ICS 83.120
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# NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA



# GB/T 4550-2026

Replacing GB/T 4550-2005

## Preparation of fibre reinforced plastic plates for test purposes

试验用纤维增强塑料平板的制备

**Issued on: May 25, 2026** **Implemented on: December 1, 2026**

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

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## Foreword

This document complies with the provisions of GB/T 1.1-2020 "Standardization Work Guidelines Part

1.Structure and Drafting Rules of Standardization Documents". Drafting. This document replaces GB/T 4550-2005 "Preparation of unidirectional fiber-reinforced plastic sheets for testing", and is consistent with GB/T 4550-2005. Compared to previous versions, aside from structural adjustments and editorial changes, the main technical changes are as follows:

a) The scope of application has been changed (see Chapter 1, Chapter 1 of the.2005 edition);

b) Added terms and definitions (see Chapter 3);

c) A summary of the methods for the winding-autoclave method and the lay-up-molding method has been added (see

d) The recommended range for winding tension has been changed (see 5.1.3,

4.1.3 in the.2005 version);

e) The relative vacuum pressure inside the vacuum bag was changed (see 5.4,

4.2.2 of the.2005 edition);

f) The cutting template in the process auxiliary materials has been removed (see

5.1 in the.2005 edition);

g) The vacuum bag material has been changed (see 6.1,

5.2 in the.2005 edition);

h) Absorbent felt was added as an absorbent material (see 6.5);

## 4 Method Overview

4.1 Winding-molding method Resin-impregnated fibers are continuously wound onto a mandrel to the required number of layers. The wound layers are then heated and pressurized using a press to cure and remove them. Two test plates are obtained after molding. The recommended size for each plate is 270mm x 270mm.

4.2 Winding-Autoclave Method Resin-impregnated fibers are continuously wound onto a mandrel to the required number of layers, along with various typical process auxiliary materials. The materials are combined to form a vacuum bag system. The winding layer is heated and pressurized in a thermostatic tank, and after curing and demolding, two test plates are obtained at once. The recommended size for each flat panel is 270mm x 270mm.

4.3 Laying-molding method A certain amount of prepreg is laid on a flat mold to the required number of layers. The layers are then heated and pressurized using a press to cure them. After demolding, a test plate is obtained. The recommended size for the plate is 270mm x 270mm.

4.4 Installation - Autoclave Method A certain amount of prepreg is laid on a flat mold to the required number of layers, and then a certain amount of prepreg and various process auxiliary materials are added. The materials are combined to form a vacuum bag system. The substrate is heated and pressurized in an autoclave, cured, and then demolded to obtain a test plate. Recommended plate. The dimensions are 400mm x 400mm. A typical combination of auxiliary materials for a vacuum bag system is shown in Figure 1.

### 5.1 Winding Equipment

5.1.1 Wrapping Machine It consists of a yarn frame, a tension control device, a glue tank,

and a circumferential winding drive mechanism (a glue tank is not required for dry winding).

5.1.2 Yarn Frame Used to hold fiber yarn balls, it can be placed upright or horizontally. The yarn ball axis should have a certain braking force to prevent the yarn ball from loosening.

5.1.3 Tension Control Device Mechanical friction or electromagnetic force methods can be used. The tension should remain stable throughout the winding process, ideally at 2% to 4% of the fiber's ultimate strength.

5.1.4 Glue Tank It should be equipped with a temperature control device. It mainly consists of an inlet winding nozzle, extrusion roller, dipping roller, and guide roller. See Figure 2 for a schematic diagram.

5.1.5 Drive Mechanism The fibers are evenly and parallelly distributed across the surface of the mandrel, with a rotation speed of 0 r/min to 30 r/min.

### 5.2 Curing Equipment

5.2.1 Oven or press It should have a temperature control device that meets the curing requirements, with a temperature control accuracy of ±3°C.

5.2.2 Autoclave The autoclave must meet the following requirements.

a) It should have a temperature control system that meets the curing requirements, with a temperature control capacity of not less than.200°C and a temperature control accuracy of ±3°C;

b) It should have a pressure control system that can meet the curing requirements, with a pressure control capacity of not less than

0.7 MPa and a pressure control accuracy of ±

0.02 MPa.

### 5.3 Mold

5.3.1 Molds for the winding-molding method and the winding-autoclave method The winding die consists of a core mold and upper and lower pressure plates. The dimensions and precision requirements of the die are shown in Figure 3.

5.3.2 Molds for the lay-up-molding method and the lay-up-autoclave method The mold for prepreg laying consists of a flat mold and two pressure plates, one above the other. A winding mold with the recommended form and precision is preferred.

5.4 Vacuum System The vacuum system should ensure that the relative vacuum pressure inside the vacuum bag is less than -94 kPa.

## 6 Process auxiliary materials

6.1 Vacuum Bags Use 0.05mm thick nylon film or polyimide film.

6.2 Breathable materials Coarse glass cloth or synthetic fiber felt is used.

6.3 Metal Upper Pressure Plate It uses aluminum plates with a thickness of 1.5mm to 2.0mm and a side length of 400mm x 400mm;.200 pieces are evenly distributed per square meter on the plate. 250 holes, with a diameter not exceeding 2mm.

6.4 Porous isolation layer Porous polytetrafluoroethylene glass cloth or porous non-stick plastic film is used.

6.5 Adhesive Absorbent Material Use glass cloth, filter paper, or absorbent felt with a thickness of 0.1mm to 0.2mm.

6.6 Separating film and release agent The release film should preferably be made of non-adhesive polytetrafluoroethylene glass cloth or non-stick plastic film; silicone grease should not be used as a release agent.

6.7 Metal base template It uses aluminum plates with a thickness of 1.5mm to 2.0mm and a side length of 430mm x 430mm.

6.8 Peripheral retaining strips Rubber strips with a length of 400mm and a width of 5mm to 10mm are used, and the thickness depends on the thickness of the sheet material being made.

6.9 Peripheral sealing strip Pressure-sensitive adhesive tape with a width of 20mm to 30mm is used.

6.10 Sealing strips Use sealing rubber putty strips.

### 7.1 Winding-molding method

7.1.1 State Adjustment The fibers are conditioned according to the specifications in the technical documents.

7.1.2 Material Calculation The number of winding layers is calculated according to formula (1).

#### 7.1.3 Entanglement

7.1.3.1 Install the mandrel coated with release agent onto the mandrel of the winding machine.

7.1.3.2 Adjust the temperature of the mandrel to be close to that of the adhesive solution; the temperature difference should not exceed ±5°C.

7.1.3.3 Pour the adhesive into the adhesive tank and adjust the adhesive to the specified temperature.