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**QC**

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OF THE PEOPLE'S REPUBLIC OF CHINA

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## **Specifications of range extender for electrical vehicles**

电动汽车用增程器技术条件

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Annex:

**References, names and dates of implementation of 42 automotive industry standards**

| No. | Standard reference | Standard name                                                                          | Standard reference being substituted | Date of implementation |
|-----|--------------------|----------------------------------------------------------------------------------------|--------------------------------------|------------------------|
| 301 | QC/T 727-2017      | Instrument for automobile and motorcycle                                               | QC/T 727-2007                        | 2017-10-01             |
| 302 | QC/T 803-2017      | Oxygen sensor for automobile                                                           | QC/T 803.1-2008                      | 2017-10-01             |
| 303 | QC/T 1072-2017     | Automotive gear position sensor                                                        |                                      | 2017-10-01             |
| 304 | QC/T 1073.1-2017   | Automotive acceleration sensors - Part 1: Line acceleration sensors                    |                                      | 2017-10-01             |
| 305 | QC/T 1074-2017     | Technical Specification for Automobile Parts Remanufacturing Products Cylinder Head    |                                      | 2017-10-01             |
| 306 | QC/T 1075-2017     | Technical conditions for metal honeycomb carriers for exhaust gas catalytic converters |                                      | 2017-10-01             |
| 307 | QC/T 777-2017      | Technical conditions for electromagnetic fan clutch of automobile                      | QC/T 777-2007                        | 2017-10-01             |
| 308 | QC/T 1076-2017     | Continuously variable transmission (CVT) performance requirements and test methods     |                                      | 2017-10-01             |
| 309 | QC/T 1077-2017     | Terminology and definition of automatic transmission control for automobiles           |                                      | 2017-10-01             |
| 310 | QC/T 1078-2017     | Advertising vehicle                                                                    |                                      | 2017-10-01             |
| 311 | QC/T 1079-2017     | Attract the pressure truck                                                             |                                      | 2017-10-01             |

# Specifications of range extender for electrical vehicles

## 1 Scope

This standard specifies the terms and definitions, requirements, test methods and inspection rules for range extenders for electrical vehicles.

This standard applies to vehicle-mounted range extenders which consist of internal combustion engines and generators and controllers.

Note: The internal combustion engine in this standard refers specifically to compression-ignition and ignition engines.

## 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 standard.

GB 1971 Rotating electrical machines - Terminal markings and direction of rotation

GB/T 18297-2001 Performance test code for road vehicle engines

GB/T 18352.5-2013 Limits and measurement methods of emissions from light vehicle (China V)

GB/T 18488.1-2015 Drive motor system for electric vehicles - Part 1: Specification

GB/T 18488.2-2015 Drive motor system for electric vehicles - Part 2: Test methods

GB/T 19055-2003 Reliability test methods for motor vehicle engines

GB/T 19596 Terminology of electric vehicles

QC/T 413 Basic technical requirements for automotive electric equipment

GB/T 18384.3 Electric vehicles - Safety specification - Part 3: Protection of persons against electric hazards

### 3.7

#### Minimum steady power

The minimum controllable output power of all steady working points of the range extender, which may be 0.

## 4 Requirements

### 4.1 Appearance

The appearance of the range extender shall be clearly marked and free from scratches, have high-voltage harness color identification, clear path. The low-voltage harness shall be laid in a neat and tidy manner.

### 4.2 Output characteristics

#### 4.2.1 Continuous power.

The continuous power of the range extender shall comply with the product's technical documentation.

#### 4.2.2 Peak power.

The peak power of the range extender shall comply with the product's technical documentation.

#### 4.2.3 Power output accuracy.

For range extenders which have power output control functions, the power output accuracy shall comply with the product's technical documentation.

### 4.3 Response characteristics

#### 4.3.1 Startup characteristics.

The start-up time of the range extender shall comply with the product's technical documentation.

In the process from start-up to steady working of the range extender, the speed overshoot does not exceed 200 rpm.

#### 4.3.2 Shutdown characteristics.

The downtime of the range extender shall comply with the product's technical documentation.

In the process of shutdown of the range extender, the internal combustion

#### **4.10 Temperature-rise and temperature-rise limits**

The temperature-rise and temperature-rise limits of the generator and controller of the range extender shall comply with the relevant provisions of GB/T 18488.1.

The temperature-rise and temperature-rise limits of the internal combustion engine of the range extender shall comply with the product's technical documentation.

### **5 Test methods**

#### **5.1 Appearance test**

The appearance of the range extender is checked by observation or manual testing.

#### **5.2 Output characteristics**

The test method is negotiated between the supplier and the purchaser.

#### **5.3 Response characteristics**

The test method is negotiated between the supplier and the purchaser.

#### **5.4 Environmental adaptability**

The test method of environmental adaptability for the generator and controller of the range extender is carried out in accordance with the provisions of GB/T 18488.2.

The test method of environmental adaptability for the internal combustion engine of the range extender shall comply with the technical documents of the internal combustion engine product.

#### **5.5 Electrical safety**

The test method for the insulation and withstanding voltage performance of the range extender as well as the cold DC resistance of the stator winding of the motor is carried out in accordance with the provisions of GB/T 18488.2.

#### **5.6 Test of energy transformation ratio**

##### **5.6.1 Test preparation.**

The test for the generator and controller of the range extender is prepared in accordance with the relevant provisions of GB/T 18488.2, the test of the internal combustion engine of the range extender is in accordance with the relevant provisions of GB 19055-2003.

For the range extender which uses liquid cooling method, the test method for the sealing of the cooling circuit of generator and controller shall comply with the relevant provisions of GB/T 18488.2; the test method for the sealing of the cooling circuit of the internal combustion engine shall comply with the relevant provisions of GB/T 19055-2003.

### **5.8 Test of insulation**

The test method for the insulation of the generator and controller of the range extender shall comply with the relevant provisions of GB/T 18384.3.

### **5.9 Test of withstanding voltage**

The test method for the withstand voltage of the generator and controller of the range extender shall comply with the relevant provisions of GB/T 18488.2.

### **5.10 Test of temperature-rise and temperature-rise limit**

The test method for the temperature-rise and temperature-rise limit of the generator and controller of the range extender shall comply with the relevant provisions of GB/T 18488.2.

## **6 Inspection rules**

### **6.1 Classification of inspections**

Inspection is divided into exit-factory inspection and type inspection.

### **6.2 Exit-factory inspection**

**6.2.1** The range extender may only be exit-factory after passing the inspection by the manufacturer's quality inspection department, meanwhile it shall be accompanied by the product quality certificate.

**6.2.2** Group-batch: Carry out group-batch according to the products produced every day.

**6.2.3** Inspection items: The exit-factory inspection shall at least complete the items as specified in Table 3.

**6.3.3** In the type inspection, if there is any unqualified item, the unqualified item shall be re-inspected by double sampling from the batch extender. If the re-inspection is disqualified, the type inspection shall be unqualified.

## **7 Marking, packaging, transportation, storage**

### **7.1 Marking**

#### **7.1.1 Nameplate.**

All range extenders shall be fixed with a nameplate in their apparent position and the writing on the nameplate shall not be easily worn out during the entire period of use. The nameplate shall contain at least the following data:

- a) Manufacturer's name;
- b) Name and trademark of the range extender;
- c) Date of manufacture or the serial number of the production;
- d) Main technical parameters of the range extender: continuous power, peak power, energy transformation ratio.

#### **7.1.2 Terminal's marking.**

The markings of the power line or terminal of each phase of the generator and controller shall comply with the provisions of GB 1971.

#### **7.1.3 Grounding marking.**

The range extender shall be provided with a grounding post and a grounding marking shall be placed next to the grounding post.

### **7.2 Packaging**

The product's packaging box shall be firm and reliable, to ensure that the product is not mechanically damaged during transportation and storage, meanwhile it is protected from moisture, vibration, dust. The technical documentation that shall be supplied together with the product in the packaging box includes at least:

- a) Product's qualification certificate;
- b) Electrical schematics, installation drawings, wiring diagrams, maintenance instructions necessary for use and maintenance;
- c) Packing list;

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