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GB/T 33832-2017

Determination of Water Resistance of Glass Fiber

玻璃纤维耐水性的测定

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Foreword

This Standard was drafted as per the rules specified in GB/T 1.1-2009.

This Standard was proposed by China Building Material Federation.

This Standard shall be under the jurisdiction of National Technical Committee for Standardization of Glass Fiber (SAC/TC 245).

Drafting organizations of this Standard: Nanjing Fiberglass Research & Design Institute Co., Ltd., Jushi Group Co., Ltd., and China National Fiberglass Product Quality Supervision & Testing Center.

Chief drafting staffs of this Standard: Zhou Qin, Li Rong, Liao Bing, Wang Yumei, Wang Tao, Xi Bin, and Wang Ling.

Determination of Water Resistance of Glass Fiber

Warning: this Standard is not intended to involve all safety issues related to the use of the product. The users of this Standard are responsible for establishing appropriate safety and healthy principles; and ensure whether it is applicable to certain limits of the regulations before use.

1 Scope

This Standard specifies two methods for determination of water resistance of glass fiber:

- Method A: mass loss method;
- Method B: monofilament tensile breaking strength retention rate method. This method is not applicable to the chopped tows with length less than 3cm.

This Standard is applicable to the determination of water resistance of glass fiber in tow shape.

2 Normative References

The following documents are essential to the application of this document. For the dated documents, only the versions with the dates indicated are applicable to this document; for the undated documents, only the latest version (including all the amendments) are applicable to this document.

GB/T 1033.1 Plastics – Methods for Determining the Density of Non-Cellular Plastics – Part 1: Immersion Method, Liquid Pycnometer Method and Titration Method

GB/T 6682 Water for Analytical Laboratory use – Specification and Test Methods

GB/T 7690.5 Reinforcements – Test Method for Yarns – Part 5: Determination of Fiber Diameter for Glass Fiber

GB/T 11415 Laboratory Sintered (Fritted) Filters – Porosity, Grading, Classification and Designation

GB/T 31290 Carbon Fiber – Determination of the Tensile properties of Single-

Filament Specimens

3 Specimen Pre-Treatment

3.1 For the continuous fiber tow, cut it into 250mm long section; take about 20g; one end shall be bounded by the fine nylon; then place it into the dryer (diameter of 180mm) containing 700mL acetone (analytically pure) or other soluble organic solvent of impregnant; the fiber with free end shall be spread as much as possible; sealing and soaking for at least 24h till the residual amount of impregnant is no greater than 0.1%. Take out, use anhydrous ethanol (analytically pure) to wash for 3 ~ 4 times; and stroke the fiber so that it becomes neat yarn bundle. Cut 100mm long section fiber from the free end, place into 105°C±2°C constant temperature drying oven to dry to the constant weight; take out; place into the dryer (with silicone) to cool off to the room temperature for backup.

3.2 Take 10g of chopped tow; place into the dryer (diameter of 180mm) containing 700mL acetone (analytically pure) or other soluble organic solvent of impregnant; sealing and soaking for at least 24h till the residual amount of impregnant is no greater than 0.1%. Take out, use anhydrous ethanol (analytically pure) to wash for 3 ~ 4 times; place into 105°C±2°C constant temperature drying oven to dry to the constant weight; take out; place into the dryer (with silicone) to cool off to the room temperature for backup.

3.3 When it is required to determine the water resistance of fiber glass containing impregnant, acetone or other organic solvent is unnecessary to be used to soak; directly dry it for backup.

4 Method A: Mass Loss Method

4.1 Method summary

Weigh a certain mass of specimen; place into the flowing and boiling water; after a certain period of time, use the sintered filter to filter, wash, dry, and weigh; calculate the mass loss rate or mass loss amount per unit surface area.

4.2 Instruments and materials

4.2.1 Steel ruler, accurate to 0.5mm.

4.2.2 Analytical balance, accurate to 0.001g.

4.2.3 Sintered filter, 100mL, shall meet the requirements of GB/T 11415; the glass material and ceramic filtering disk are suitable. Its aperture shall be less than the diameter of glass fiber. It shall be treated according to the use instructions before the

5.2.3 Constant temperature drying oven, the temperature shall be controlled at 105°C±2°C.

5.2.4 Tensile tester shall conform to the provisions of GB/T 31290.

5.3 Test procedures

5.3.1 Take no less than 100 pieces of backup fiber samples; place into beaker (5.2.1); add 600mL of boiled water; place onto the adjustable electric furnace; perform the hydrolyzed reaction as per 4.4.2; take off; use ice-water bath to cool off.

5.3.2 Use water to wash for 3 times ~ 4 times; place the specimen into 105°C±2°C constant temperature drying oven (5.2.3) to dry; take off; place into dryer to cool off.

5.3.3 Measure the monofilament tensile breaking strength before and after the hydrolyzed treatment as per the provisions of GB/T 31290; separately obtain no less than 25 pieces of valid data.

5.4 Result calculation

It shall be calculated as per Formula (3).

$$\delta = \frac{F_2}{F_1} \times 100\% \quad \dots\dots\dots (3)$$

Where:

δ – monofilament tensile strength retention rate, in %;

F_2 – average monofilament tensile breaking strength of treated specimen, in cN;

F_1 – average monofilament tensile breaking strength of backup specimen, in cN;

The result shall be retained 1 digit after the decimal point.

6 Precision

The repeatability limit of mass loss method can refer to Table 1.