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Replacing GB/T 12544-1990

**Measurement of Maximum
Speed of Motor Vehicles**

汽车最高车速试验方法

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Foreword

This standard is drafted according to the rule given in GB/T 1.1-2009.

This standard supersedes "Motor Vehicles - Maximum Speed - Test Method" (GB/T 12544-1990).

Compared with GB/T 12544-1990, the main technical changes in this standard are as follows:

- "Term and Definition" (Chapter 3) is added;
- Test conditions are modified, thereof, "vehicle conditions" (4.1), "measurement parameters and their units and accuracy" (4.2), "road characteristics" (4.3), "atmospheric conditions" (4.4) and "test mass and load distribution of vehicle" (4.5) are added;
- The double-direction test method on straight road (5.2.1) is modified, and the test frequency is changed to "the number of test in each direction is not less than once" from "once in both direction";
- "Single-direction test" (5.2.2) is added;
- "Maximum speed on ring road" (5.3) is added and the correction factor of ring road is introduced;
- "Specification for Determination of Correction Factor for Ring Road" (Appendix A) and "Calculation Formula for Air Density" (Appendix B) are added.

Technical contents of this standard are prepared by reference to "Uniform Provisions Concerning the Approval of Motor Vehicles with Regard to the Measurement of the Maximum Speed".

Compared with ECE R68:1997, the main changes in this standard are as follows:

- Some management contents of certification application procedure are cancelled;
- The notice of vehicle type certification is cancelled.
- The arrangement of certification mark is cancelled;
- Relevant contents of production conformity management are cancelled.

This standard is proposed by Ministry of Industry and Information Technology of the People's Republic of China.

This standard is under the jurisdiction of the National Technical Committee on Automobiles of Standardization Administration of China (SAC/TC 114).

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The previous editions of the standard superseded by this standard are as follows:

- GB/T 1334-1977;
- GB/T 12544-1990.

Measurement of Maximum Speed of Motor Vehicles

1 Scope

This standard specifies the measurement of maximum speed of motor vehicles.

This standard is applicable to all motor vehicles except electric vehicles. Combination vehicles may also refer to the provisions of this standard.

2 Normative References

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the normative document (including any amendments) applies

GB/T 12428 Laden Mass Calculating Method for Buses

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

3 Term and Definition

For the purposes of this document, the following term and definition apply.

3.1

Maximum speed

The maximum stable speed the vehicle can maintain according to the specified test method.

4 Test Conditions

4.1 Vehicle conditions

4.1.1 Vehicles shall be clean, and the windows and ventilation devices in passenger compartment shall be shut down, unless otherwise specified.

4.1.2 Lighting devices and auxiliary devices on vehicle shall be shut down except the equipment required for test and the daily operating units of the vehicle.

4.2 Measurement parameters and their units and accuracy

See Table 1 for the parameters, units and accuracy of measurement.

4.4 Atmosphere conditions

Compared with the air density of standard environment, the change of air density during the test shall not exceed 7.5%. See Appendix B for the calculation formula of air density.

4.5 Test mass and load distribution of vehicle

4.5.1 Category M₁ vehicle and Category N₁ vehicle with maximum design total mass less than 2t

Where 50% of the maximum allowable loading mass of vehicle is less than or equal to 180kg, the test mass is the complete vehicle mass plus 180kg; where 50% of the maximum allowable loading mass of vehicle is greater than 180kg, the test mass of vehicle is the complete vehicle mass plus 50% of the maximum allowable loading mass (including the mass of measuring personnel and instruments). The load shall be distributed uniformly as possible.

4.5.2 Categories M₂ and M₃ motor vehicles and Category N vehicles with maximum design total mass not less than 2t

Unless otherwise specified, the Categories M₂ and M₃ city buses are subject to 65% of the loading mass, and other vehicles are subject to full load.

The load of Categories M₂ and M₃ motor vehicles is uniformly distributed according to GB/T 12428 while that of Category N vehicles is uniformly distributed according to GB/T 12534.

5 Test Methods

5.1 Test vehicle preparation

Prior to the test, all vehicle parts which will affect the test result shall be preheated to meet the stable temperature condition designated by the manufacturer.

The gear is adjusted to make the vehicle reach its maximum stable speed.

5.2 Specification for maximum speed test on straight road

5.2.1 Standard test specification (double-direction test)

In order to reduce the effect of such factors as road gradient and wind direction (wind speed), the test is carried out successively from two directions of the test road, and the same path is adopted as possible.

The time t_1 taken to test the single trip is recorded. The change of travelling speed of the vehicle shall not exceed 2% during the test. The number of test in each direction is not less than once, and the change in time " t_1 " does not exceed 3%.

Calculation formula of test speed:

$$V = \frac{L \times 3.6}{t} \quad (1)$$

Where,

V - the speed, km/h;

t - the arithmetic average of measured time t_1 of to-and-fro direction test, s;

L - the measured length of road, m.

5.2.2 Single-direction test

Where the motor vehicle can't reach its maximum speed from both directions due to the characteristics of the test road, it is allowed to conduct the test from one direction only.

In this test, the road characteristics shall meet the requirements of 4.3.1 and 4.3.2.

In addition,

- Traveling test is repeated continuously for 5 times;
- The horizontal component of wind speed in driving direction of vehicle does not exceed $\pm 2\text{m/s}$.

Considering the wind speed, the maximum speed shall be corrected according to the following formulas:

$$V_{vi} = |v_i| \times 3.6 \quad (2)$$

$$V_{ri} = \frac{3.6L}{t} \quad (3)$$

$$V_i = V_{ri} \pm V_{vi} \times f \quad (4)$$

Where,

Where the horizontal component of wind is opposite to the driving direction of vehicle, "+" is selected; otherwise "-" is selected.

V_{ri} - the maximum speed of each driving, km/h;

t - the time taken by the motor vehicle to travel " $L(\text{m})$ ", s;

V_{vi} - the horizontal component of wind speed, km/h;

v_i - the horizontal component of measured wind speed in driving direction, m/s;

f - the correction factor, evaluated as 0.6.

The maximum speed V is calculated according to the following formula after scoring out two extreme values of V_i :

$$V = \frac{1}{3} \sum_1^3 V_i \quad (5)$$

5.3 Maximum speed on ring road

The time taken for driving a round trip " t_i " is recorded. The motor vehicle travels at the maximum speed on the road for three times at least, and no action is imposed to the steering wheel to correct the driving direction. The time difference of each measurement does not exceed 3%.

Calculation formula of time \bar{t} :

$$\bar{t} = \frac{1}{3} \sum_1^3 t_i \quad (6)$$

Calculation formula of maximum speed:

$$V_a = \frac{L \times 3.6}{\bar{t}} \quad (7)$$

Where,

V_a - the maximum speed, km/h;

\bar{t} - the time, s;

L - the length of actual length the motor vehicle travels on the ring road, m.

Where the maximum speed is measured on ring road, the speed V_a should be corrected with empirical factor; particularly, the centrifugal force effect of ring road and the consequential change in motor vehicle direction shall be considered;

$$V = V_a \times k \quad (8)$$

Where, k ($1.00 \leq k \leq 1.05$) is the correction factor determined according to Appendix A.

Appendix B

(Normative)

Calculation Formula for Air Density

$$d_r = d_0 \times \frac{H_T}{H_0} \times \frac{T_0}{T_T} \quad (\text{B.1})$$

Where,

d_r - the air density of test environment;

d_0 - the air density of standard environment;

H_T - the atmospheric pressure of test;

T_T - the absolute temperature of test, K;

H_0 - the atmospheric pressure of standard environment, $H_0=100\text{kPa}$;

T_0 - the temperature of standard environment. $T_0=293\text{ K}(20^\circ\text{C})$.

In addition, during the test, the atmospheric pressure shall not be lower than 91kPa, and the temperature shall not be lower than 273K and not higher than 313K (0~40°C).