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**Test method for maturity of cotton fibers - Microscopic
method**

棉纤维成熟度试验方法 显微镜法

(ISO 4912:1981 Textiles - Cotton fibers - Evaluation of maturity - Microscopic
method, MOD)

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Test method for maturity of cotton fibers - Microscopic method

1 Scope

This standard specifies a test method for measuring the maturity of cotton fibers after swelling with sodium hydroxide solution, by microscopy.

This standard applies to untreated raw cotton, laps, slivers, cotton fibers taken from yarn.

2 Normative references

The provisions in following documents become the provisions of this Standard through reference in this Standard. For the dated references, the subsequent amendments (excluding corrections) 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 6097 Sampling method for testing of cotton fibers

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

3 Terms and definitions

The following terms and definitions apply to this standard.

3.1

Mature ratio

The ratio -- of cell wall thickening to an artificially selected 0.577 standard thickening.

3.2

Dead fibre

After the cotton fiber is expanded according to the specified conditions, the fiber whose cell wall thickness is equal to or less than one-fifth of the maximum width.

4 Principles

After cotton fibers are swelled by 18% sodium hydroxide solution, the cotton fiber maturity is determined, by observing the ratio of cell wall thickness to maximum width, as well as the fiber morphology, through a microscope.

5 Instruments, tools, reagents

5.1 Microscope or micro projector: Magnification is 400X.

5.2 Counters.

5.3 Sodium hydroxide solution: $18\% \pm 0.2\%$.

5.4 Microscope slides, coverslips, limiter clear board, 50 mm small steel ruler, tweezers, thin combs, dense combs, picking needles, glue, etc.

6 Atmosphere for test

No humidity conditioning is required, the test can be carried out in any atmospheric environment. In order to make it easier for the fibers to be fixed on the glass slide, it should be carried out, under the conditions of a relative humidity of not less than 40% and no strong airflow.

7 Sample preparation

7.1 Extraction of test samples

Take out at least 32 bundles of fibers about 10 mg, from different parts of the laboratory sample, to form one set of test sample. Take two sets of samples in total. OR take two sets of test samples, according to GB/T 6097, each about 10 mg.

7.2 Preparation of test specimens

7.2.1 Pull a test sample by hand or use a limiter clear board, to organize a test sample into a cotton bundle with one end neat and straight, uniform in thickness, clear in layers.

7.2.2 In the order of first thin carding and then densely carding, from the neat end of the cotton bundle, comb the short fibers of 16 mm and below for fine-staple cotton and 20 mm and below for long-staple cotton. Split lengthwise, to divide it into five roughly equal cotton bundles.

7.2.3 Apply a little glue along the edge of the glass slide. Use hand to hold one end of the small cotton bundle. Use tweezers in the other hand, to pick up a small amount of

fibers from the neat end of the small cotton bundle. Arrange them evenly on the glass slide. Repeat this process, until 100 or more fibers are lined up on the slide.

7.2.4 Use a pick needle to move the fibers on the glass slide, so that the fibers are arranged in parallel, straight and evenly distributed; the width of the array is about 25 mm.

7.2.5 Gently cover the cover glass. Drop sodium hydroxide solution on one corner of the cover glass. Gently press the cover glass, to make the solution infiltrate to each fiber; prevent the generation of air bubbles.

7.2.6 Use a paper towel, to absorb the spilled solution, along the edge of the cover glass, to prevent corrosion of the microscope lens.

7.2.7 The other four small cotton bundles are prepared, according to the procedures of 7.2.3 ~ 7.2.6.

7.2.8 Another set of test sample is prepared, according to the above procedure.

8 Test steps

8.1 Adjust the condenser of the microscope, to obtain a field of view, which has moderate luminance and uniform illumination, so as to enhance the contrast, between the fiber cell wall and the middle cavity.

8.2 Put the glass slide on the stage of the microscope, so that the middle of the fiber is in the center of the field of view. Observe and classify the fibers one by one. Record the number of each type of fiber in each specimen. Test the mature ratio of the fiber or percentage of mature fibers.

8.2.1 For the test of mature ratio, all fibers of each specimen are divided into three categories:

- a) Normal fibers;
- b) Dead fibers;
- c) Thin-walled fibers.

8.2.2 For the test of the percentage of mature fibers, all fibers of each specimen are into two categories:

- a) Mature fibers;
- b) Immature fibers.

8.3 Two test personnel test each of the five test specimens, to get the test results.

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