Standard shall be under the jurisdiction of National Technical Committee on Road Vehicles of Standardization Administration of China.

The responsible drafting organizations of this Standard: Tsinghua University, Chinese Automotive Technology & Research Centre, Beijing University of Aeronautics and Astronautics, and CSR'S Zhuzhou Electric Locomotive Research Institute.

The chief drafting staffs of this standard: Chen Quanshi, He Yuntang, Gao Dawei, Qi Bojin, Shi Shuangrong, Yang Weibin, and Wu Lixun.

The DC/DC converter for electric vehicles

1 Scope

This Standard specifies the requirements, test method, inspection rules, labeling, packaging, transportation and storage, etc. for the DC/DC converter for electric vehicles.

This Standard applies to the DC/DC converter of power supply for electric vehicles. For the DC/DC converter used for low voltage power system (12V, 24V) of accessories and control systems, it may reference to the relevant contents of this Standard.

The power rating of DC/DC converters involved in this Standard is KW-level (1 kW ~ 200 kW). It does not include modular low-power DC/DC converters.

2 Normative references

The articles contained in the following documents have become part of this Standard when they are quoted herein. For the dated documents so quoted, all the modifications (excluding corrections) or revisions made thereafter shall not be applicable to this Standard. For the undated documents so quoted, the latest editions shall be applicable to this Standard.

GB/T 2423.1 Environmental testing for electric and electronic products – Part 2: Test methods – Tests A: Cold (GB/T 2423.1-2008, IEC 60068-2-1: 2007, IDT)

GB/T 2423.2 Environmental testing for electric and electronic products – Part 2: Test methods – Tests A: Hot (GB/T 2423.2-2008, IEC 60068-2-2: 2007, IDT)

GB/T 2423.17 Environmental testing for electric and electronic products – Part 2: Test methods – Tests Ka: Salt spray (GB/T 2423.17-2008, IEC 60068-2-1: 1981, IDT)

GB 4208-2008 Degrees of protection provided by enclosure (IP code) (IEC 60529:2001, IDT)

GB 14711-2006 General requirements for safety of small and medium size rotating electrical machines

GB/T 17619-1998 Limits and methods of testing for immunity of electrical / electronic sub-assemblies in vehicles to electromagnetic radiation

The earthing point shall be clearly indicated with earthing mark.

5.9 Electrical gap and creepage distance

The electrical gap and creepage distance shall be in accordance with the relevant requirements specified in Table 3 of GB/T 18488.1-2006.

5.10 Rated power

The maximum output power from the DC/DC converter shall be greater than or equal to the rated power value indicated on the nameplate after the temperature rise is stable, under specified environmental condition, rated voltage, and continuous operating condition.

5.11 Peak output power and duration

For a DC/DC converter, the overloading output power shall not be less than 1.2 times of its rated power. The operating duration measured at peak value according to the method as mentioned in sub-clause 6.11 shall not be less than 6 min.

5.12 Electromagnetic compatibility (EMC)

For a DC/Dc converter, the conductive interference and radiated interference generated during operation shall not exceed the limits specified in clauses 12 and 14 in GB 18655-2002.

The anti-interference of an operating DC/DC converter shall comply with clause 4 of GB/T 17619-1998.

5.13 Dynamic response time

The dynamic response time of a DC/DC converter shall meet the delivery documents signed by the manufacturer and user.

5.14 Reliability

The mean time between failures (MTBF) of a DC/DC converter shall not be less than 3000 h, under the rated load or according to the set condition of cyclic operation.

5.15 Durability

The durability requirements of a DC/DC converter shall meet the delivery documents signed by manufacturer and user.

For a DC/DC converter, the humidity test shall be carried out in accordance with sub-clause 3.11 of QC/T 413-2002, for 2 cycles. During test, when 0 ~ 45°C, the DC/DC converter shall operate at normal state.

6.1.3 Salt spray

The salt spray test shall be in accordance with the relevant requirements of GB/T 2423.17. The DC/DC shall be properly installed. The recommended test duration shall be 16 h, 24 h and 48 h. Upon completion of test, and after the DC/DC converter is recovered for 1 h ~ 2 h, check if it can operate normally after energized.

6.2 Vibration test

A DC/DC converter shall be performed for vibration test in accordance with sub-clause 3.12 of QC/T 413-2002.

6.3 Mechanical strength of outer housing

Evenly apply a force equivalent to a weight of 100 kg onto an arbitrary area of 30 cm × 30 cm on the surface of the outer housing of the DC/DC converter. Observe the plastic deformation on the surface.

6.4 Protection level

Test shall be carried out in accordance with GB 4208-2008 with respect to IP55.

6.5 Noise

A DC/DC converter shall be performed for operating noise in accordance with sub-clause 4.4 of QC/T 413-2002.

6.6 Insulation performance

Under the condition that the DC/DC converter is not operated, when the ambient temperature is 23°C±2°C and relative humidity is 80% ~ 90%, use a 1000V megger (or other instrument with the same function and precision level) to measure the insulation resistance between the live circuit of a DC/DC converter and the earth (outer housing).

6.7 Performance of voltage withstanding

Under the condition that the DC/DC converter is not operated, when the ambient temperature is 23°C±2°C and relative humidity is 80% ~ 90%, use a voltage withstanding tester with a measuring range of 2000 V (DC) (or rated voltage of +1500 V) to measure

b) Certificate of conformity; and

c) Instructions for use.

8.3 Transportation

8.3.1 During transportation, the product shall be kept away from serious mechanical impact, strong sunlight and rain, not turned upside down.

8.3.2 During loading/unloading, handle the product with care. Strictly avoid throwing, rolling and heavy load.

8.4 Storage

8.4.1 The product may be stored in a dry, clean, and well-ventilated warehouse with a temperature range from -30 ~ +70°C.

8.4.2 The product shall not be exposed to direct sunlight and kept away from heat source by not less than 2 m.

8.4.3 The product shall not be turned upside down and shall avoid mechanical impact and heavy load.

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Contact: Wayne Zheng, Sales@ChineseStandard.net

Linkin: <https://www.linkedin.com/in/waynezhengwenrui/>

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