Road vehicles – Static steering efforts test procedure

1. Scope

This standard stipulates the test methods for static steering effort in motor vehicles. It does not apply to motorcycles or special-purpose vehicles.

2. Quoted standards

The following standards are quoted in this standard, and thus comprise part of the stipulations in this standard. The quoted standards are the latest issues (including supplements).

JIS D 0102: Road vehicles — Dimensions, masses, weights and performances — Vocabulary

JASO Z117-1: Road vehicles — Vehicle dynamics test methods — Part 1: General conditions for passenger cars

JASO Z117-2: Road vehicles — Vehicle dynamics test methods — Part 2: General conditions for heavy vehicles and buses

JASO Z208: Glossary of terms relating to automobile stability and controllability

3. Definitions

The definitions of the main terms used within this standard are as described in **JIS D 0102** and **JASO Z208**. Other terms are defined below.

a) Steering wheel effective radius

Extends from the center of the wheel to the midpoint between the indentations of the steering wheel grip and the outer circumference of the wheel.

b) Steering effort:

he steering wheel operating force required in the direction of rotation. This value is the steering torque measured around the steering wheel axis divided by the steering wheel effective radius.

c) Static steering effort

The steering effort for a vehicle when stationary. This is expressed as center position steering effort and as 70% angular position steering effort.

d) Center position steering effort

The steering effort recorded at the center position when turning the steering wheel continuously from the full right (or left) angular position to the full left (or right) angular position. This effort is indicated by the symbol F_c.

e) 70% angular position steering effort

The steering effort recorded at the 70% maximum left (or right) angular position when turning the steering wheel continuously from the full right (or left) angular position to the full left (or right) angular position. This effort is indicated by the symbol F_7.

4. Test conditions

4.1 Test vehicle configuration

4.1.1 Tires

The tires are to be as stipulated in **5.4.2** (Tires) in **JASO Z117-1** and in **6.3.2** (Tires) in **JASO Z117-2.**

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4.1.2 Load conditions

Load the vehicle to the maximum loads indicated in the specifications manual for the front and rear axles. There are no particular stipulations on the centers of gravity of the loads added.

4.1.3 Front wheel alignment and steering wheel configuration

The front wheel alignment, front wheel maximum angle, and backlash for the steering wheel of the test vehicle should be aligned as indicated in the specifications manual.

4.1.4 Engine configuration

For vehicles with power steering, during testing the engine should be set to the idling speed indicated in the specifications manual.

4.1.5 Test vehicle positioning

The test vehicle should be positioned on a horizontal road surface.

4.2 Road surface configuration

The road surface containing the front wheels of the test vehicle should be the standard one.

4.3 Measuring equipment

The measuring equipment is to be as follows.

4.3.1 Steering effort measuring device

A device capable of recording the steering effort (or steering torque) of the test vehicle.

4.3.2 Steering wheel angular measuring device

A device capable of measuring the steering wheel rotation angle for the test vehicle.

5. Test method

5.1 Measurement preparations

Mount the steering effort measuring device and steering wheel angular measuring device in the test vehicle. Position the vehicle as stipulated in **4.1** with the front wheels placed on the standard road surface.

5.2 Test procedure

5.2.1 Center positioning

Align the center position of the steering wheel angular measuring device with the center position of steering wheel rotation, and align the steering effort measuring device zero position with the steering effort zero position.

5.2.2 First measurement

The test should be conducted without brakes applied to the front wheels and with the gear shift in neutral. First, turn the steering wheel continuously from the center position to the full right position without stopping. Next, turn the steering wheel from the full right position to the full left position in the same way, and then finally turn the steering wheel from the full left position to the full right position.

This procedure forms one cycle. Two cycles are to be performed consecutively, and the steering wheel angle and steering effort are to be recorded at the same time. Note that the second cycle starts from the full right position after the first cycle, and finishes in the full right position in the same way as for the first cycle.

5.2.3 Repeated measurements

The procedure described in **5.2.2** forms one test; this test should be repeated at least three times to increase the accuracy of measurements.

The tires are to be sufficiently turned after each test to place a new surface portion in contact with the road surface.

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