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Electric buses safety requirements

电动客车安全要求

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Foreword

All technical contents of this Standard are mandatory. This Standard was drafted in accordance with the rules given in GB/T 1.1-2009. This Standard was proposed by and shall be under the jurisdiction of Ministry of Industry and Information Technology of the People's Republic of China. Drafting organizations of this Standard. Zhengzhou Yutong Bus Co., Ltd., China Automotive Technology and Research Center Co., Ltd., BYD Automotive Industry Co., Ltd., Ningde CATL Co., Ltd., Chongqing Vehicle Test and Research Institute Co., Ltd., Zhejiang Geely New Energy Commercial Vehicle Co., Ltd., SAIC Chase Automobile Co., Ltd., Hunan CRRC Electric Vehicle Co., Ltd., National Automobile Quality Supervision and Test Center (Xiangyang), Shanghai Motor Vehicle Inspection Certification and Tech Innovation Center Co., Ltd., Changchun Automobile Test Center Co., Ltd., China Automotive Engineering Research Institute Co., Ltd., Dongfeng Motor Corporation Technical Center, Anhui Ankai Automobile Co., Ltd., Xiamen King Long United Automobile

Industry Co., Ltd., Xiamen King Long Wagon Co., Ltd., BAIC Foton Motor Co., Ltd., Zhongtong Bus Holding Co., Ltd. Main drafters of this Standard. Li Gaopeng, Lian Yubo, Lu Chun, Guan Xiuwen, Liu Zhixin, Yin Lichao, Song Guanghui, Ye Lei, Liu Zhaohui, Wang Fang, Yu Yanhu, Wang Wei, Wang Dan, Li Yao, Lin Chunjing, Peng Wang, Zhang Hongbo, Gao Zhenhua, Zhu Shunliang, Cui Fengtao, Zhang Dazhi, Ai Longcai, Chen Shundong, Li Zhiqiang, Kang Yanyu, Wei Changhe, Zhao Jia.

1 Scope

China's mandatory national standard for the safety of electric buses. China operates the overwhelming majority of the world's electric buses, and this is the document that governs how they are built. Its starting point is that the general electric vehicle safety standard was not enough for a vehicle of this kind: a bus carries a very large battery, often under the floor or on the roof along the whole length, and it carries up to a hundred people who leave through a small number of doors. So this standard was written on top of GB 18384 and GB 38031 to add what is specific to the bus - the resistance to water and dust of a vehicle that wades through flooded streets, the fire behaviour of the high voltage components, and the safety of the rechargeable energy storage system and of charging. It applies to M2 and M3 electric buses, both battery electric and hybrid, and not to fuel cell buses.

This Standard specifies the safety requirements and test methods for electric buses. This Standard applies to M2 and M3 electric buses, including battery electric buses and hybrid electric buses. This Standard does not apply to fuel cell electric buses.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

GB/T 2408-2008 Plastics - Determination of burning characteristics - Horizontal and vertical test

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

GB 8624-2012 Classification for burning behavior of building materials and products

GB/T 10295 Thermal insulation - Determination of steady-state thermal resistance and related properties - Heat flow meter apparatus

GB 13094 The safety requirements for bus construction

GB/T 15089 Classification of power-driven vehicles and trailers

GB 17578 Requirements and test methods of strength for the superstructure of bus

GB 18384 Electrically propelled road vehicles - Safety specifications

GB/T 19596 Terminology of electric vehicles

GB 20071-2006 The protection of the occupants in the event of a lateral crash

GB/T 31498-2015 The safety requirement of electric vehicle post crash

3 Terms and definitions

For the purpose of this document, the terms and definitions defined in GB 13094, GB/T 15089, GB/T 19596 and the following apply.

3.1 minimum management unit of battery system The minimum unit of battery that the battery management system can monitor.

4 Safety requirements

4.1 General safety requirements The general safety of electric buses shall meet the requirements of GB 18384.

4.2 Requirements for waterproof and dustproof performance

4.2.1 Vehicle wading requirements Carry out the vehicle wading test according to the test method specified in 5.1.1. Within 10 min after the test is completed, the insulation resistance of the vehicle shall be greater than 1 MOmega.

4.2.2 Requirements for degrees of protection provided by Class B voltage components

4.2.3 Vehicle soaking requirements Carry out the vehicle soaking test according to the test method specified in 5.1.3.Within 2 h after the test is completed, the vehicle shall not be fired or exploded.

4.4 Safety requirements for rechargeable energy storage system

4.4.1 Thermal runaway requirements for the minimum management unit of battery system Carry out the thermal runaway test for the minimum management unit of battery system according to the test method specified in 5.3.1.The test object shall not be fired or exploded.

4.4.2 Flame retardant requirements for materials of parts in rechargeable energy storage system Except for secondary cells, other non-metallic parts in the rechargeable energy storage system are subjected to the flame retardant test of the materials of parts in the rechargeable energy storage system according to the test method specified in 5.3.2, which shall meet the following flame retardant requirements.

4.4.4 Requirements for disconnecting devices The rechargeable energy storage system

shall be equipped with fuses and manual maintenance switches.

4.4.5 Requirements for pressure relief devices The rechargeable energy storage system shall be equipped with directional pressure relief and pressure balancing devices, and the pressure relief pressure shall not exceed 50 kPa.

4.4.6 Abnormal alarm requirements The rechargeable energy storage system shall provide a thermal event alarm signal 5 min before thermal diffusion due to thermal runaway of a single battery, which in turn causes a danger in the passenger cabin.

4.6 Charging safety requirements

4.6.1 Safety requirements for charging interfaces When the vehicle is equipped with multiple charging interfaces, the charging interface that does not perform charging shall be electrically neutral.

4.7 Safety requirements after vehicle crash and rollover

4.7.1 Safety requirements after vehicle crash If there is a rechargeable energy storage system of which the lowest point is not more than 1 m above the ground (the vehicle is at no-load state), the crash test shall be carried out according to the test method specified in 5.5.1.

4.7.3 Exemption clauses for vehicle crash and rollover tests When a vehicle model that requires the assessment of vehicle crash safety requirements meets one of the following two conditions, it is deemed to meet the requirements of 4.7.1.

5.1 Waterproof and dustproof

5.1.1 Vehicle wading test The vehicle shall travel 500 m at a speed of 5 km/h ~ 10 km/h in a 300 mm deep pool for 3 min ~ 6 min. If the length of the pool is less than 500 m, the test shall be repeated so that the accumulative wading length is not less than 500 m. The total test time, including when the vehicle is outside the pool, shall be less than 10 min.

5.1.3 Vehicle soaking test The vehicle is soaked in a 500mm deep water pool for 24 h with Class A and B voltage circuits disconnected.

5.2 Fireproof performance

5.2.1 Flame retardant performance test of Class B voltage components The horizontal burning and vertical burning shall be tested according to the provisions of GB/T 2408-2008.

5.2.2 Test of flame retardant and thermal insulation performance between rechargeable energy storage system (or installation cabin) and passenger cabin

5.3 Rechargeable energy storage system safety