

ICS 43.040.60

CCS T 26



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

GB/T 46021-2025

**Test and evaluation methods for solar and thermal comfort of
automotive safety glazing**

汽车玻璃光热舒适性测试评价方法

Issued on: August 1, 2025

Implemented on: February 1, 2026

**Issued by: State Administration for Market Regulation;
Standardization Administration of the PRC**

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1 Scope

This document specifies the evaluation item assignment, test methods, evaluation methods and reporting requirements for the solar and thermal comfort of automotive safety glazing.

This document applies to the test and evaluation of the solar and thermal comfort of automotive safety glazing.

2 Normative References

GB/T 2680

GB/T 5137.2-2020

GB/T 5137.4-2020

GB/T 11976

GB/T 15488

GB/T 42788

JJF 1615-2017

ISO 8050

3 Terms and Definitions

The terms and definitions defined in GB/T 2680, GB/T 42788, GB/T 11976, GB/T 15488 and QC/T 1119, and the following are applicable to this document.

3.1 Smart glass

A glass product whose optical properties, such as transmission, reflection or absorption in a specific wavelength band, can be altered under the influence or excitation of an external energy field, such as electricity, light, heat or special gases, and can maintain or reverse this state after the effects are eliminated.

[source. GB/T 42788-2023, 3.1, modified]

3.2 Tinted state

Under given control conditions, the lowest state of visible light transmittance achieved by smart glass.

[source. GB/T 42788-2023, 6.16]

3.3 Bleached state

Under given control conditions, the highest state of visible light transmittance achieved by smart glass.

[source. GB/T 42788-2023, 6.17]

3.4 Color rendering index

Ra The general color rendering index after light passes through a test piece.

NOTE. the color rendering index (CRI) generally refers to the average value of CRI of the light source for the first to eighth standard color samples specified by the International Commission on Illumination (CIE).

[source. GB/T 11976-2015, 3.5, modified]

3.5 Color temperature conversion ability

The ability of the glass to convert the color temperature of the light source.

[source. GB/T 15488-2010, 3.26, modified]

3.6 Relative insulation ratio

Compared to 3 mm ordinary flat glass with a visible light transmittance of (89 ± 1)% under standard conditions, the relative temperature change rate achieved by using automotive

safety glazing.

3.7 Dimming ability

Under given control conditions, the ability of smart glass to adjust light across different wavelength ranges.

3.8 Contrast ratio (TRANSLATOR NOTE. it should be contrast ratio)

Under given control conditions, the ratio of visible light transmittance of the bleached state to that of the tinted state of smart glass.

4 General Rules

4.1 To ensure consistency and comparability in the test and evaluation of solar and thermal comfort of automotive safety glazing, this document does not consider external factors, such as vehicle model, interior materials and air conditioning, etc.; it only evaluates the solar and thermal comfort of automotive safety glazing materials in different parts.

4.2 Evaluation items for smart glass and other types of glass are shown in Table 1. For smart glass, the evaluation of dimming ability shall be conducted in both tinted and bleached states.

Evaluations of other items besides the dimming ability shall be conducted under the same stable condition, which shall be agreed upon by the supply-side and the demand-side.

5.1 Visible Light Transmittance (Tv)

The visible light transmittance is tested in accordance with 6.3. Values are assigned to the

5.9 Dimming Ability (DA)

The dimming ability is a bonus item. The dimming ability is tested in accordance with 6.11, and bonus points are awarded in accordance with Table 11. If smart glass alters optical properties other than visible light transmittance, the test method and bonus points for the dimming ability will be agreed upon by the supply-side and the demand-side.

6.1 Test Conditions

Unless otherwise specified, the test shall be conducted under the following environmental conditions.

- a) Ambient temperature. $20\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$;
- b) Relative humidity. 40% ~ 80%.

6.2 Specimen Preparation

Specimens shall be made from the product or test pieces. Test pieces shall be cut from the corresponding test area of the product, with a relatively flat portion measuring 300 mm × 300 mm. For laminated glass, specimens may also be made by applying a 300 mm × 300 mm film to a 3 mm ordinary flat glass of the same size with a visible light transmittance of (89 ± 1)%.

Before the test, the specimens shall be cleaned and placed under the conditions specified in 6.1 for at least 24 hours.

6.3 Visible Light Transmittance

The test shall be conducted using the instruments and equipment conforming to the provisions of 5.3 in GB/T 5137.2-2020, and in accordance with 5.4 in GB/T 5137.2-2020. The test results are expressed as the arithmetic mean of three specimens and rounded to one decimal place.

6.4 Color Rendering Index

The test and calculation shall be performed in accordance with the method specified in ISO 9050 2003. The test results are expressed as the arithmetic mean of three specimens and rounded to one decimal place.

6.5 Color Temperature Conversion Ability

The test shall be performed in accordance with the method specified in Appendix A. The test results are expressed as the arithmetic mean of three specimens and rounded to one decimal place.

6.6 Ultraviolet Transmittance

The test shall be conducted using the instruments and equipment conforming to the provisions of Chapter 5 in GB/T 5137.4-2020, and in accordance with Chapter 7 in GB/T 5137.4-2020, and the ultraviolet transmittance at an atmospheric mass of 1.5 is calculated in accordance with 8.1 of GB/T 5137.4-2020. The test results are expressed as the arithmetic mean of three specimens and rounded to one decimal place.

6.7 Solar Direct Infrared Transmittance

The test shall be conducted using the instruments and equipment conforming to the provisions of Chapter 5 in GB/T 5137.4-2020, and in accordance with Chapter 7 in GB/T 5137.4-2020, and the solar direct infrared transmittance at an atmospheric mass of 1.5 is calculated in accordance with 8.6 of GB/T 5137.4-2020. The test results are expressed as the arithmetic mean of three specimens and rounded to one decimal place.