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**Controllability and Stability Test Procedure for Automobile
(English Translation)**

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1 Scope

This Standard specifies the pylon course slalom test procedure, steering transient response test procedure (steering wheel angle step input and steering wheel angle pulse input), returnability test procedure, steering efforts test procedure, steady static circular test procedure, and controllability and stability test procedure for the central area of steering wheel for automobile.

The pylon course slalom test procedure, steering transient response test procedure (steering wheel angle step input and steering wheel angle pulse input), returnability test procedure, and steering efforts test procedure are applicable to Type-M, Type-N and Type-G vehicles. The steady static circular test procedure is applicable to bi-axial

Type-M, Type-N and Type-G vehicles. The controllability and stability test procedure for the central area of steering wheel is applicable to Type-M1 and Type-N1 vehicles.

Other types of vehicles may take them as a reference.

2 Normative References

The following documents are indispensable to the application of this document. In terms of references with a specified date, only versions with a specified date are applicable to this document. In terms of references without a specified date, the latest version (including all the modifications) is applicable to this document.

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

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

GB/T 12534-1990 Motor Vehicles - General Rules of Road Test Method

GB/T 12549 Terms and Definitions for Vehicle Controllability and Stability

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

3 Instruments and Equipment

3.1

The instruments required for the test are as follows.

3.2

The test instruments shall comply with the requirements of 3.5 in GB/T 12534-1990.

3.3 The measurement range and maximum error of the various measuring instruments

shall satisfy the requirements in Table 1.

3.5 The various sensors are installed in accordance with their respective instruction manuals. Specifically speaking, the speedometer shall be installed on the longitudinal symmetry plane of the vehicle; the controllability and stability tester shall be as close to the center of mass of the vehicle as possible.

4.1.1 Before the test, determine the wheel positioning parameters. Check, adjust and

tighten the steering system and suspension system; lubricate them as required.

4.1.2 If new tires are used for the test, before the test, they shall at least go through

200 km of normal running. If used tires are used for the test, after the test is completed, the residual tire crown pattern depth shall be not less than 1.6 mm. The tire pressure shall comply with the exit-factory technical requirements of the vehicle.

4.1.4 In pylon course slalom test, the load state is the maximum design total mass of the

vehicle. In steering transient response test (steering wheel angle step input and steering wheel angle pulse input),

4.2 Test Site and Environment

4.2.1

Test site shall be dry, flat and clean, with cement concrete or asphalt pavement.

The slope in any direction shall not be greater than 2%. In terms of the controllability and stability test of the central area of steering wheel, the slope shall be not greater than 1%.

4.2.2

The wind speed shall be not greater than 5 m/s.

5.3 Test Methods

5.3.1

On the test site, in accordance with the stipulations of Figure 1 and Table 2, set up 10 stakes.

5.4.1 Test speed

The test speed for the i th pylon course slalom test shall be determined in accordance with Formula (1).

5.4.3 Average yaw velocity

The average yaw velocity of the i th test shall be determined in accordance with Formula (3).

5.4.4 Average roll angle of vehicle body

The average roll angle of vehicle body of the i th test shall be determined in accordance with Formula (4).

5.5 Result Expression of Pylon Course Slalom Test

5.5.1

Fill in the peak data of the time-history curve of the various measurement variables within the effective staking area and the driver's subjective evaluation into

Table 3.

5.5.2

In the form of Figure 3, fit-draw the relational graph of the average yaw velocity and the vehicle speed.

5.5.3

In the form of Figure 4, fit-draw the relational graph of the average steering wheel angle and the vehicle speed.

5.5.4

In the form of Figure 5, fit-draw the relational graph of the average roll angle of vehicle body and the vehicle speed.

6.3 Test Methods

6.3.1

The test speed is determined in accordance with 70% of the maximum speed of the tested vehicle (rounded off to an integer multiple of 10). However, the maximum test speed should not exceed 120 km/h.

6.3.2

Before the test, at the test speed, run for 10 km, so as to warm up the tires.

6.4 Test Data Processing

6.4.1

The steady-state values of the various measurement variables shall adopt the mean value after entering the steady state. If the rate of change of the vehicle's forward speed is greater than 5%, or if the change of the steering wheel angle exceeds 10% of the mean value, then, this test is invalid.

6.4.2

Adopt the method specified in 5.4.5.1

a) or 5.4.5.1

b) to obtain the time-history of lateral acceleration; determine the steady-state acceleration value.

6.4.3

In accordance with Figure 7, determine the response time of the yaw velocity and the lateral acceleration.

6.4.4

In accordance with Figure 7, determine the response time of the yaw velocity. If peak value does not emerge, it shall be explained in the remarks in Appendix A.

6.4.5

The overshoot of yaw velocity shall be determined in accordance with Formula (7).

6.5.2 In accordance with the following curve forms, express the test data at different lateral