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Replacing GB/T 18386-2005

Electric Vehicles – Energy

Consumption and Range – Test Procedures

电动汽车 能量消耗率和续驶里程 试验方法

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Foreword

This Standard was drafted as per the rules specified in GB/T 1.1-2009.

This Standard replaced GB/T 18386-2005 *Electric Vehicles – Energy Consumption and Rang – Test Procedures*. Compared with GB/T 18386-2005, besides the editorial modifications, this Standard has the major technical requirements as follows:

- Test mass has significant changes;
- The provisions on test shift has been changed;
- Test environment temperature conditions have changes; delete the outdoor test conditions;
- The criterion for ending the test cycle has major changes; add the ending conditions applicable to the working condition method for heavy-duty vehicles;
- Add the parking provisions;
- Add the calculation method for range and energy consumption in the working condition method of heavy-duty vehicles;
- Test cycle has changes; add China's typical urban bus cycle specified in GB/T 19754-2015 and C-WTVC cycle specified in GB/T 27840-2011;
- Add the recommended program for the driving resistance coefficient of heavy-duty commercial vehicles.

This Standard was proposed by Ministry of industry and Information Technology of PRC.

This Standard shall be under the jurisdiction of National Technical Committee of Auto Standardization of Vehicles (SAC/TC 114).

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Electric Vehicles – Energy Consumption and Range – Test Procedures

1 Scope

This Standard specifies the test method for energy consumption and range of battery electric vehicle.

This Standard is applicable to the battery electric vehicle. The electric right three-wheeled motorcycle can refer to implement.

2 Normative References

The following documents are essential to the application of this document. For the dated documents, only the versions with the dates indicated are applicable to this document; for the undated documents, only the latest version (including all the amendments) are applicable to this document.

GB 7258 Safety Specifications for Power-Driven Vehicles Operating on Roads

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

GB 18352.5-2013 Limits and Measurement Methods for Emissions from Light-Duty Vehicles (CHINA 5)

GB/T 19596 Terminology of Electric Vehicles

GB/T 19754-2015 Test Methods for Energy Consumption of Heavy-Duty Hybrid Electric Vehicles

GB/T 27840-2011 Fuel Consumption Test Methods for Heavy-Duty Commercial Vehicles

3 Terms and Definitions

The terms and definitions stipulated in GB 7258, GB/T 19596 are applicable to this document.

maximum design traction mass.

4.3.2 Vehicle conditions

The test vehicle shall be loaded as per the technical requirements of each test.

The tires shall use the type required by the manufacturer as the original accessory; be inflated according to the tire inflation pressure corresponding to the manufacturer recommended tire maximum test load and maximum test speed. The viscosity of lubricant used for the mechanical moving components shall conform to the provisions of manufacturer.

Turn off the lighting, signaling device and auxiliary equipment in the vehicle; unless the test and vehicle day-time operation have requirements for the above devices.

Except for the driving purposes, all storage systems (electrical energy, hydraulic pressure, air pressure, etc.) shall be charged to the maximum value specified by the manufacturer.

The test driver shall, according to the vehicle manufacturer recommended operating procedures, make the power battery operate at the normal operating temperature.

Before the test, the test vehicle shall use the power battery equipped on it to drive at least 300km.

4.3.3 Environment temperature conditions

Perform the indoor test at the room temperature of 20°C~30°C.

4.3.4 Test shift

If the manufacturer recommended vehicle driving mode can match with the reference curve of the working conditions, then use the manufacturer recommended mode; if the manufacturer recommended mode can't meet the requirements for the reference curve of the working conditions, then select the higher mode of maximum vehicle speed.

4.4 Test procedures

4.4.1 General

When confirming the energy consumption and range, the same test procedures shall be used; the test procedures shall include the following three steps:

- a) Perform the initial charge of the power battery (see 4.4.4);
- b) Perform the range test under the working conditions or constant speed conditions (see 4.4.5);

speed tolerance applicable to other categories vehicles is $\pm 3\text{km/h}$; the time tolerance is $\pm 1\text{s}$.

During each driving cycle, the accumulated time allowed to exceed the tolerance range against the categories M1, N1, M2 vehicles with maximum design total mass no greater than 3500kg shall not exceed 4s; the accumulated time allowed to exceed the tolerance range against other categories vehicles shall not exceed 10s. The total time exceeding the tolerance shall be indicated in the test report.

4.4.3 Criterion for ending the test cycle

It mainly includes:

- a) When performing the NEDC working condition test cycle specified in 4.4.5.2:
 - 1) For the test vehicle with maximum speed greater than or equal to 120km/h, if it can't meet the tolerance requirements specified in 4.4.2, then stop test;
 - 2) For the test vehicle with maximum speed less than 120km/h, when working condition target speed is greater than vehicle declared maximum speed, the speed benchmarking curve corresponding to the target working condition shall be adjusted into the vehicle declared maximum speed; at this time, the driver is required to depress the accelerator pedal to the end; the actual vehicle speed is allowed to exceed the tolerance upper limit specified in 4.4.2; when it can't meet the tolerance lower limit requirements specified in 4.4.2, then stop test; when working condition target speed is less than or equal to the vehicle declared maximum speed, it can't meet the tolerance requirements specified in 4.4.2, stop test.
- b) When performing China typical city bus cycle working condition test cycle specified in 4.4.5.2, if it can't meet the tolerance requirements specified in 4.4.2, stop test.
- c) When performing the C-WTVC working condition test cycle specified in 4.4.5.2, speed is less than or equal to 70km/h, if it can't meet the tolerance requirements specified in 4.4.2, stop test; when speed is greater than 70m/h, if it can't meet the tolerance requirements, then depress the accelerator pedal to the end, till the speed again follows the C-WTVC cycle working condition target speed, the tolerance range specified in 4.4.2 is allowed to be exceeded.
- d) When performing the constant speed test specified in 4.4.5.3, if the vehicle's driving speed doesn't reach 54m/h (categories M1, N1, M2 vehicles with maximum design total mass greater than 3500kg) or 36km/h (other vehicles beyond categories M1, N1, M2 vehicles with maximum design total mass greater than 3500kg), stop test.

When the test end condition is reached, maintain the shift unchanged, vehicle shall be

Record the number of parking and parking time of the test vehicle during the test period. When test cycle working condition is end, vehicle stops, record the travelled distance D of the test vehicle, expressed by km; the measured value shall be rounded off to the nearest integer; such distance is the driving range measured by the constant speed method. Meanwhile record the used time expressed in hour (h) and minute (min).

4.4.5.3.2 Constant speed method applicable to the vehicles beyond the categories M1, N1, and M2 vehicles with maximum design total mass no greater than 3500kg

Perform the (40 ± 2) km/h constant speed test, the vehicle is allowed to park for twice during the test process; each parking time shall not exceed 2min; when the vehicle speed reaches the requirements stipulated in 4.4.3, stop test.

Record the number of parking and parking time of the test vehicle during the test period. When test cycle working condition is end, vehicle stops, record the travelled distance D of the test vehicle, expressed by km; the measured value shall be rounded off to the nearest integer; such distance is the driving range measured by the constant speed method. Meanwhile record the used time expressed in hour (h) and minute (min).

NOTE: the constant speed method test is retained only for other standard citations, and the results shall not be treated as the driving range test result of this Standard.

4.4.6 Power battery charging and energy measurement

After completing the tests specified in 4.4.5.2 and 4.4.5.3, connect the vehicle to the power grid within 2h; charge the vehicle power battery fully as per the charging regulation specified in 4.4.4.3. Connect the energy measurement device between the power grid and vehicle charger; measure the energy $E_{\text{power grid}}$ from the power grid and expressed by Wh, the measured value shall be rounded off to the nearest integer.

NOTE: if the power grid is cut off, its disconnecting time shall be extended to an appropriate time according to the power off time. The vehicle manufacturer and technical service department of certified laboratory shall discuss the effectiveness of the charging.

4.5 Calculation method for driving range and energy consumption

4.5.1 Calculation method applicable to the working condition method for categories M1, N1, M2 vehicles with maximum design total mass no greater than 3500kg

The driving range is the travelled distance D of the test vehicle recorded in 4.4.5.2.1, expressed by km, and it shall be rounded off to the nearest integer.

Use Formula (1) to calculate the energy consumption C , expressed in Wh/km; it shall be rounded off to the nearest integer.

Where:

$E_{\text{power grid}}$ – energy from the power grid during the charging period, in Wh;

C – energy consumption for the working condition of China typical urban bus cycle, in Wh/km.

4.5.2.2 Calculation method applicable to the working condition of C-WTVC cycle

According to Table 2 confirm the test vehicle characteristic mileage distribution rate K in urban, highway and highspeed; use Formula (4) to calculate the energy consumption C for the working condition of C-WTVC; expressed by Wh/km; rounded off to the nearest integer:

$$C = C_{\text{urban}}K_{\text{urban}} + C_{\text{highway}}K_{\text{highway}} + C_{\text{highspeed}}K_{\text{highspeed}} \dots\dots\dots(4)$$

Where:

C_{urban} – energy consumption in urban part, in Wh/km;

C_{highway} – energy consumption in highway part, in Wh/km;

$C_{\text{highspeed}}$ – energy consumption in highspeed part, in Wh/km;

K_{urban} – mileage distribution rate coefficient in urban part (urban rate for short), in %;

K_{highway} – mileage distribution rate coefficient in highway part (highway rate for short), in %;

$K_{\text{highspeed}}$ – mileage distribution rate coefficient in highspeed part (highspeed rate for short), in %.