Comparative Study of Electromagnetic Exposure to Electric Vehicle

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ABSTRACT

With the development of science and technology, the increase of people’s awareness of green development, energy conservation and environmental protection has become an inevitable trend of future development. Blade electric vehicle (BEV) received widely attention for its small noise and high energy efficiency recently. However, the BEV brings a series of problems when bringing convenience to people’s lives. Among them, the electromagnetic radiation of BEV has received more attention. Aiming at this question, this paper analysis the electromagnetic radiation of several household electric appliance (HEA) and traffic tool based on national standard GB 8702-2014. In order to formulate protective measures, this paper compares electromagnetic radiation of BEV with the electromagnetic radiation of HEA and other traffic tools, which can lay the basis for developing related physical protection measures.

KEYWORDS
Electric vehicle, Electromagnetic radiation, GB 8702-2014.

INTRODUCTION

In recent years, the shortage of oil and the environmental crisis make energy conservation and protection a major trend in the future. The new energy electric vehicle will not produce any exhaust gases in operation process. Which will relieve the problem of environmental pollution to some extent [1]. Due to the increase of electric vehicles and household electrical appliances, the public attention to electromagnetic radiation has increased. The national standard GB 8702 specifies the limit value of electromagnetic field. Compared the test data to the limit level specified in GB 8702-2014 between electric vehicles and household appliance, this paper analyzed the electromagnetic radiation, which will provide the basis for the establishment of standard and relevant protective measures.

MAGNETIC RADIATION ANALYSIS FOR HOUSEHOLD APPLIANCES

Household appliances has become an essential part of people’s lives gradually. As people enjoy the convenience that they bring, they also affect the electromagnetic radiation that they emit. In this chapter, the magnetic radiation generated by appliances, such as refrigerators and microwave ovens, are analyzed [2] [3].

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**Magnetic Radiation of Refrigerators**

With the equipment ELT-400, the front surface, right surface, rear surface and left surface of the refrigerator were measured, as shown in Figure 1. Compared the maximum test data of four position with limit level of GB 8702-2014 standard, the result shows as Figure 2.

According to the results shown in Figure 2. The magnetic radiation values at each frequency point are within the limits specified by the standard. The minimum margin of the magnetic radiation value is 24.7375 dB

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![Figure 1. Measurement positions.](image1)

![Figure 2. Test results.](image2)
Magnetic Radiation of Microwave Ovens

With the equipment ELT-400, the front surface, right surface, rear surface, and left surface and above surface of microwave ovens were measured, as shown in Figure 3. Compared the maximum test data of four position with limit level of GB 8702-2014 standard, the result shows as Figure 4.

According to the results shown in Figure 4. The magnetic radiation values at each frequency point are within the limits specified by the standard. The minimum margin of the magnetic radiation value is 26.4413 dB.
MAGNETIC RADIATION ANALYSIS FOR TRANSPORTATION

With the process of urbanization is accelerating, in order to improve the urban traffic congestion and atmospheric environment, more and more advanced transport put into use. The magnetic radiation generated by high-speed rail and subway were analyzed [4].

Magnetic Radiation of High-Speed Rail

With the equipment ELT-400, the car connection, distribution cabinet, pantograph, non-power compartment connection, the top and bottom of the car were measured, as shown in Figure 5. Compared the maximum test data of four position with limit level of GB 8702-2014 standard, the result shows as Figure 6.

According to the results shown in Figure 6. The magnetic radiation values at each frequency point are within the limits specified by the standard. The minimum margin of the magnetic radiation value is 24.9989 dB.
Magnetic Radiation of Subway

With the equipment ELT-400, the car connection, electric cabinet, air condition cabinet, seats were measured, as shown in Figure 7. Compared the maximum test data of four position with limit level of GB 8702-2014 standard, the result shows as Figure 8.

According to the results shown in Figure 6. The magnetic radiation values at each frequency point are within the limits specified by the standard. The minimum margin of the magnetic radiation value is 2.6619 dB.
MAGNETIC RADIATION OF NEW ENERGY VEHICLES

In order to resolve the growing environmental pollution problems, new energy vehicles develop rapidly. However, due to more electrical equipment, compared with traditional vehicles, electric vehicles may produce more serious electromagnetic radiation during run time [5]. In this chapter, for example, a study on magnetic radiation of the electric vehicle was carried out. With the equipment ELT-400, the head, chest, genitals of each seat were measured. Compared the maximum test data of four position with limit level of GB 8702-2014 standard, the result shows as Figure 9.

With electric system and exist of motor and controller, there will be electromagnetic radiation inevitably. According to the results shown in Figure 9. The magnetic radiation values at each frequency point are within the limits specified by the standard. The minimum margin of the magnetic radiation value is 18.4496 dB

CONCLUSION

According to the test results, the household appliances, transports and electric vehicle test in this paper are within in the standard requirement. However, due to the uniqueness of the sample and the variability of the state of electric vehicle, the magnetic radiation of electric vehicle remains to be further studied.

REFERENCES

