

ICS 81.040.10

CCS Q30



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

GB/T 30020-2023

**Test method for determining defects of glass - Photoelastic
scanning method**

玻璃缺陷检测方法 光弹扫描法

Issued on: March 17, 2023

Implemented on: October 1, 2023

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

Table of Contents

Foreword	3
1 Scope	5
2 Normative References	5
3 Terms and Definitions	5
4 Testing Principle	6
5 Testing Devices	6
6 Testing Steps	8
7 Testing Records	9
8 Testing Report	9
Appendix A (informative) Self-explosion Risk Assessment of Tempered Glass	11
Bibliography	13

Foreword

This document was issued on 17 March 2023 by the State Administration for Market Regulation; Standardization Administration of the PRC and takes effect on 1 October 2023.

It is a GB/T standard: recommended rather than compulsory, but it is the text a Chinese reviewer applies when assessing a submission.

1 Scope

GB/T 30020-2023 sets out how defects in glass are found by scanning the glass with polarized light and reading the stress field around them, covering the testing principle, the devices, the steps, the records and the report. It applies to defects that cause stress concentration in the glass. In transmission-type testing the polarized light passes through the sheet from one side and reaches the analyser on the other, so an inclusion declares itself not by its own contrast but by the pattern it produces in the glass around it. The record clause asks for the classification and the position of each defect in the scanned image and for a count of the point defects in the piece under test, and the report clause fixes what has to be stated. An informative annex applies the result to assessing the risk of spontaneous breakage in tempered glass, referring to JG/T 455. That is the reason the method exists: an inclusion a fraction of a millimetre across is invisible to inspection by eye, survives tempering, and can break a façade pane years after glazing, when replacing it means access equipment and a closed street. For float glass and tempering plants, façade contractors, and testing laboratories.

This document describes the testing principle, devices, steps, records and reports of determining

glass defects through the photoelastic scanning method.

This document is applicable to the testing of defects that cause stress concentration in transparent glass and its products, and provides a reference for assessing the possible self-explosion risk of tempered glass in service.

2 Normative References

This document does not have normative references.

3 Terms and Definitions

The following terms and definitions are applicable to this document.

3.1 photoelastic scanning method

Photoelastic scanning method is a method of scanning the glass under test with polarized light

and determining the location of glass defects through the stress concentration spots.

3.2 tensile stress zone of tempered glass

Tensile stress zone of tempered glass refers to a zone distributed within the range of $0.2h \sim 0.5h$

from the upper and lower glass surfaces, and the tempering stress is the tensile stress in the

thickness direction of the tempered glass.

NOTE: h is the thickness of tempered glass.

3.3 compressive stress zone of tempered glass

Compressive stress zone of tempered glass refers to a zone distributed within the range of $0.2h \sim 0.5h$

from the upper and lower glass surfaces, and the tempering stress is the compressive stress in the

thickness direction of the tempered glass.

5.4 Image Analysis System

It consists of a computer, buzzer and analysis software, and shall be able to automatically

identify the image with a sudden change of stress concentration light spot caused by defects

and send out an alarm.

5.5 Digital Magnifying Glass

The magnification shall be higher than 60 times, and the depth of field shall be larger than 12

mm. It shall be able to read and identify the color and size of defects on the glass surface and

inside the glass, and the depth from the glass surface and take pictures.

6 Testing Steps

6.1 Transmission-type Testing

The transmission-type testing is a testing method, in which, the polarized light vertically passes

through the glass from one side of the glass and reaches the analyzer on the other side. It is

applicable to the testing of single-piece and multi-layer composite glass and shall be carried out

in accordance with the following procedures:

- a) Determine the cleanliness of the glass surface. If stains and dust on the glass surface obviously affect the light transmission and transparency of the glass, the glass surface shall be cleaned first, so as not to affect the test results;
- b) Respectively place the polarizer and the analyzer of the transmission-type photoelastic meter on the two sides of the glass under test and align them with each other; turn on the plane light source, and the polarized light reaches the analyzer through the glass;
- c) Scan the glass under test. The mode of scanning movement can be hand-held or mechanically carried equipment. The direction of scanning movement can be horizontal or vertical. The speed of scanning movement is not higher than 50 mm/s;
- d) The information image of the glass stress birefringence field during the scanning process is collected by the industrial camera, and transmitted to the image analysis

system for automatic analysis and identification;

e) If the image analysis system does not issue an alarm, then, synchronously move the polarizer and the analyzer to the next adjacent position for the next testing, until an alarm signal appears;

f) Use the digital magnifying glass to further analyze the sudden change point of stress concentration light spot corresponding to the alarm signal, so as to determine the color, distribution depth (tensile stress zone of tempered glass or compressive stress zone of tempered glass), type and size of the defect;

g) In accordance with the above-mentioned procedures, complete the scanning of the entire area of the glass under test, and record the location of the glass containing defects and the defect information;

h) When the on-site testing does not use or unconditionally uses the industrial camera to collect the information image of the glass stress birefringence field during the scanning process, conduct the identification with the naked eye.

6.2 Reflective Testing

The reflective testing is a testing method, in which, the polarized light is incident at an angle of

45° to the glass surface from one side, then, reflected by the glass surface to the analyzer on the

same side. It shall be carried out in accordance with the following procedures:

a) In accordance with the requirements of 6.1, clean the glass surface;

b) Place the reflective photoelastic meter on one side of the glass. If it is coated glass, then, the reflective photoelastic meter shall be placed on the non-coated surface. If there is interference light on the other side that affects the testing effect, a dark shading cloth or shading plate shall be used to cover the other side; the testing can also be performed at night, so as to avoid the impact of sunlight;

c) The scanning mode, image acquisition, analysis and identification, and defect information recording of reflective testing shall comply with the requirements of 6.1.