

ICS 83.120
CCS Q 23



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

GB/T 1463-2026

Replacing GB/T 1463-2005

**Test methods for the density and relative density of fibre
reinforced plastics**

纤维增强塑料密度和相对密度试验方法

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 supersedes GB/T 1463-2005 "Test Methods for Density and Relative Density of Fiber Reinforced Plastics" and is consistent with GB/T 1463-2005. 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) The requirements for thermometers have been increased (see 5.1.5);
- c) Requirements for density bottles have been added (see 5.1.6);
- d) Requirements for non-aqueous solvent impregnating solutions have been added (see 6.2);
- e) The requirements for specimen conditioning have been changed (see 7.4,

8.1.1 of the.2005 edition);

f) The requirement for weighing metal wires in air has been removed (see

8.1.2 in the.2005 edition);

g) The method for measuring sample mass in the impregnation solution and removing air bubbles adhering to the material surface has been modified (see 8.1.3,

8.1.4 in the.2005 edition);

h) A description of the impregnation solution density at different temperatures has been added (see 8.1.5);

i) The calculation formula for the buoyancy method has been modified (see 9.1.1,.2005 version 9.1.1);

4 Method Principles

4.1 Buoyancy Method According to Archimedes' principle, the volume of the sample is calculated using buoyancy. The density of the sample is the mass of the sample in air divided by its volume.

4.2 Geometric Method Prepare a sample with a regular geometric shape, weigh it, calculate the sample volume using the measured sample dimensions, and divide the sample mass by the sample volume. The volume is equal to the density of the sample.

5.1 Buoyancy Method

5.1.1 Balance, scale division 0.0001g.

5.1.2 Place the sample on the tray and weigh its mass in air.

5.1.3 Impregnation container, beaker or other wide-mouthed container, containing impregnation solution and immersion sample.

5.1.4 Measuring device. When using a mesh tray (integrated with the balance density component), as shown in Figure 1a), or using a metal wire (diameter not greater than...) When the diameter is

0.125 mm, it is as shown in Figure 1b).

5.1.5 Thermometer, accurate to 0.1°C.

5.1.6 Density bottle, capacity 25mL or 50mL.

5.2 Geometric Method

5.2.1 Balance, scale division 0.001g.

5.2.2 Vernier caliper, accuracy 0.01mm.

6 Materials

6.1 Distilled or deionized water, meeting the requirements of Grade III water in GB/T 6682, should be thoroughly degassed by boiling and cooling.

6.2 Non-aqueous solvents should be used, and the solvent used should not dissolve, swell, or otherwise affect the sample, but should allow the sample to be adequately wetted. It has a lower density than the sample. Ethanol is preferable.

7 Samples

7.1 Sample Preparation Perform in accordance with the provisions of GB/T 1446.

7.2 Number of Samples The number of samples is 5.

7.3 Sample Size

7.3.1 Buoyancy Method The sample should have a smooth surface, a volume of not less than 1 cm³, and a mass of 1 g to 5 g.

7.3.2 Geometric Method The specimen should be a regular and smooth geometric shape, such as a cuboid or cylinder, and its dimension in any characteristic direction should not be less than [amount missing]. 4mm, the sample volume should be greater than 10cm³.

7.4 Sample Conditioning Before testing, the test specimens should be conditioned for at least 24 hours under the laboratory standard environmental conditions recommended by GB/T 1446, unless otherwise specified. There are regulations.

8.1 Buoyancy Method

8.1.1 Weigh the sample (m_1) in air, accurate to 0.0001 g.

8.1.2 The temperature of the impregnation solution shall be measured using a thermometer. The temperature of the impregnation solution is generally $(23 \pm 2)^\circ\text{C}$; when the technical specifications specify a test temperature... In case of special requirements, the technical specifications shall apply.

8.1.3 Place the sample on a mesh tray or suspend it using a wire, ensuring the sample is completely immersed in the impregnation solution within the container. The container must not touch the water. Use a wire mesh tray or the sample. Remove any air bubbles adhering to the sample as quickly as possible using another wire. Weigh the sample in the impregnation solution. (m_2), accurate to 0.0001g. If necessary, the same impregnation solution can be used to pretreat the sample by methods such as ultrasonication, soaking, or centrifugation. Reduce bubble formation.

8.1.4 Repeat the test according to the specified number of samples.

8.1.5 When water and ethanol are used as impregnation solutions, their density values at different temperatures are shown in Appendix A. Alternatively, a density bottle can be used in this method. Measure the density of the impregnation solution directly before and after the first use.

8.2.1 Weigh the sample in air (m) to an accuracy of

0.001 g.

8.2.2 Measure the specimen dimensions at three points evenly distributed along each characteristic direction, accurate to

0.01 mm. The difference between the three dimensions should not exceed [a certain value]. The value exceeds 1%. The arithmetic mean of the three points is taken as the dimension of the sample in this direction, thus obtaining the volume (V) of the sample.

9.1 Density

9.1.1 Buoyancy Method The sample density is calculated according to formula (1).

9.2 Relative Density

10. Test Results According to the provisions of GB/T 1446.

11 Test Report The test report should include the following.

- a) Test methods and standard numbers;
- b) Description of the sample material;
- c) Sample number, shape, dimensions, appearance quality, and quantity;
- d) Conditioning of the test environment and the condition of the test specimen;
- e) The impregnation solution and its temperature;
- f) The density or relative density value of each sample at a specified temperature, and the arithmetic mean of a set of samples;
- g) Personnel involved in the experiment, date, and other details.