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ICS 43.120
CCS T 09

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ASSOCIATION STANDARD

T/CSAE 45-2015

Performance levels and methods of measurement of magnetic and electric field strength from electric vehicles, 9 kHz to 30 MHz

电动汽车的电磁场发射强度（9KHz - 30MHz）测试规范

(English Translation)

Issued on: November 5, 2015 **Implemented on: November 5, 2015**

Issued by: China Society of Automotive Engineers

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Foreword

This standard was drafted in accordance with the rules given in GB/T 1.1-2009.

Please note that some elements of this standard may involve patents. The issuing organization of this standard does not assume responsibility for identifying these patents.

The main differences between this standard and the relevant standards are given in the written instructions.

This standard was proposed and managed by the China Automotive Engineering Society.

This standard was drafted. China Automotive Engineering Research Institute Co., Ltd., Kerry Electric Vehicle Systems Co., Ltd., Changan, Chongqing Automobile Co., Ltd.

1 Scope

This specification specifies the limits and measurement methods for the radiated emissions of magnetic and electric fields in the frequency range of 9 kHz to 30 MHz for electric vehicles.

And limits and measurement methods for conducted emissions from 9 kHz to 30 MHz.

This specification applies to pure electric vehicles, hybrid vehicles, plug-in hybrid vehicles, extended-range electric vehicles, fuel cells.

Electric cars such as automobiles.

The conducted emission measurement in this specification is only applicable to the vehicle battery charging system. The switching frequency should be above 9 kHz, and the energy passes through the gold.

The technical requirements for conductor transmission and conducted emissions are only applicable during the charging process of the battery through the AC power cord.

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2 Normative references

The following documents are indispensable for the application of this document. For dated references, only the dated version applies.

This document. For undated references, the latest edition (including all amendments) applies to this document.

GB/T 4365 Electrotechnical terminology electromagnetic compatibility SAE J551/1 - Performance Levels and Methods of Measurement of Electromagnetic Compatibility of Vehicles, Boats (up to 15 m), and Machines (16.6Hz to 18GHz) SAE J1772 -(R) SAE Electric Vehicle and Plug in Hybrid Electric Vehicle Conductive Charge Coupler GB/T 6113.101-2008 Specification for radio disturbance and immunity measuring equipment and methods of measurement - Part 1-1. Radio disturbance and Immunity measurement equipment GB/T 6113.104-2008 Radio disturbance and immunity measurement equipment and methods of measurement - Part 1-4. Radio disturbances and Immunity measurement equipment auxiliary equipment radiation disturbance ANSI C63.4 - American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to

40 GHz

ANSI C63.12 - American National Standard for Electromagnetic Compatibility Limits -Recommended Practice GB 18352.3-2005 light vehicle pollutant emission limit and measurement method GB 14023-2011 Vehicle, ship and internal combustion engine radio disturbance characteristics for the protection of off-board receiver limits and measurement methods ECE R10.04-Uniform provisions concerning the approval of vehicles with regard to Electromagnetic compatibility SAE J551/5-2012 - Performance Levels and Methods of Measurement of Magnetic and Electric Field Strength from Electric Vehicles, Broadband, 150 kHz to 30 MHz GB/T 18387-2008 Limits and methods of measurement of electromagnetic field radiation intensity of electric vehicles. Broadband 9 kHz to 30 MHz

3 Terms and definitions the terms and definitions established in GB/T 4365 apply to this specification.

4 disturbance limit

The electromagnetic field radiation emission limit is referred to GB/T 18387-2008, and the conducted emission limit is referred to ECE R10.04.

4.1 Radiated emission limits

Table 1 and Figure 1 show the peak detection electric field strength emission limits.

Table 2 and Figure 2 show the peak detection magnetic field strength emission limits.

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Table 1 Peak electric field emission limits

Frequency f

MHz

Level dB

μV/m/kHz

Level dB

μV/m/kHz

0.009~4.77 99.9-20lg [f/0.009] 99.9~45.4 4.77~15.92 154.4-40lg [f/0.009] 45.4~24.4 15.92~20 89.4-20lg [f/0.009] 24.4~22.5 20~30 22.5 22.5 Note. Limits vary linearly with log frequency 99.9 45.4 24.4 22.5 GB/T 18387-2008 E-field PK

Figure 1 Peak electric field emission limit

Table 2 Peak magnetic field emission limits

Frequency f

MHz

Level dB

μA/m/kHz

Level dB

μA/m/kHz

0.15~4.77 48.4-20lg [f/0.009] 48.4~-6 4.77~15.92 102.9-40lg [f/0.009] -6~-27.1 15.92~20 37.9-20lg [f/0.009] -27.1~-29.0 20~30 -29.0 -29.0 Note. Limits vary linearly with log frequency 48.4-27.1-29 GB/T 18387-2008 H-field PK

Figure 2 Peak magnetic field emission limits

4.2 Conducted emission limits See Table 3 and Figure 3 for the conducted emission limits of the on-board charging system.

Table 3 Conducted emission limits

Frequency f

MHz

Limit value dB

Quasi-peak average

0.15~0.50 66~56 56~46 0.50~5 56 46 5~30 60 50

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Note 1: Lower limits should be used at the transition frequency (0.50MHz and 5MHz).

Note 2: In the frequency range of 0.15 MHz to 0.50 MHz, the limit decreases linearly with the logarithm of the frequency.

Figure 3 Conducted emission limits

5 measuring instruments the quasi-peak measurement receiver shall comply with the requirements of Chapter 4 of GB/T 6113.101-2008.

The average measuring receiver shall comply with the requirements of Chapter 6 of GB/T 6113.101-2008 and have GB/T 6113.101 -2008 the 6 dB bandwidth required by 6.2.1.

The peak measurement receiver shall comply with the requirements of Chapter 5 of GB/T 6113.101-2008 and shall have GB/T 6113.101-2008

5.2.1 Required 6 dB bandwidth.

The antenna should meet the requirements of GB/T 6113.104-2008. The following antennas are used for this specification.

Electric field antenna - 1m vertical monopole with antenna matching unit;

Magnetic field antenna - 60cm electrostatic shielding ring antenna.

Other related measuring equipments meet the requirements of GB/T 6113.

6 test site

6.1 Radiation launch site requirements the test site should meet the requirements of the open field (OATS) or meet the requirements of the absorbing shielded room (ALSE), see GB 14023-2011.

6.1.1 Electric field antenna grounding requirements the electric field antenna matching unit must be fixed to the reflective floor to obtain the minimum grounding inductance.

6.1.2 Electric field antenna position requirements the rod antenna is placed on the ground, and the nearest part of the vehicle is 3m±0.03m. It is tested at the front, rear, left and right positions of the vehicle, such as

Figure 4 shows.

a. the front and back of the vehicle, along the centerline of the vehicle;

b. The left and right sides of the vehicle, along the centerline between the front and rear wheels.

Figure 4 Electric field antenna position

6.1.3 Magnetic field antenna position requirements the center of the loop antenna is placed 1m ± 0.05m above the ground and 3m ± 0.03m from the nearest part of the vehicle.

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