NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

GB/T 42923-2023

Glass-fibre-reinforced plastic products - Determination of fibre length

玻璃纤维增强塑料制品 纤维长度的测定

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Standardization Administration of the PRC

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Foreword

This document was issued on 6 August 2023 by the State Administration for Market Regulation; Standardization Administration of the PRC and takes effect on 1 March 2024.

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 42923-2023 covers the measurement of fibre length in glass-fibre-reinforced plastic products, and applies to discontinuous glass-fibre-reinforced thermoplastic moulding compounds. Its shape is that of a compact test method: a test principle, the test equipment, the test procedures, and the test report, with terms taken from ISO 472. Almost all of the document's substance is in the procedure clause, which is by far the longest. Specimen preparation starts from calcined ash - the polymer is burned away and the fibre recovered from what is left - and the amount of ash taken is set so that each image displayed on the screen contains roughly one hundred fibres, a working density thin enough for individual fibres to be told apart and measured on the image. That starting point is the reason the method exists: the length it reports is the length of the fibre as it survives in the finished product, after the compounding and moulding the fibre has been through, rather than the length of the fibre as it was supplied. Compounders, moulders and the engineers specifying reinforced thermoplastic parts use it, along with the laboratories checking incoming compound and outgoing mouldings on both sides of a supply contract.

This document describes the method for determining fiber length in glass-fiber-reinforced

plastic products.

This document is applicable to discontinuous glass-fiber-reinforced thermoplastic molding

compounds and molded parts. Before molding, the fiber length is less than or equal to 7.5 mm;

after molding, the fiber length is less than 1 mm.

NOTE: fiber-reinforced polymer matrix composites of other lengths may take this as a reference.

2 Normative References

The contents of the following documents constitute indispensable clauses of this document

through the normative references in the text. In terms of references with a specified date, only

versions with a specified date are applicable to this document. In terms of references without a

specified date, the latest version (including all the modifications) is applicable to this document.

ISO 472 Plastics - Vocabulary

NOTE: GB/T 2035-2008 Terms and Definitions for Plastics (ISO 472:1999, IDT)

ISO 1172 Textile-glass-reinforced Plastics - Prepregs, Molding Compounds and Laminates -

Determination of the Textile-glass and Mineral-filler Content - Calcination Methods

NOTE: GB/T 2577-2005 Test Method for Resin Content of Glass Fiber Reinforced Plastics (ISO

1172:1996, MOD)

3 Terms and Definitions

The terms and definitions defined in ISO 472 are applicable to this document.

Addresses of the terminology database maintained by ISO and IEC for standardization are as

follows:

---ISO online browsing platform: http://www.iso.org/obp;

---IEC electronic open platform: http://www.electropedia.org/.

6 Test Procedures

6.1 Specimen Preparation

Take a certain amount of sample from the calcined ash. Its fiber concentration is such that each

image displayed on the screen contains approximately 100 fibers. The amount of sample

depends on the fiber content and test conditions, especially the diameter of the crystallizing

dish (since fibers are deposited on a horizontal plane, the water depth in the crystallizing dish

has no effect on the concentration of fibers deposited on the glass slide).

EXAMPLE: for a glass-fiber-reinforced polyamide composite material with a content of 30%,

when using a crystallizing dish with a diameter of 90 mm, approximately 0.006 g of

sample is required.

NOTE 1: it is assumed that the fiber length is less than 1 mm.

In accordance with the requirements of ISO 1172, at 625 ?C, calcinate the material for 1 hour

and 30 minutes, then, cool it.

NOTE 2: the obtained ash consists mainly of glass fibers and may also include mineral fillers. Since

the fibers are extremely fragile, all subsequent treatment must be done with extreme care,

so as to avoid breakage and invalid measurement results.

NOTE 3: after cooling, transfer the ash in the crucible to a watch glass.

NOTE 4: choose the material of an appropriate mass and size. If the material is not sufficiently

calcined, properly extend the calcination time.

Place the previously degreased glass slide into the crystallizing dish (5.2) and pour an

appropriate amount of demineralized water (containing a small amount of surfactant) to cover

the glass slide. In accordance with the mass and size of the fibers, determine the amount of

water, so as to avoid the formation of convection currents during subsequent evaporation.

Pour the ash in the watch glass onto the glass slide in the crystallizing dish (or use the tip of

the

scraper to transfer a sufficient amount of ash).

Place the crystallizing dish containing the ash into the ultrasonic equipment to disperse the fibers without any mechanical action. The time required for dispersion ranges from a few seconds to one minute.

NOTE 5: reasonably choose the power and frequency of the ultrasonic equipment, so as to avoid

fiber breakage.

Place the crystallizing dish into the oven (5.8) preheated to 130 ?C for about 1 h, so as to remove

moisture. Then, let it cool. If heating causes fiber bonding, then, this step can be omitted.

Place the crystallizing dish next to the microscope or stereoscope (5.4). Place the fiber-covered

glass slide under the lens of a microscope or stereoscope.

If necessary, wipe away all fibers from the bottom of the glass slide.

6.2 Calibration

Use a reference scale to calibrate the system. It is recommended to use a calibration glass slide

with a length of 1 mm or 1.5 mm.

Calibrate by measuring the length of the calibration glass slide. In accordance with the method

of measuring fiber length, use the mouse to click on both ends of the calibration glass slide, and

compare the reading with the length of the calibration glass slide. The tolerance should be 0.01

mm.

If necessary, increase the frequency of microscope calibration.

6.3 Examination and Measurement

In the pattern of brightfield illumination or darkfield illumination (circular illumination), use reflected light or transmitted light to directly examine the fibers, and it is unnecessary to use coverslips or mounting fluid.