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PEOPLE'S REPUBLIC OF CHINA**

JT/T 1358-2020

**Performance requirements and test methods for lane keeping
assist system for bus
(English Translation)**

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Table of Contents

Foreword...	3
Introduction...	4
1 Scope...	5
2 Normative References...	5
3 Terms and Definitions...	5
4 System Requirements...	6
5 Test Method...	10
Appendix A (Informative) Lane for Curved Line Test...	14
Bibliography...	15

1 Scope

This Standard specifies the performance requirements and test methods for lane keeping assist systems of bus.

This Standard is applicable to the lane keeping assist function (system) of Class-B and Class-III M2, M3 categories of bus driving on road sections with standardized lane markings.

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) is applicable to this document.

GB/T 3730.2 Road Vehicle - Masses - Vocabulary and Codes

GB 5768.3 Road Traffic Signs and Markings - Part 3: Road Traffic Markings

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

GB/T 26773-2011 Intelligent Transport Systems - Lane Departure Warning Systems - Performance Requirements and Test Procedures

JT/T 883-2014 Driving Danger Warning System for Commercial Vehicles - Technical Requirements and Test Method

ISO 2575:2010 Road Vehicles - Symbols for Controls, Indicators and Tell-Tales

3 Terms and Definitions

For the purposes of this Document, the terms and definitions given in GB/T 3730.2, GB 5768.3, GB/T 15089 and GB/T 26773 and the following apply.

3.1 Lane keeping assistance system

m/s (100 km/h) or the maximum design speed (the smaller value between the two).

4.2.2 The radius of curvature for the smallest bending line adapted to the LKAS shall be no greater than 500m.

4.2.3 Allow different types of execution methods to achieve lane keeping assist

functions. Execution methods include controlling steering or braking, etc.

4.3.1.1 On and off of LKAS

When both the ignition switch and the LKAS switch are turned on and the system has no faults, the system is turned on.

LKAS shall be turned off manually by the driver or automatically turned off by the system. It can be turned off automatically when the ignition switch of the vehicle is turned off; or the driver can turn it off manually through the "LKAS switch" [see the requirements of item a) in 4.4.1].

4.3.1.2 Standby and activation of LKAS

After LKAS is turned on, the self-checking is normal, but when the system activation conditions are not met, the system shall enter the standby state.

The conditions for LKAS activation shall at least include: detecting the markings of the lane where the vehicle is on; determining the location of the subject vehicle in the lane, and the subject vehicle speed in the normal operating range, etc. When all activation conditions are met, the system shall automatically enter the activation state.

4.3.2 State switching process

The state switching process and necessary conditions of LKAS in the working process are shown in Figure 1.

4.4 Alarm prompt

A lane departure warning prompt that meets the requirements of 5.4 in JT/T 883-2014 shall be provided.

4.5 Lane keeping

LKAS shall be designed so that the driver can use it safely in any state, and the vehicle behaviour caused by lane keeping should be controlled. LKAS shall meet the following operating restrictions:

4.8.1 The user manual shall specify the minimum vehicle speed required for system operation and system failure conditions.

4.8.2 The user manual shall inform the driver of the conditions for system activation and deactivation.

5.1.1 Test environment conditions

The test environment requirements are:

- a) Test location: asphalt or concrete pavement;
- b) Ambient temperature: -20°C ~ 40°C;
- c) The wind speed shall be less than or equal to 3 m/s;
- d) The horizontal visibility range shall be greater than 1 km;
- e) The visible lane markings on the test road shall be clearly marked, in good condition, and comply with the provisions of GB 5768.3.

5.1.2 Test road-section conditions

The test road-section shall be dry and flat, with sufficient length to meet the requirements of the test speed (no less than 20m/s) when the vehicle leaves the lane at a low deviation speed.

The lane width of the test section is 3.75m; and the width and colour of the test lane marking shall comply with the provisions of GB 5768.3.

5.1.3 Test vehicle conditions

The mass of the test vehicle shall be BETWEEN the curb weight of the vehicle plus the total mass of the driver and the test equipment (the total mass of the driver and the test equipment is 150kg) AND the maximum allowable total mass. The conditions of the test vehicle shall not be changed after the start of the test.

5.2.1 Test items

Departure warning prompts and lane keeping tests on straight line and curved line.

the lane at a departure rate of $0.4 \text{ m/s} \pm 0.2 \text{ m/s}$; and then release the steering wheel, make the subject vehicle deviate from the lane freely. A total of 8 tests were performed in two groups (4 departures to the left in the first group and 4 departures to the right in the second group).

The vehicle manufacturer shall give the shortest time interval between two consecutive tests to avoid the unavailability of the lane keeping function.

5.2.4.2 Test judgment

During the single test process in each group, if the outer edge of the front tire on the side of the subject vehicle deviates from the direction of the lane and the distance across the lane boundary is no more than 1.1 m, the test is successful. If all 8 tests are successful, the lane keeping function test on the straight line is qualified.

5.2.5.1 Requirements for curved test line

The curved test line consists of a straight line and a curved line. The curved line is a variable curvature curve; and the rate of curvature change shall be continuous and no greater than $4 \times 10^{-5} / \text{m}^2$. For examples of test lanes on curved line, see Appendix A.

When the subject vehicle continues to drive near the centreline of the lane, the road alignment of the curved line shall be able to ensure that the lateral acceleration of the subject vehicle does not exceed 1.0 m/s^2 ; or at least within the last 1s of the test, the road alignment of the curved line shall ensure that the lateral acceleration of the vehicle remains within the range of $0.5 \text{ m/s}^2 \sim 1.0 \text{ m/s}^2$.

5.2.5.2 Test procedures

The test shall be carried out on a road that changes from a straight line to a curved line. The vehicle speed shall be maintained at $20 \text{ m/s} \pm 0.5 \text{ m/s}$ during the entire test period.

On straight line, the subject vehicle shall be kept straight in the middle of the lane.

When the vehicle is stable, release the steering wheel before entering the curved line.

After the vehicle enters the curved line, the test time shall last for 5s.

The test shall be carried out for twice, once entering into the left curved line, and once entering into the right curved line, as shown in Figure 3.

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