JJG

NATIONAL METROLOGICAL VERIFICATION REGULATION

OF THE PEOPLE'S REPUBLIC OF CHINA

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Automobile Side Slip Testers

汽车侧滑检验台

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Verification Regulation of Automobile Side Slip Testers

1 Scope

This Regulation applies to the initial verification, follow-up verification and in-use inspection of the double-slide type automobile side slip tester. This Regulation also applies as a reference for the calibration of the single-slide automobile side slip tester.

2 Normative references

The following documents are referred to in this Regulation:

JJF 1001, General terms in metrology and their definitions

JT/T 507, Automobile side slip tester

For dated references, only the dated version applies to this Regulation; for undated references, the latest version (including all amendments) applies to this Regulation.

3 Terms and units of measurement

The following terms and definitions, as well as those determined by JJF 1001 and JT/T 507, are applicable to this Regulation.

3.1 automobile side slip tester

Equipment used to detect the lateral side slip distance of the steering wheel of the motor vehicle.

3.2 side slip distance

The ratio OF the lateral displacement of the slipper caused by the rolling of wheels within the longitudinal effective measuring range of the slipper TO the vertical effective measurement length of the vehicle when the vehicle drives through the side slip tester at a specified speed in the center without being applied any steering force.

The inward displacement of the slipper is a negative (-) value, and the outward displacement is a positive (+) value.

The unit of side slip distance is demonstrated in meters per kilometer (m/km).

3.3 twin slipper automobile side slip tester

An automobile side slip tester – whose left and right slippers are connected by a mechanical device – that can move inward and outward synchronously.

3.4 vertical effective measurement length

The vertical length of the slipper, involved in the calculation of the side slip distance, of the automobile side slip tester.

4 General

The automobile side slip tester (hereinafter referred to as the side slip tester) is a device used to detect the side slip distance of the automobile. It usually consists of a release plate, a slipper, a return mechanism, a linkage device (twin slipper side slip tester), a lock mechanism, a displacement measuring device and a display device. The working principle of the side slip tester detection: Where no steering force is applied, the motor vehicle passes the side slip tester, at a speed of no more than 5 km/h, in the center straightly and stably, and the wheels roll within the longitudinal effective measuring range of the slipper, causing lateral displacement of the slipper. The ratio of the displacement to the vertical effective measurement length is the side slip distance.

Side slip tester is generally classified into single steering shaft automobile side slip tester and double steering shaft automobile side slip tester. The single steering shaft automobile side slip tester is used to detect the lateral side slip distance of wheels equipped with one steering shaft. The double steering shaft vehicle side slip tester is used to detect the lateral side slip distance of wheels equipped with one or two steering shafts. The double steering shaft automobile side slip tester can be further classified into return type or non-return type automobile side slip tester.

5 Measurement performance requirements

5.1 Side slip distance

5.1.1 Measuring range

The measuring range of side slip distance shall not be less than 10.0 m/km both inward and outward.

5.1.2 Resolution

The resolution of the display device of the side slip tester shall not be greater than 0.1 m/km.

5.1.3 Zero error

The zero error of side slip distance shall not exceed ±0.2 m/km.

5.1.4 Instrument drift

Instrument drift shall not exceed ±0.2 m/km.

5.1.5 Indication error

5.1.5.1 Static indication error: The static indication error of side slip distance shall not exceed ±0.2 m/km.

5.1.5.2 Dynamic indication error: The dynamic indication error of side slip distance shall not exceed ±0.2 m/km.

5.1.6 Repeatability

Repeatability shall not be greater than 0.1 m/km.

5.2 Height difference of side slipper

The height difference between the points on the left and right slippers of the side slip tester shall not exceed 5 mm.

5.3 Displacement synchronization of side slipper

For twin slipper side slip testers, the displacement synchronization of the left and right slippers shall not exceed 0.1 mm.

5.4 Force required for the slipper to move

5.4.1 The force required for the slipper to move from the zero position to 0.1 mm shall not exceed 60 N.

5.4.2 The force required for the slipper to move from the zero position to 5 mm shall not exceed 120 N.

6 General technical requirements

6.1 Appearance and general requirements

6.1.1 On the side slipper, there shall be a clear nameplate, which shall indicate the equipment name, specification and model, rated load, measuring range, manufacturer's name, production date, factory number, etc.

6.1.2 The slipper shall move flexibly and smoothly without any obvious blockage. There shall be no obvious movement of the slipper along the direction of vehicle travel.

6.1.3 The instrument display shall be clear and stable, without defects affecting the readings.

the instrument and displacement measuring device (or dial gauge). Use the displacement control device of the verification device (or use a micro-motion tool) to slowly push the slipper to move the slipper. When value indicated by the displacement measuring device (or dial gauge) reaches the verification point, record the indicated value of the side slip tester. Repeat this method 3 times inwardly and outwardly, and calculate the indication error of each verification point according to Formula (1). The indication error shall meet the requirements of 5.1.5.1.

$$\Delta_i = \overline{X_i} - X_{SL} \quad (1)$$

Where:

Δ_i – indication error of the i^{th} verification point (i = 1,2,3), m/km;

$\overline{X_i}$ – the average value of the 3 indications of the side slip instrument at the i^{th} verification point (i=1,2,3), m/km;

X_{SL} – the equivalent side slip distance of the i^{th} verification point displacement measuring device (or dial gauge), which is calculated from the vertical effective measurement length of the slipper, m/km, calculated according to Formula (2).

$$X_{SL} = \frac{X_S}{L} \quad (2)$$

Where:

X_{SL} – the equivalent side slip distance of the i^{th} verification point displacement measuring device (or dial gauge), which is calculated from the vertical effective measurement length of the slipper, m/km;

X_S – displacement measuring device (or dial gauge) display value of the i^{th} verification point (i=1,2,3), mm;

L – vertical effective measurement length of the slipper (measured value), m.

(2) Dynamic indication error

Install the control device, displacement measuring device and gear tool of the verification device as shown by Figure 1. The axis of the measuring rod of the displacement measuring device shall be consistent with the moving direction of the slipper. Adjust the side slip tester to the detection state, and adjust the zero position of the side slip testing instrument and displacement measuring device. Set the advance rate of the control device to be about 7 mm/s, and the advance displacement to 5 mm. Start the displacement control device of the verification

Where:

R – repeatability, m/km;

$X_{i\ max}$ – the maximum value indicated by the side slip tester at the i^{th} verification point (i=1,2,3), m/km;

$X_{i\ min}$ – the minimum value indicated by the side slip tester at the i^{th} verification point (i=1,2,3), m/km;

C – range coefficient, C = 1.69.

7.3.2.2 Height difference of side slipper

Place the laser line projecting (marking) instrument at an appropriate position on the nearby ground; adjust its level to emit a horizontal beam. Select 5 measuring points on the left and right slippers (usually at the four corners about 20 cm from the edge of the side slipper and the center of the side slipper); place the steel ruler on the measurement points perpendicular to the side slipper. Use a laser line projecting (marking) instrument and a steel ruler to measure the height of each point relative to the same reference level. The difference between the maximum value and the minimum value of the height is the height difference of the side slipper. Calculate the height difference of the side slipper according to Formula (6), which shall meet the requirements of 5.2.

$$\Delta H = H_{max} - H_{min} \quad (6)$$

Where:

ΔH – height difference of side slipper, mm;

H_{max} – the maximum value of each measuring point on the left and right slides of the side slipper, mm;

H_{min} – the minimum value of each measuring point on the left and right slides of the side slipper, mm.

7.3.2.3 Displacement synchronization of side slipper

According to the method in Figure 1 (or Figure 2), install displacement measuring devices (or dial gauges) and gear tools on both the left and right slides, so that the axes of the measuring rods of the displacement measuring devices (or dial gauges) are consistent with the moving direction of the slippers. Adjust the side slip tester to the calibration state, and adjust the zero position of the side slip testing instrument and the left and right displacement measuring devices (or dial gauges). Use the control device of the verification device (or use a micro-motion tool) to push the left and right slippers inwards and outwards; when the side slip testing instrument shows that the side slip is about 5.0 m/km, read the left and right displacement measuring devices (or dial gauges).

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