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**Performance requirements and test procedures for
advanced emergency braking system of commercial
vehicle**

营运车辆自动紧急制动系统性能要求和测试规程

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Table of Contents

Foreword	3
1 Scope	4
2 Normative references	4
3 Terms and definitions, abbreviations	5
4 General requirements.....	8
5 Function requirements.....	10
6 Environmental adaptability requirements	13
7 Test procedures	14
References	24

Performance requirements and test procedures for advanced emergency braking system of commercial vehicle

1 Scope

This standard specifies the general requirements, functional requirements, environmental adaptability requirements, test procedures for advanced emergency braking systems of commercial vehicles.

The standard applies to advanced emergency braking systems installed on commercial vehicles, where the test procedures are applicable to the normative testing of advanced emergency braking systems in a closed field test environment.

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 standard.

GB/T 19951-2005 Road vehicles - Test methods for electrical disturbances from electrostatic discharge

GB/T 21437.2-2008 Road vehicles - Electrical disturbances from conduction and coupling - Part 2: Electrical transient conduction along supply lines only

GB/T 21437.3-2012 Road vehicles - Electrical disturbances from conduction and coupling - Part 3: Electrical transient transmission by capacitive and inductive coupling via lines other than supply lines

GB/T 28046.1-2011 Road vehicles - Environmental conditions and testing for electrical and electronic equipment - Part 1: General

GB/T 28046.2-2011 Road vehicles - Environmental conditions and testing for electrical and electronic equipment - Part 2: Electrical load

GB/T 28046.3-2011 Road vehicles - Environmental conditions and testing for electrical and electronic equipment - Part 3: Mechanical load

The length of path as travelled by the non-diffused light emitted by an incandescent lamp which has a color temperature of 2700 K when its illuminance is reduced to 5% of the initial value.

[GB/T 33577-2017, definition 3.14]

3.1.7

Adjacent lane

The travelling lane which shares the boundary of the lane as travelled by the subject vehicle, the direction of which is opposite to the traveling direction of the subject vehicle.

3.1.8

Clearance

The distance from the tail of the target vehicle to the head of the subject vehicle.

3.1.9

Emergency braking phase

After the AEBS issues a brake command request to the subject vehicle, the phase during which the subject vehicle starts deceleration at a speed of at least 4 m/s².

3.1.10

Collision warning phase

Before the emergency braking phase, the phase during which the AEBS sends the driver an early warning of possible collisions in front.

3.1.11

Minimum start velocity

The minimum speed of subject vehicle when the AEBS starts the warning and emergency braking function.

3.1.12

Relative velocity

The difference between the longitudinal speed of the subject vehicle and the target vehicle, which is calculated by the use of the formula (1):

storage, working state of communication module, state of main power, state of other devices connected to the AEBS host, etc.

The AEBS shall have a self-diagnosis function to prompt the driver and generate fault code information in real time for faults that occur during operation.

4.6 Driver control and human-machine interface

The AEBS shall provide the driver with a human-machine interface to interact with the driver. Provides warning information including at least two of audible, visual, or tactile, braking information, operation, cessation, or fault state information of the AEBS. The displayed information shall be clearly displayed in direct sunlight and at night.

4.7 Driver intervention

When the subject vehicle is in the emergency braking phase, it shall be ensured that the working state of AEBS is not affected by the driver's operation for brake pedal.

4.8 AEBS function recovery and release

The AEBS shall automatically return to normal working state when the vehicle is ignited. After the release of AEBS function, it shall use an optical warning signal to alert the driver, prompting the driver that the AEBS is in the off/on state.

4.9 Brake constraints for emergency braking

Emergency braking shall not cause longer lock tire time than allowed by anti-lock brakes or stability controls.

4.10 Brake light control

When AEBS implements automatic braking, the brake light shall illuminate at the same time and remain lit for at least 0.5 s.

4.11 Data backup

4.11.1 For AEBS trigger event data, it shall perform local data backup and remote data backup. The most recent storage time for local data backup shall be not less than 48 h; the remote storage time shall be not less than 60 d.

4.11.2 AEBS trigger event data shall include at least the following information:

- a) Operational behavior: The specific operational behavior generated by AEBS, which shall include the information of not less than the activation of collision warning function, activation of emergency braking function, termination of collision warning function, termination of emergency

braking function;

- b) Operational state: The state of the system when it responds to the specified operational behavior, which shall include at least the normal state, abnormal state, no response;
- c) Timestamp: The time information that the system generates the corresponding operational behavior.

4.12 Installation and use requirements

The AEBS system shall be installed and used in accordance with the manufacturer's instructions for use, including AEBS calibration, minimum starting speed, and applicable and non-applicable conditions.

5 Function requirements

5.1 Running speed

The AEBS shall operate normally at least within the range from a running speed of 15 km/h to the maximum design speed under all load states of the vehicle.

5.2 Target detection area

5.2.1 The minimum detection distance of AEBS shall be not more than 2 m. The maximum detection distance to the target vehicle shall be not less than 150 m. The maximum detection distance to the pedestrians shall be not less than 60 m.

5.2.2 The AEBS's lateral detection width of the minimum detection level of the target vehicle at the maximum detection distance position shall not be less than 3.75 m.

5.2.3 AEBS shall be capable of detecting the target vehicle on a bend which has a radius of curvature not more than 250 m.

5.3 Collision warning

5.3.1 Warning time

If the TTC or ETTC is more than 4.4 s, the AEBS shall not issue a collision warning.

5.3.2 Warning mode

When the AEBS detects a possible collision with a forward vehicle or pedestrian, it shall be able to output an alarm of not less than two different levels. The level-1 collision warnings shall be generated 1.4 s before the emergency braking

vehicle's speed is 80 km/h, after the emergency braking phase, it shall avoid the collision between the two vehicles.

5.4.2.2 Minimum speed reduction in the pedestrian emergency braking of vehicle

For AEBS with pedestrian emergency braking, when the subject vehicle's speed is 60 km/h, after the emergency braking phase, the speed reduction of the subject vehicle at the time of collision shall be not less than 20 km/h.

5.5 In-vehicle communication

The AEBS shall be able to extract the required information from the in-vehicle communication network. The information provided by the in-vehicle communication network includes at least the speed information, the brake, the throttle, the turn signals.

5.6 Vehicle-road communication

5.6.1 Type II AEBS shall have the vehicle-road communication function of wireless mobile communication technology, to realize the interaction with the execution data of roadside unit.

5.6.2 Type II AEBS shall be able to use the wireless mobile communication interface to receive forward obstacle status information as transmitted by the roadside unit: obstacle type information, geographical location information, motion status information; receive the forward road condition information: road surface adhesion coefficient information, lateral slope information, longitudinal slope information, bend radius information, etc.; receive dangerous warning information, traffic condition information, bad weather information, etc.

5.6.3 Type II AEBS shall be able to use the wireless mobile communication interface to transmit information not less than the following categories: geographical location information of the subject vehicle, driving status information of the subject vehicle, pedestrian or obstacle information as detected by the subject vehicle, vehicle accident information as detected by the subject vehicle, traffic or road abnormality information as detected by the subject vehicle.

5.6.4 The wireless mobile communication interface of the type II AEBS shall support both cellular access communication mode and direct connection communication mode. The two communication modes shall adopt the same network system.

5.6.5 The wireless communication technology as used in type II AEBS shall comply with the provisions of JT/T 794.

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