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**Test methods of electrical heating properties for glazing  
materials used in power-driven vehicles**

机动车玻璃电加热性能试验方法

**(English Translation)**

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### 1 Scope

This document describes the test methods of electrical heating properties - circuit conductivity and heating power, driving visibility, electrical attachment pull-off force, electrical attachment bending resistance, hotspot and heating uniformity, defrosting efficiency, overpressure, low temperature electric thermal shock resistance and moisture resistance - for glazing materials used in power-driven vehicles.

This document applies to the static property test of electrically heated glazing products and does not represent the properties in the installed state.

### 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the version corresponding to that date is applicable to this document; for undated references, the latest version (including all amendments) is applicable to this document.

GB/T 5137.2, Test methods of safety glazing materials used on road vehicles - Part

2: Optical properties tests (GB/T 5137.2-2020, ISO 3538:1997, MOD)

GB/T 13978, Digital multimeters

JJG 124-2005, Verification Regulation of Amperemeters Voltmeters Wattmeters and Ohmmeters

### 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

#### 3.1

Type-A electrically heated glazing

Electrically heated glazing with heating wires placed on the inner surface of tempered glass/laminated safety glass/plastic safety glass by silk-screen printing, inkjet or other methods.

#### 3.2

Keys:

1 - glass;

2 - black border area;

3 - the outermost heating wire at the top;

4 - heating wire;

5 - electrical attachment;

6 - busbar;

7 - the outermost heating wire at the bottom;

8 - heating evaluation area;

L1 - the distance between the outermost heating wires at the top;

L2 - the distance between the outermost heating wires at the bottom.

Figure 1 - Schematic diagram of the heating evaluation area of type-A electrically heated glazing

#### 3.6

electrical attachment

Component for connecting electrically heated glazing to the vehicle power supply.

### **3.7**

#### **hotspot**

The highest temperature point (area) on the outer surface of the sample when the electrically heated glazing is powered on and heated for a specified time at a specified ambient temperature.

### **3.8**

#### **defrosting**

The electrically heated glazing is heated by inputting the voltage required by the product specification into the electrical attachment to remove frost on the outer surface of the glass.

### **3.9**

#### **melting area**

Check whether the visibility of the electrically heated glazing used in power-driven vehicles during driving complies with the requirements of the corresponding product technical conditions.

This test is only applicable to samples with heated transparent areas.

## **7.2.2 Test equipment and apparatus**

A steel ruler with a graduation value of 0.5 mm, a reading microscope with a graduation value of 0.001 mm and a tape measure with a graduation value of 1 mm.

### **7.2.3 Test procedure**

For type-A electrically heated glazing, use a reading microscope to measure the width of the heating wire, use a tape measure to measure the length of the heating wire, and use a steel ruler to measure the distance between two adjacent heating wires.

For type-B electrically heated glazing, use a reading microscope to measure the width of the heating wire. When used on windshield glass, the secondary image deviation and optical distortion of the sample under power-on state shall be tested according to GB/T

5137.2, and the applied voltage and power-on time shall comply with the requirements of the corresponding product standards or technical conditions.

For type-C electrically heated glazing, the visible light transmittance shall be measured in accordance with GB/T 5137.2.

### **7.2.4 Expression of results**

For type-A electrically heated glazing, driving visibility is expressed by three values:

the maximum width of the heating wire; the minimum spacing between two adjacent heating

wires; and the ratio of the total area of the opaque heating wires within the transparent visible area of the heating evaluation area to the area of the transparent visible area of the heating evaluation area.

For type-B electrically heated glazing, driving visibility is expressed by the width of the heating wire. When used as a windshield, it is expressed by both the secondary image deviation and optical distortion under applied voltage.

For type-C electrically heated glazing, driving visibility is expressed in terms of visible light transmittance.

### **7.3.1 Test purpose**

Check whether the electrical attachment meets the requirements of the corresponding product technical conditions after being subjected to a certain mechanical force.

#### **7.3.2.1 Dynamometer**

The measurement accuracy is 0.1 N.

#### **7.3.2.2 Stopwatch**

The second hand jump value is no more than 0.2 s.

### **7.3.3 Test procedure**

Method A: Apply a specified pulling force perpendicular to the glass surface to the electrical attachment for 30 seconds unless otherwise specified. After the test, record the mechanical damage of the connection between the electrical attachment and the glass, and calculate the heating power.

Method B: Apply a tensile force perpendicular to the glass surface to the electrical attachment and gradually increase it until the connection between the electrical attachment and the glass is broken. After the test, record the breaking tensile force value.

### **7.3.4 Expression of results**

Method A uses the heating power and mechanical damage after the test to express the electrical attachment pull-out force.

Method B uses the breaking tensile force value to express the electrical attachment pull-out force.

### **7.4.1 Test purpose**

Check whether the electrical attachment connected to the glass surface meets the requirements of the corresponding product technical conditions after being bent a specified