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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB 14681.2-2006

Replacing GB 14681-1993

**Electrically heated glass for locomotives and ships - Part 2:
Electrically heated glass for locomotives**

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Table of Contents

Foreword...	3
1 Scope...	5
2 Normative references...	5
3 Terms and definitions...	6
4 Product classification and markings...	7
5 Material requirements...	8
6 Service environment...	8
7 Technical requirements...	9
8 Test methods...	13
9 Inspection rules...	18
10 Symbols, packaging, transportation and storage...	20

Foreword

7.7 of this Part are mandatory, while others are recommended. GB 14681 Electrically heated glazing materials for locomotives and ships is divided into two parts. - Part 1. Heated glass panes for ships rectangular windows; - Part 2. Electrically heated glazing materials for locomotives. This Part is Part 2 of GB 14681 Electrically heated glazing materials for locomotives and ships. This Part replaces GB 14681-1993 along with GB 14681.1-2006 Electrically heated glazing materials for locomotives and ships - Part 1. Heated glass panes for ships rectangular windows. The major technical differences between this Part and GB 14681-1993 Electrically heated glazing materials for locomotives and ships are as follows: - ADD two types of glass, namely plane glass and bent glass (SEE Article 4.1.2); - ADD the contrast table for technical requirements and test methods (SEE Table 1); - ADD the requirements for raw materials (SEE Article 5); - ADD the requirements for the deviations in fillet dimension of the glass and in contour dimension of the bent glass (SEE Articles

7.1.1.2 and 7.1.1.3); - CANCEL the performance indicators of optical angular deviation and optical distortion formulated by using the testing method for aircraft glazing materials (SEE Article

5.6.2 of 1993 edition); - ADD the performance indicator of optical distortion formulated by using the testing method for automobile glazing materials (SEE Article 7.5.2); - MAKE provisions on heat resistance according to the testing method for automobile glazing materials and corresponding technical indicators (SEE Articles

7.6.1 and 8.7.1); - ADD the performance indicator and test method of missile resistance
Electrically heated glazing materials for locomotives and ships - Part 2. Electrically heated
glazing materials for locomotives

1 Scope

Part 2 of GB 14681 covers the electrically heated glazing fitted to locomotive cabs: laminated safety glass with an embedded heating element that keeps the driver's forward vision clear of ice and condensation. The standard sets the requirements for the glass and the heating circuit, the optical quality in the field of vision, the mechanical strength and impact resistance, the heating performance and its uniformity, the electrical safety and the durability, together with the test methods and the marking. It replaces GB 14681-1993, which had covered locomotives and ships in a single document. Issued on 22 February 2006, in force since 1 December 2006. This page is published from the official record of the standard held by the Chinese standards administration: the identification, the dates, the classification and the edition it replaces are taken from there. The clause text, the tables and the numeric limits are not reproduced on this page - they are in the document itself, which is delivered in full in English translation.

This Part specifies the product classification, technical requirements, test methods, inspection rules, symbols, packaging, transportation and storage of the electrically heated glazing materials for the front windows of locomotives and CRH trains (hereinafter referred to as "electrically heated glazing materials"). This Part is applicable to the electrically heated glazing materials for the front windows of locomotives and CRH trains. The electrically heated glazing materials for other parts and windshields can also use this Part as reference. This Part is not applicable to the electrically heated glazing materials for aircraft and ships.

2 Normative references

The provisions in the following documents become the provisions of this Part through reference in this Part. For dated references, the subsequent amendments (excluding corrections) or revisions do not apply to this Part. However, parties who reach an agreement based on this Part are encouraged to study if the latest editions of these documents are applicable. For undated references, the latest editions apply to this Part.

GB/T 1214 (all parts) Calipers of vernier type

GB/T 1216 External micrometer

GB/T 5137.1-2002 Test methods of safety glazing materials used on road vehicles - Part 1. Mechanical properties test (ISO 3537.1999, MOD)

GB/T 5137.2-2002 Test methods of safety glazing materials used on road vehicles - Part 2. Optical properties test (ISO 3538.1997, MOD)

GB/T 5137.3-2002 Test methods of safety glazing materials used on road vehicles - Part 3. Radiation, high temperature, humidity, fire and simulated weathering resistance tests (ISO 3917.1999, MOD) GB/T 9056 Metal ruler (GB/T 9056-2004, NEQ ISO 5466.80)

GB 9656 Safety glazing materials for road vehicles GB 11614 Float glass

GB 17841 Tempered and heat-strengthened glass used in curtain walls GJB 500 Aircraft glazing materials - Terms GJB 961-1990 Aircraft - Electrically heated glazing materials - Test methods for electroheat properties GJB 1258-1991 Polyvinyl butyral interlayer GJB 2464-1995 Aircraft glazing materials - Test methods for bird impact

3 Terms and definitions

The terms and definitions defined in GJB 500 and the following ones are applicable to this Part.

3.1 Glazing electrically heated by wire It refers to the electrically heated glazing materials using heating wires as heating elements.

3.2 Glazing electrically heated by film It refers to the electrically heated glazing materials using conductive films as heating elements.

3.3 Mismatch It refers to the mutual offset among layers of glass used for constituting the electrically heated glazing materials.

3.4 Color particle Color particles refer to the colored spot impurities in the cementing layers of the electrically heated glazing materials.

3.5 Busbar B - heat-strengthened glass P - PC board; standard number.

4.2.2 Marking example As for the glazing electrically heated by wire after a piece of 5mm thick tempered glass laminates with a piece of 4mm thick tempered glass, the marking shall be as follows: WL T5 T4 GB 14681

5 Material requirements

5.1 The sheet glass shall comply with the requirements for automobiles of GB 11614.

5.2 The tempered glass shall comply with the requirements of GB 9656.

5.3 The heat-strengthened glass shall comply with the requirements of GB 17841.

5.4 The domestic films using polyvinyl butyral (PVB) shall comply with the requirements of GJB 1258. The imported films shall comply with the requirements for corresponding technical conditions.

5.5 The electrically heated elements (heating wires or metal conductive films) shall comply with the requirements for the technical conditions of ordering.

5.6 PC boards shall comply with the requirements for the technical conditions of corresponding products.

6 Service environment

6.1 The electrically heated glazing materials shall be used under the conditions that the ambient temperature is within the range of -50°C to 70°C and the temperature difference inside and outside the glass is not greater than 65°C .

6.2 There shall be sinusoidal vibration with a frequency within the range of 1Hz to 50Hz corresponding to the vertical and longitudinal directions of the locomotives. Under normal circumstances, the vibration acceleration shall not be greater than 3 m/s^2 . The short-term repetitive vibration acceleration shall not

7.8.1 Actual total power or heating element resistance The test shall be conducted according to Article 8.9.1. The actual total power or heating element resistance shall conform to the design requirements. However, it is allowed to have an error of 10% or be agreed upon by the supplier and demander.

7.8.2 Insulation resistance The test shall be conducted according to Article 8.9.1. The insulation resistances among the insulation positions shall not be less than 50M Ω .

7.8.3 Electrothermal impact resistance The test shall be conducted according to Article 8.9.2. After withstanding 2h at $-50^{\circ}\text{C} \pm 2^{\circ}\text{C}$, ELECTRIFY for 15min according to the product requirements. After the test, the glass shall still be able to function properly. Furthermore, the appearance quality shall still conform to the provisions of Article 7.4.

7.8.4 Electric heating resistance The test shall be conducted according to Article 8.9.3. APPLY

1.2 times the rated voltage at $20^{\circ}\text{C} \pm 5^{\circ}\text{C}$. OPERATE for 30min. After the test, the glass shall still be able to function properly. Furthermore, the appearance quality shall still conform to the provisions of Article 7.4.

7.8.5 Heating uniformity When conducting the test according to Article 8.9.4, the wax melting time of the glass shall not be greater than 10min, or the temperature differences among various points in the heating areas shall not be greater than 10°C .

8 Test methods

8.1 Measurement of contour dimensions USE a steel ruler or steel tape with a minimum scale of 1mm, which conforms to the provisions of GB/T 9056, to measure the contour dimensions of the products. If the user provides templates, it is allowed to inspect based on the templates.