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Safety Specifications for Commercial Bus

营运客车安全技术条件

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Foreword

This Standard was drafted as per the rules specified in GB/T 1.1-2009.

This Standard was proposed by Transport Service Department, Ministry of Transport of the PRC.

This Standard shall be under the jurisdiction of Bus Subcommittee of the National Technical Committee for Standardization of Automotive (SAC/TC 114/SC22).

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Safety Specifications for Commercial Bus

1 Scope

This Standard specifies the safety technical requirements for the entire vehicle, main assembly, safety protection device of the commercial bus.

This Standard is applicable to the Class-B and Class-III commercial bus in the Type-M₂ and Type-M₃ vehicle.

This Standard is not applicable to the school bus.

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 document.

GB/T 2408 Plastics – Determination of Burning Characteristics – Horizontal and Vertical Test

GB/T 3730.1 Motor Vehicles and Trailers – Types – Terms and Definitions

GB/T 6323 Controllability and Stability Test Procedure for Automobiles

GB 7258 Safety Specifications for Power-Driven Vehicles Operating on Roads

GB 12676 Technical Requirements and Testing Methods for Commercial Vehicle and Trailer Braking Systems

GB 13057 The Strength of the Seats and their Anchorages of Passenger Vehicles

GB 13094 The Safety Requirements for Bus Construction

GB/T 13594 Antilock Braking Performance and Test Procedure for Motor Vehicles and their Trailers

GB 14166 Safety-Belts, Restraint Systems, Child Restraint Systems and ISOFIX Child Restraint Systems for Occupants of Power-Driven Vehicles

GB 14167 Safety-Belt Anchorages, ISOFIX Anchorages Systems and ISOFIX Top

Tether Anchorages for Vehicles

GB/T 14172 Static Roll Stability Test Method for Motor Vehicles

GB/T 15089 Classification of Power-Driven Vehicles and Trailers

GB 17578 Requirements and Test Methods of Strength for the Superstructure of Bus

GB/T 17619 Limits and Methods of Testing for Immunity of Electrical / Electronic Sub-Assemblies in Vehicles to Electromagnetic Radiation

GB 18565 Composite Performance Requirement and Detecting Methods for Road Transport Vehicles

GB/T 18655 Vehicles Boats and Internal Combustion Engines - Radio Disturbance Characteristics - Limits and Methods of Measurement for the Protection of on-Board Receivers

GB/T 19056 Vehicle Travelling Data Recorder

GB 19239 Mounting Requirements of Special Equipment for Gas Vehicle

GB/T 23334 Open-Type Roof Escape Hatch on Bus

GB/T 24545 Requirement of Speed Limitation System for Motor Vehicles

GB/T 30677 Performance Requirements and Testing Methods for Electronic Stability Control System (ESC) for Light Vehicles

GB 30678 Safety Signs and Information Symbols for the Use of Bus

JT/T 721 Requirements and Test Methods of Electromagnetic Retarder for the Use of Bus

JT/T 782 Technical Requirements of Tyre Failure Emergency Safety Device for Bus

JT/T 794 GNSS System for Operating Vehicles - Technical Specification for Vehicle Terminals

JT/T 808 GNSS System for Operating Vehicles - General Specifications for Vehicle Terminal Communication Protocol and Data Format

JT/T 883 Driving Danger Warning System for Commercial Vehicles - Technical Requirements and Test Method

JT/T 889 Loading Performance Requirements and Test Methods for Engine

3500kg shall meet the requirements of GB/T 30677; the ESC equipped onto the other commercial buses shall meet the requirements of Appendix A. The electromagnetic compatibility of the ESC shall conform to the provisions of GB/T 18655 and GB/T 17619.

4.1.5 The commercial bus with length greater than 9m shall be equipped with the Lane Departure Warning System (LDWS) that conforms to the provisions of JT/T 883; and equipped with the Automatic Emergency Braking System (AEBS). The forward collision warning function of the AEBS shall conform to the provisions of JT/T 883; other functions shall conform to the provisions of relevant standards.

4.1.6 When leaving the factory, the commercial bus shall be equipped with vehicle inside and outside video monitoring system with the storage and upload functions; and equipped with the vehicle terminal based on satellite positioning system with the travel recording function:

--- The video monitoring system shall conform to the provisions of JT/T 1076 and JT/T 1078; and the video monitoring range shall cover at least the driver's area, passenger door area, passenger area, and front area outside of the vehicle.

--- The vehicle terminal based on satellite positioning system shall conform to the provisions of GB/T 19056, JT/T 794 and JT/T 808.

4.1.7 The commercial bus shall be equipped with safety signs, which shall conform to the provisions of GB 30678.

4.1.8 The commercial bus shall indicate the number of seats (including the driver's seat) in Chinese and Arabic numerals with a height greater than or equal to 100mm in the vicinity of the passenger door outside the bus.

4.1.9 The commercial bus roll stability shall conform to the provisions of GB 7258.

4.10 The commercial bus with maximum design speed of greater than 100km/h shall have the speed limit function; or shall be equipped with the speed limit device meeting the requirements of GB/T 24545; and the maximum speed adjusted by the speed limit function or speed limit device shall be no greater than 100km/h.

4.2 Steering system

4.2.1 When the maximum design axle load of steering shaft is greater than 4000kg, the power steering device shall be installed. When steering, the power steering function shall be continuously valid; and when the power steering device failed, the steering wheel can also control the vehicle.

4.2.2 The commercial bus shall be understeering characteristics; perform the test as per GB/T 6323; the understeering degree shall conform to the provisions of QC/T 480.

4.6.3.8 The commercial bus with length greater than 9m shall be equipped with at least 2 safety roof windows; while the commercial bus with length greater than 7m and less than or equal to 9m shall be equipped with at least 1 safety roof window. The open-type safety roof window shall meet the requirements of GB/T 23334.

4.6.3.9 The emergency hammer conforming to the provisions of QC/T 1048 shall be installed nearby the emergency window of the commercial bus; when the emergency hammer is removed, it can alarm through the sound signal.

4.6.3.10 A emergency hammer shall be installed nearby the driver's seat. If installing the power-controlled passenger door, the passenger door emergency switch shall be set up for the benefit of the driver's operation; if installing the automatic window-breaker, the automatic window-breaker switch shall be set up.

4.6.3.11 The stepping floor area of the commercial bus shall set up no seat. No folding seats shall be provided in the channel. The emergency door approach width shall conform to the provisions of GB 13094; the front row seat-back on the emergency door approach shall be nonadjustable.

4.7 Safety guards

4.7.1 The commercial bus shall be equipped with single fuel tank, the rated capacity of which shall be less than or equal to 260L, and the following requirements shall be met:

- a) The fuel tank shall be fixed firmly; its installing position shall be subject to the protection of the vehicle body structure in the vehicle front and rear collision accidents. Any part of the fuel tank shall be no less than 600mm (for the rear-engine commercial bus, the front end of the fuel tank shall be behind the front shaft) away from the vehicle front end; while be no less than 300mm away from the vehicle rear end.
- b) For the commercial bus with fuel tank subject to no protection of the longitudinal beam of the vehicle body, the side safety guards shall be installed. The side safety guards of the fuel tank can not only guard the fuel tank on the side but also meet the requirements of the following static strength test:
 - 1) Exert static load to the side safety guards of the fuel tank through the loading device with height of 250mm, width of 200mm;
 - 2) The loading center is about 500mm away from the ground; the loading points are located in the two ends and middle parts of the side safety guards of the fuel tank;
 - 3) The horizontal load for each loading point is 25kN (for the Class-B commercial bus, it is equivalent to 12.5% of the maximum total mass of the vehicle);

Appendix A

(Normative)

Performance Requirements and Test Method for Electronic Stability Control System of the Commercial Bus

A.1 Overview

This Appendix specifies the performance requirements and test methods for electronic stability control system of the commercial bus.

A.2 Performance requirements

A.2.1 Lane maintenance capacity. When the vehicle is performed J-steering test for 4 times continuously at the initial reference speed and reference speed; at least 2 times tests out of 4 times test shall meet the requirements that the vehicle doesn't depart from the lane. The initial reference speed and reference speed are determined as per Method in Sub-clause A.6.3.1.

A.2.2 Engine torque reduction. When the test is performed as per the Sub-clause A.6.3.2, at least 2 times of test out of the 4 times continuous tests shall meet the following requirements:

- a) There shall be at least 0.5s continuously from the vehicle entering into the corner for 1.5s to the vehicle leaving the corner, compared with the driver's required torque, the engine output torque shall be at least reduced 10%;
- b) Any wheel shall not deviate from the lane.

A.2.3 Anti-rollover control capability. When the test is performed as per the Sub-clause A.6.3.3, the vehicle enters into the corner at the same speed, at least 6 times tests out of 8 times continuous tests shall meet the following requirements:

- a) When the vehicle enters into the corner for 3s, the speed shall not exceed 47km/h;
- b) When the vehicle enters into the corner for 4s, the speed shall not exceed 45km/h;
- c) Any wheels shall not deviate from the lane;
- d) ESC activates the service brake.

A.3 ESC failure monitoring

A.5.4 The tire pressure shall be fully charged inflation pressure recommended by the vehicle manufacturer.

A.5.5 The initial braking temperature of the hottest brake shall be within the range of 66°C~204°C.

A.6 Test method

A.6.1 Tire grinding

The vehicle travels around the circle with radius of 45.7m at about 0.1g lateral acceleration in the clockwise and counterclockwise directions for two laps respectively.

A.6.2 Brake grinding and temperature

A.6.2.1 The brake grinding shall be performed as per the following requirements:

- a) The transmission shift shall be placed at the maximum proper shift running at the normal speed of 32km/h~64km/h; the vehicle shall repeat the braking actions at the deceleration of 0.3g and speed of 64km/h ~32km/h; the interval of each braking action shall be 1.6m, totally 500 times.
- b) When performing the performance test as per the Sub-clause A.6.3, the brake shall be grounded for 40 times as per the above method.

A.6.2.2 The temperature of the hottest brake. When performing the tests, if the temperature of the hottest brake exceeds 204°C, it needs cooling off till the temperature is within the range of 66°C~204°C; if the temperature is lower than 66°C, then it needs repeating the braking actions to increase the temperature of the brake within the range of 66°C~204°C.

A.6.3 J-steering test

A.6.3.1 Determination of reference speed

- a) Determination of initial reference speed. Perform the J-steering test in the clockwise and counterclockwise directions by increasing the speed gradually. The two-direction test speed starts from 32km/h±1.6km/h; passing through the corner at constant speed, then increase at the interval of 1.6km/h gradually till the ESC activates the service brake or wheel deviates from the lane. During the test period, if the wheel deviates from the lane, repeat the test at the same speed. If the wheel deviates from the wheel again, then perform 4 times test at the same speed (deviation is of ±1.6km/h). The average speed or speed that the wheel deviates from the lane within 0.5s before the ESC activating the service brake is called initial reference speed, rounded off to 1km/h.
- b) Determination of reference speed. Adopting the initial reference speed

of failure indicator shall remain connected.

A.6.4.2 When the vehicle is static, and the ignition start system is located in position of “Lock” or “Off”; start the ignition start system to the position of “Start”, start up the engine. Place the transmission on the forward shift; the vehicle accelerates to 48km/h $\pm$ 8km/h. Then continue to travel at even speed; perform at least once left-turning, right-turning, and braking operation within 2min, check whether the ESC failure indicator meets the requirements of Sub-clause A.3.

A.6.4.3 When the vehicle is static, and the ignition start system is located in position of “Off” or “Lock”. After 5min, start the ignition start system to the position of “Start”, start up the engine. Confirm that the ESC failure signal device is lighted again, prompt the presence of the failure, and the device shall maintain lighted when the engine stops running or before the removal of the failure.

A.6.4.4 Close the ignition start system to the position of “Off” or “Lock”. Restore the normal state of the ESC system; start the ignition start system to the position of “Start”; start up the engine. Confirm whether the failure indicator is extinguished or not.

A.6.5 Data post processing

A.6.5.1 The original data of vehicle speed is filtered by 12-pole no-class Butterworth filter; the cutoff frequency is of 10Hz.

A.6.5.2 The torque data signals acquired via the vehicle-mounted communication network or CAN bus needn't be filtered. If it is simulated signal, it shall be filtered by 12-pole no-class Butterworth filter; the cutoff frequency is of 10Hz.

A.6.5.3 During the engine torque reduction test period, the activating point of ESC makes the engine torque reduce is the starting separating point between the measured driver required torque and engine torque. The torque data can be obtained through the vehicle-mounted communication network or CAN bus. The torque value for activating point of ESC activating the engine torque reduction shall be obtained through the interpolation.

A.6.5.4 In the J-steering test, when the vehicle enters into or out of the corner, the vehicle reference point shall be center point of the vehicle front wheel.

A.6.5.5 The original data of travel brake pressure shall undergo “zero-returning” processing; after returning to zero, the brake pressure shall be filter by 12-pole no-class Butterworth filter; the cutoff frequency is of 10Hz. The “zero-returning” processing of travel brake pressure indicates the travel brake pressure takes the average brake pressure within 0.5s before the vehicle front wheel entering into the corner as the “zero air pressure”; after entering into the corner, the brake pressure shall undergo displacement treatment.

A.6.5.6 ESC activating travel brake indicates the ESC system operates and makes

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