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

GB/T 7690.5-2013

**Reinforcements -- Test method for yarns -- Part 5: Determination
of fiber diameter for glass fiber**

增强材料 纱线试验方法 第5部分：玻璃纤维纤维直径的测定

(English Translation)

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Foreword

GB/T 7690 "Reinforcements - Test method for yarns" consists of 6 parts:

- Part 1: Determination of linear density;
- Part 2: Determination of twist;
- Part 3: Determination of breaking force and breaking elongation for glass fibre;
- Part 4: Determination of stiffness;
- Part 5: Determination of fiber diameter for glass fiber;
- Part 6: Determination of twist balance index.

This is Part 5 of GB/T 7690.

This document was drafted in accordance with the rules given in GB/T 1.1-2009.

This Part replaces GB/T 7690.5-2001 "Reinforcements -- Test method for yarns -- Part 5: Determination of fibre diameter for glass fibre". Compared with GB/T 7690.5-2001, in addition to editorial modifications, the main technical changes are as follows:

- Changed the content of NOTE 1 in "Scope" to the main text (see Chapter 1 of this Edition; NOTE 1 in Chapter 1 of Edition 2001);
- Deleted the two chapters "Normative references" and "Definitions" (see Chapter 2 and Chapter 3 of Edition 2001);
- Changed the minimum magnification of the microscope from "500 times" to "400 times" (see 2.2.1 of this Edition; 4.2.1 of Edition 2001);
- Added the method of removing the sizing from the fiber (see 2.3.1 of this Edition).

This Part uses translation method to identically adopt ISO 1888:2006 "Textile glass - Staple fibers or filaments - Determination of average diameter". It made the following modifications:

- Modified the standard name.

This Part was proposed by and shall be under the jurisdiction of National Technical Committee on Fiberglass of Standardization Administration of China (SAC/TC 245).

Main drafting organizations of this Part: Nanjing Fiberglass Research and Design Institute Co., Ltd., National Fiberglass Product Quality Supervision and Inspection Center.

Reinforcements - Test method for yarns - Part 5:

Determination of fiber diameter for glass fiber

1 Scope

This Part of GB/T 7690 specifies two test methods for the average fiber diameter (i.e., the average value of the actual diameter) in glass fiber products, namely the longitudinal method and the cross-sectional method.

This method is applicable to fixed-length fibers or continuous fibers in glass fiber products.

The mean diameter must not be confused with the nominal diameter, which is used to name the yarn and its constituent materials. It is a rounded-off value related to the mean diameter.

2.1 Principle

Fibers and monofilaments are immersed in a liquid medium with a different refractive index. Their longitudinal profiles are observed under a microscope and their diameters are measured.

2.2.1 Microscope: equipped with the following:

- Eyepiece with built-in micrometer. The total magnification of the eyepiece and objective lens shall be at least 400 times. 1000 times is preferred. The resolution

of the microscope shall be sufficient to measure values with an accuracy of at least 0.5 μm (see NOTE);

- A stage that can be moved laterally and rotated;
- Lighting system.

NOTE: The system can be replaced or combined with a micro projector. A transparent ruler (arc ruler is better) can be used to measure the specimen on the micro projector.

The recommended microscope is one that uses plane polarized light. It is equipped with a Kohler light source illumination system and an Abbe condenser. A green filter can Remove the mold. Use the saw (3.2.5) to cut a thin disc-shaped specimen (about 4 mm thick) from the upper part of the molded body for testing under a microscope.

3.3.3 Positioning and centering of specimens

To facilitate the positioning of the specimen in the field of view, the magnification can be lowered first, for example to 150 x. When the specimen is positioned, the magnification can be increased and completely centered.

The end of the fiberglass will appear as a shiny disk.

Adjust the lighting to minimize the area of stray light around each bright surface, while maintaining sufficient brightness to make the scale easy to read.

Adjust these bright disks to the micrometer scale.

3.3.4 Measurement

Move the stage so that one scale of the micrometer is tangent to a disk. Record the scale number. Estimate the reading to the nearest half scale, which is equivalent to the diameter of the disk.

NOTE: Elliptical surfaces may appear during measurement. These ellipses are caused by the fact that the fibers in the sample are not all arranged in parallel and are obliquely cut during cutting. The

length of the minor axis in the ellipsoidal surface can represent the diameter of the continuous fiber.

Randomly measure 25 disks. Slightly move the stage during measurement so that one

scale of the micrometer is tangent to one disk in each measurement.

If 25 values cannot be obtained in this way, measure along another axis, avoiding measuring the same fiber twice, until 25 measurements have been made.

4 Results expression

Calculate the arithmetic mean of the 25 measured values. Convert the arithmetic mean into a value in micrometers (μm) based on the magnification factor of the optical system.

The result is rounded to $0.5 \mu\text{m}$.

5 Test report

The test report shall include the following:

- a) a statement of the method used in this Part and the method (A or B) chosen;
- b) the necessary details to identify the yarn tested;

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