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**Intermediate Check Specifications of Measuring Equipment
for Vehicle Inspection Body**

机动车检验机构检测设备期间核查规范

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Intermediate Check Specifications of Measuring Equipment for Vehicle Inspection Body

1 Scope

This Standard specifies the basic requirements, determination principles for check objects, methods for intermediate check, result determination principles and processing, as well as records and reports of intermediate check of measuring equipment for vehicle inspection body (hereinafter referred to as “intermediate check”).

This Standard applies to intermediate check conducted by vehicle inspection body on in-use measuring equipment.

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 4091 Shewhart Control Charts

GB 7258 Technical Specifications for Safety of Power-driven Vehicles Operating on Roads

GB 18565 Composite Performance Requirement and Detecting Methods for Road Transport Vehicles

JJF 1001 General Terms in Metrology and Their Definitions

RB/T 218 Competence Assessment for Inspection Body and Laboratory Mandatory Approval - Requirements for Vehicles Inspection Body

3 Terms and Definitions

What is defined in GB 7258, GB 18565, JJF 1001 and RB/T 218, and the following terms and definitions are applicable to this document.

3.1 Vehicle Safety Technology Inspection

Vehicle safety technology inspection refers to the activities of inspecting motor vehicles operating on roads, including registration inspection of motor vehicles and inspection of in-use motor vehicles pursuant to the *Law of the People's Republic of China on Road Traffic Safety*

and the regulations for its implementation, and in accordance with the requirements of national safety technology standards for motor vehicles.

3.2 Vehicle Emission Inspection

Vehicle emission inspection refers to the activities of conducting emission inspection on in-use motor vehicles pursuant to the stipulations of the *Law of the People's Republic of China on the Prevention and Control of Air Pollution*, and in accordance with the standards and specifications formulated by the environmental protection authority.

3.3 Automotive Multiple-function Inspection

Automotive multi-function inspection refers to the activities of inspecting the combination of multiple technical properties, such as: vehicle dynamic quality, safety, fuel economy, service reliability, exhaust pollutants and noise, as well as the completeness and status of vehicle equipment, pursuant to the stipulations of the *Regulations on the Administration of Road Transport Vehicles*, and in accordance with the standards and specifications formulated by the competent transportation department of the State Council.

3.4 Vehicle Inspection

Vehicle inspection is a general term for three types of inspection activities: vehicle safety technology inspection, vehicle emission inspection and automotive multiple-function inspection.

3.5 Vehicle Inspection Body

Vehicle inspection body is a general term for inspection institutions engaged in three types of inspection activities: vehicle safety technology inspection, vehicle emission inspection and automotive multiple-function inspection.

3.6 Intermediate Check

Intermediate check refers to an operation carried out in accordance with the prescribed procedures to determine whether the measuring equipment remains in the state at the time of its verification / calibration.

4 Basic Requirements for Intermediate Check

4.1 The intermediate check shall be carried out in accordance with the prescribed procedures and the formulated check plans.

4.2 The vehicle inspection body shall confirm the measuring instruments and equipment, select the methods for checking and determining the frequency of checking in the intermediate check plans.

4.3 The vehicle inspection body shall check certain parameters, ranges or measurement points

term stability, the shewhart control chart method may be used to perform the intermediate check on the instruments and equipment. Usually, the instruments and equipment being checked are used to periodically perform repeated measurements on the check standards, or the check standards are used to periodically perform repeated measurements on the instruments and equipment being checked, and the obtained characteristic values are used to draw the average value control chart or the range control chart.

7 Result Determination Principles and Processing of Intermediate Check

7.1 Determination Principles and Processing of Transfer Measurement Method and Reference Substance Method

7.1.1 If Formula (1) or Formula (2), Formula (3) or Formula (4) is established, then, the result passes the current check. It suggests that the measuring equipment remains in the state at the time of its verification or calibration, is in a controlled state and can continue to be used.

7.1.2 Otherwise, Formula (1) or Formula (2), Formula (3) or Formula (4) do not hold, and the result fails the current check. It suggests that the technical indicators of the measuring equipment exceed the expected requirements of use, and that the equipment shall be immediately stopped. The inspection body shall analyze the abnormalities of the technical conditions of the measuring equipment being checked, and find out the reasons. The methods for the check may be replaced, and the check points may be added. If necessary, repair or replacement shall be performed for re-verification or re-calibration.

7.2 Determination Principles and Processing of Multi-set Comparison Method, Two-set Comparison Method and Check Standard Method

7.2.1 When $E_n \leq 0.7$, the intermediate check result satisfies the requirements, indicating that the measuring equipment remains in the state at the time of its verification or calibration, is in a controlled state and can continue to be used.

7.2.2 When $0.7 < E_n \leq 1$, the intermediate check result satisfies the requirements, but there is a risk trend. The inspection body shall analyze the measuring equipment, find out the reasons, strengthen maintenance and tracking, and increase the frequency of check.

7.2.3 When $E_n > 1$, the result fails the current intermediate check, indicating that the technical indicators of the measuring equipment exceed the expected requirements of use, and that the equipment shall be immediately stopped. The inspection body shall analyze the abnormalities of the technical conditions of the measuring equipment being checked, and find out the reasons. The methods for the check may be replaced, and the check points may be added. If necessary, repair or replacement shall be performed for re-verification or re-calibration.

7.3 Determination Principles and Processing of Shewhart Control Chart Method

Appendix A

(Informative)

Some Examples of Intermediate Check of Measuring Equipment

A.1 An Example of Intermediate Check of Speedometer Test Bench

A.1.1 Scope

It is applicable to the intermediate check of speedometer test bench.

A.1.2 Check standard

Tachometer: with an accuracy of Level 0.1.

A.1.3 Check items (or parameters)

Speed indication error.

A.1.4 Environmental conditions of check

The environmental conditions of the check are as follows:

---temperature: 0 °C ~ 40 °C;

---relative humidity: 0 ~ 85%;

---the check shall be carried out in a surrounding environment free from contamination, vibration, noise and electromagnetic interference that may affect the measurement.

A.1.5 Technical requirements (control limit)

In accordance with the technical requirements of JJG 909-2009, determine that the control limit is that the indication error of the check point speed does not exceed $\pm 3\%$.

A.1.6 Method for check

Adopt the transfer measurement method for the check.

Adjust the upper computer software of the speedometer test bench to the speed measurement interface; select 40 km/h as the check point; select the test vehicle and drive the roller to accelerate to the check point. After the speed becomes stable, continuously record the speed indication value of the speedometer test bench and the rotational speed of the tachometer for 3 times. In accordance with Formula (A.1), calculate the speed indication error.

A.2 An Example of Intermediate Check of Special Axle (wheel) Load Tester for Motor Vehicle Inspection

A.2.1 Scope

It is applicable to the intermediate check of special axle (wheel) load tester for motor vehicle inspection.

A.2.2 Check standard

Choose either a weight or a dynamometer.

---weight: the accuracy is not lower than Level M_{22} ;

---dynamometer: the accuracy is not lower than Level 0.5.

A.2.3 Check items (or parameters)

Load indication error.

A.2.4 Environmental conditions of check

The environmental conditions of the check are as follows:

---temperature: $0\text{ }^{\circ}\text{C} \sim 40\text{ }^{\circ}\text{C}$;

---relative humidity: $0 \sim 85\%$;

---the check shall be carried out in a surrounding environment free from contamination, vibration, noise and electromagnetic interference that may affect the measurement.

A.2.5 Technical requirements (control limit)

In accordance with the technical requirements of JJG 1014-2006, determine that the control limit is that the indication error of the load does not exceed $\pm 2.0\%$.

A.2.6 Methods for check

A.2.6.1 Selection of methods for check

Adopt the transfer measurement method for the check. Choose either the weight method or the dynamometer method for the check.

A.2.6.2 Weight method

After performing zero-point adjustment of the axle (wheel) load tester, add weights to the bearing of the axle (wheel) load tester being checked; select a commonly used weighing point as the check point. After loading to the check point, read the indication value of the axle (wheel) load tester. In accordance with Formula (A.2), calculate the indication error of the check point.

A.3 An Example of Intermediate Check of Roller Opposite Force Brake Test Bench

A.3.1 Scope

It is applicable to the intermediate check of roller opposite force brake test bench used for the benchtop brake inspection of motor vehicles.

A.3.2 Check standard

Choose either a weight or a dynamometer.

---weight: the accuracy is not lower than Level M₂;

---dynamometer: the accuracy is not lower than Level 0.3.

A.3.3 Check items (or parameters)

Braking force static indication error.

A.3.4 Environmental conditions of check

The environmental conditions of the check are as follows:

---temperature: 0 °C ~ 40 °C;

---relative humidity: 0 ~ 85%;

---the check shall be carried out in a surrounding environment free from contamination, vibration, noise and electromagnetic interference that may affect the measurement.

A.3.5 Technical requirements (control limit)

In accordance with the technical requirements of JJG 906-2015, determine that the control limit is that the static indication error of the braking force does not exceed $\pm 3.0\%$.

A.3.6 Methods for check

A.3.6.1 Selection of methods for check

Adopt the transfer measurement method for the check. Choose either the weight method or the dynamometer method for the check.

A.3.6.2 Weight method

In accordance with the requirements of the instructions for use of the equipment, fix the special force measuring lever on the roller of the brake test bench or an equivalent position of the roller; determine the lever ratio (if necessary). As for the check point, select 50% of the full scale of the brake test bench. After the lever is installed, set the meter to zero. In accordance with the specified check point, load weights on the left (right) brake test bench; read the indication value

A.4 An Example of Intermediate Check of Platform Brake Test Bench

A.4.1 Scope

It is applicable to the intermediate check of platform brake test bench used for the benchtop brake inspection of motor vehicles.

A.4.2 Check standard

Working dynamometer: the accuracy is not lower than Level 0.3.

A.4.3 Check items (or parameters)

Braking force indication error.

A.4.4 Environmental conditions of check

The environmental conditions of the check are as follows:

---temperature: 0 °C ~ 40 °C;

---relative humidity: 0 ~ 85%;

---the check shall be carried out in a surrounding environment free from contamination, vibration, noise and electromagnetic interference that may affect the measurement.

A.4.5 Technical requirements (control limit)

In accordance with the technical requirements of JJG 1020-2017, determine that the control limit is that the indication error of the braking force does not exceed $\pm 3.0\%$.

A.4.6 Method for check

Adopt the transfer measurement method for the check.

In accordance with the requirements of the instructions for use of the equipment, install special loading tools and dynamometer, etc. The direction of force application is consistent with the direction of the braking force of the brake test bench, that is, the driving direction. As for the check point, select 50% of the full scale of the brake test bench. Simultaneously adjust the dynamometer and the brake test bench instrument to zero. In accordance with the specified check point, use the dynamometer to load the brake test bench; read the indication value of the left (right) platform brake test bench corresponding to the check point; repeat the measurement for 3 times.

In accordance with Formula (A.6), calculate the indication error of the left (right) platform brake test bench at the check point.

A.6 An Example of Intermediate Check of Headlamp Tester

A.6.1 Scope

It is applicable to the intermediate check of headlamp tester used by vehicle inspection body.

A.6.2 Check standard

Test vehicle.

A.6.3 Check items (or parameters)

High-beam luminous intensity indication error.

A.6.4 Environmental conditions of check

The environmental conditions of the check are as follows:

---temperature: 0 °C ~ 40 °C;

---relative humidity: 0 ~ 85%;

---the check shall be carried out in a surrounding environment free from contamination, vibration, noise and electromagnetic interference that may affect the measurement.

A.6.5 Technical requirements (control limit)

In accordance with the technical requirements of JJG 745-2016 and the inspection method specified in GB 21861, as well as JJF 1059.1, carry out the analysis and evaluation of uncertainty; obtain that the measurement uncertainty of the indication value of the high-beam luminous intensity at the check point is 18%, $k = 2$.

A.6.6 Method for check

A.6.6.1 Adopt the multi-set comparison method for the check. In accordance with the inspection body's intermediate check scheme, use the headlamp tester being checked to measure the test vehicle.

A.6.6.2 In accordance with the requirements of the instructions for use, start up and warm up the instrument. In accordance with the inspection method specified in GB 21861, drive the test vehicle centered along the guide line to the specified inspection distance and stop. The longitudinal axis of the vehicle shall be parallel to the guide line. Place the transmission in neutral; the vehicle's power supply is in a charging state; turn on the high beams of the headlamps. In accordance with the measurement procedures of the headlamp tester, start the measuring instrument; automatically search for the headlamps of the test vehicle; measure the high-beam luminous intensity. At this time, record the indication value of high-beam luminous intensity I_1 .

A.6.6.3 Afterwards, measure the high-beam luminous intensity of the same stable test vehicle on the second headlamp tester. Repeat the steps of A.6.6.2 to obtain the indication value of high-beam luminous intensity of the test vehicle I_2 .

A.6.6.4 Then, measure the high-beam luminous intensity of the same stable test vehicle on the third headlamp tester. Repeat the steps of A.6.6.2 to obtain the indication value of high-beam luminous intensity of the test vehicle I_3 . In accordance with Formula (A.8), calculate E_n .

$$E_n = \frac{|I_1 - \bar{I}|}{\sqrt{\frac{n-1}{n}} U} \quad \dots\dots\dots (A.8)$$

Where,

E_n ---normalized bias;

I_1 ---the measurement result of high-beam luminous intensity of the headlamps of the test vehicle by the headlamp tester being checked, expressed in (kcd);

$\bar{I}$ ---the average value of the measurement results of high-beam luminous intensity of the headlamps of the test vehicle by three headlamp testers being checked, expressed in (kcd);

U ---the uncertainty of three measurements. If the two sets of instrument and equipment are traceable to the same unit, their correlation effects shall be considered.

A.6.7 Determination and processing of check results

A.6.7.1 When $E_n \leq 0.7$, the intermediate check result satisfies the requirements. It suggests that the headlamp tester being checked remains in the state at the time of its verification or calibration, is in a controlled state and can continue to be used.

A.6.7.2 When $0.7 < E_n \leq 1$, the intermediate check result satisfies the requirements, but there is a risk trend. The inspection body shall analyze the headlamp tester being checked, find out the reasons, strengthen maintenance and tracking, and increase the frequency of check.

A.6.7.3 When $E_n > 1$, the result fails the current check. It suggests that the technical indicators of the headlamp tester being checked exceed the expected requirements of use, and that the equipment shall be immediately stopped. The inspection body shall analyze the abnormalities of the technical conditions of the headlamp tester being checked, and find out the reasons. The methods for the check may be replaced, and the check points may be added. If necessary, repair or replacement shall be performed for re-verification or re-calibration.

A.6.8 Frequency of check

The intermediate check shall be carried out at least once a year. When the check data is in a critical state, or when the results are in doubt, the frequency of check may be appropriately increased.

A.7 An Example of Intermediate Check of Chassis Dynamometer

A.7.1 Scope

It is applicable to the intermediate check of chassis dynamometers used with the simple transient condition method or loading deceleration method in GB 18285-2005.

A.7.2 Check standard

- torque part: weight, Level M₂;
- speed part: tachometer, Level 0.1.

A.7.3 Check items (or parameters)

Indication errors of torque and speed.

A.7.4 Environmental conditions of check

The environmental conditions of the check are as follows:

- temperature: 0 °C ~ 40 °C;
- relative humidity: 0 ~ 85%;
- the check shall be carried out in a surrounding environment free from contamination, vibration, noise and electromagnetic interference that may affect the measurement.

A.7.5 Technical requirements (control limit)

In accordance with the technical requirements of JJF 1221-2009, determine the control limits of the check items:

- torque: the torque indication error at the check point does not exceed $\pm 1.0\%$;
- speed: the speed indication error at the check point does not exceed $\pm 0.5\%$.

A.7.6 Methods for check

A.7.6.1 Selection of methods for check

Adopt the transfer measurement method for the check.

A.7.6.2 Torque check

Install the force measuring lever of the chassis dynamometer to make it in a balanced state. Adjust the upper computer software of the chassis dynamometer to the torque check interface, then, set the indicating device of the chassis dynamometer to zero. Within the specified measurement range, select 60% of the full scale as the check point; record the torque indication

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