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Method for Quantitative Analysis of Ramie (Flax Hemp)

Cotton Blended Textile – Micro Projection

麻棉混纺产品定量分析方法 显微投影法

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Table of Contents

Foreword	3
1 Scope	4
2 Normative References	4
3 Principle	4
4 Reagents	4
5 Apparatus	5
6 Test Procedures	5
7 Calculation	7
8 Result Analysis and Test Report	9
Appendix A (Informative) Morphological Characteristics of Cotton, Ramie, Flax and Hemp Fibers	10
Appendix B (Informative) Calculation Method Explanation of the Converted Number	11
Appendix C (Informative) Reference Diameter of Fiber	12
Appendix D (Normative) Density of Cotton, Ramie, Flax, and Hemp Fiber	13

Method for Quantitative Analysis of Ramie (Flax Hemp) Cotton Blended Textile – Micro Projection

1 Scope

This Standard specifies test methods for quantitative analysis of ramie cotton blended textile products using micro-projectors and digital image analyzers.

This Standard applies to ramie cotton, flax cotton, and hemp cotton blended textile products.

2 Normative References

The provisions in following documents become the provisions of this Standard through reference in this Standard. For dated references, the subsequent amendments (excluding corrigendum) or revisions do not apply to this Standard, however, parties who reach an agreement based on this Standard are encouraged to study if the latest versions of these documents are applicable. For undated references, the latest edition of the referenced document applies.

GB/T 6529 Textiles - Standard atmospheres for conditioning and testing

GB/T 8170 Rules of rounding off for numerical values & expression and judgement of limiting values

FZ/T 01057.3 Test method for identification of textile fibers - Part 3: Microscopy

3 Principle

Both linen and cotton are plant cellulose fibers. After blending, neither chemical analysis methods can be used to determine their component content, nor can they be separated mechanically. This method uses an ordinary biological microscope, micro-projector or digital image analyzer to distinguish and count a certain number of fibers; and uses the micro-projector or digital image analyzer to measure the diameter or cross-sectional area of the fibers to calculate the weight percentages of various fibers.

4 Reagents

All used reagents are chemically pure.

6.1.2.3 Fabrics

Randomly select at least one piece of 10cm×10cm fabric from the laboratory samples; split it into yarns (specimens with sizing must be de-sized first; and then split into yarns after processing); and randomly take out a 10cm long section, totally taking 30 sections; and then combine into one bunch. When the fiber content of the warp and weft yarns of a woven fabric is different, the split warp and weft yarns must be dried and weighed separately; and the fiber weight percentage of each component of the warp and weft yarns must be measured respectively; and then calculate the weight percentage of each fiber component in the entire fabric.

6.2 Specimen coloring

6.2.1 Preparation of specimen colorant

Put 2.5g of RM fiber colorant into a glass container; pour 20mL of alcohol; stir thoroughly with a glass rod; and then pour 180mL of boiled distilled water and stir evenly.

6.2.2 Dyeing

Boil-dye the prepared specimen with colorant at a liquor ratio of 1:50 for 1 min. Take it out and rinse it with water until there is no floating color. After drying, balance it according to GB/T 6529. If it is colored yarn, do not dye it. Put the specimen in the oven and pre-bake for 20 min before balancing.

6.3 Preparation of slide glass

6.3.1 Preparation of fiber longitudinal slide glass

Use a fiber slicer to evenly cut fiber bundles of 0.2 mm to 0.36 mm in length from the dyed specimen (6.2.2); move them to a watch glass; add a certain amount of anhydrous glycerol; and mix thoroughly to form thick suspension. Use a wide-mouth pipette to absorb a small amount of evenly mixed suspension and place it on a slide glass. Spread it evenly and cover it with a coverslip to fix the sample. Be careful not to let the fibers flow out of the coverslip to avoid losing the fiber. Otherwise, it needs to prepare the slide glass again.

6.3.2 Preparation of cross-section slide glass

Put the specimen dyed in 6.2.2 into a fiber slicer; apply collodion liquid and evenly cut into fiber cross-section slices with a thickness of 20μm ~ 30μm; and move this fiber cross-section slice to a slide glass dripping with glycerin; cover with a coverslip for measuring fiber cross-section.

6.4 Counting the number of fiber

Use an ordinary biological microscope (magnification between 200x and 250x) or a micro-projector to observe the fibers. Place the slide glass prepared according to 6.3.1 on the stage of

an ordinary biological microscope or micro-projector, observe the various types of fibers entering the field of view through the eyepiece; and identify their categories according to the morphological and structural characteristics of the fibers (see Appendix A). Start counting near the top or bottom corner of the field of view. As the slide glass is slowly moved horizontally across the field of view, identify and count all fibers that pass through the center of the eyepiece reticle. After each stroke across the field of view, move the slide glass vertically by 1 mm to 2 mm and then slowly move it horizontally across the field of view to identify and count fibers. Repeat this operation procedure until all slide glasses have been viewed and the total number of counts shall be more than 1000. If the number of fibers on the slide glass exceeds 1000 and cannot be interrupted, the entire range of the slide glass shall be counted. If the number of fibers in the entire range of the slide glass is less than 1000, another slide glass shall be made so that the total number of fibers can reach more than 1000. For each batch of specimens, count two groups of more than 1000 fibers; and calculate the converted number of each fiber in the two groups (see Appendix B). The difference in the converted number of each fiber between the two tests shall be no greater than 10.

6.5 Measurement of fiber diameter

Calibrate the micro-projector so that it can magnify 500 times when reaching the projection plane; and then place the slide glass prepared in 6.3.1 on the stage so that the measured fibers are within the projection circle. Make fine adjustment against the projector so that the edge of the fiber image is projected onto the wedge ruler as a thin line; and measure the projected width at the middle of the fiber length as the diameter. But do not measure those fibers whose measuring points are at the intersection of two fibers or those fibers shorter than 150 μ m. More than 200 fibers of each type must be measured. After the measurement, calculate the average diameter of each fiber, expressed in μ m. When the measurement accuracy is not too high, the reference diameter in Appendix C can be used.

6.6 Measurement of fiber cross-section

Place the slide glass prepared in 6.3.2 on the stage of the micro-projector; calibrate the projector according to 6.5; and place a piece of tracing paper with a coordinate grid of about 30cm $\times$ 30cm in the projection plane. Use a sharpened pencil to trace the fiber image onto tracing paper. Do not trace fibers that have already been traced. If there are less than 100 fibers of each type on one slide glass, prepare another slide glass until there are more than 100 fibers of each type. After tracing, calculate the cross-sectional area of each fiber by counting the number of squares, expressed in mm².

7 Calculation

7.1 Determine the average diameter of the fiber according to 6.5; and use the fiber density in Appendix D to calculate the weight percentage of each fiber, see Formulas (1) to (5).

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