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FZ

**TEXTILE INDUSTRY STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

FZ/T 01057.3-2007

**Test method for identification of textile fibres - Part 3:
Microscopy
(English Translation)**

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1 Scope

This document specifies a test method for the identification of textile fibers - the Microscopy.

This document is applicable to the identification of various textile fibers.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

FZ/T 01057.1, Test method for identification of textile fibers -- Part 1.General introduction

3 Terms and definitions

This document contains no terms and definitions requiring definition.

4 Principle

Observe the longitudinal and cross-sectional morphology of the unknown fiber using a microscope and/or a microscopic image analyzer. Identify the fiber type by comparing these features with the known morphological characteristics of fibers.

5.1 Instruments

5.1.1

Biological microscope, with a magnification of at least 100x.

5.1.2

Microscopic image analyzer. it shall comprise a microscope, a camera, a computer, an image acquisition card, dedicated analysis software, and a monitor. The microscope's objective and eyepiece shall provide a total magnification of at least 500x. A calibration scale for the instrument's magnification shall be included.

5.1.3

Hardy microtome. capable of cutting fiber sections with a thickness of 10 μm ~30 μm .

5.1.4 Rotary microtome. features a concealed, silent ratchet mechanism, a crank-slider

assembly, and high-precision guide rails for the specimen block, enabling continuous sectioning of fibers with uniform thickness. The section thickness is adjustable within the range of 1 μm ~40 μm .

5.2 Tools

5.2.1

Microscope slide. 76.2 mm x 24.5 mm x 2 mm.

5.2.2

Cover slip. 18 mm x 18 mm or 24 mm x 24 mm.

5.2.3

Dropper.

5.2.4

Blade.

5.2.5

Tweezers.

5.2.6

Black paper box.

5.3 Reagents

5.3.1

Anhydrous ethanol. analytically pure.

5.3.2

Ethanol (80% v/v). dilute 80 mL of absolute ethanol with water to a final volume of 100 mL.

5.3.3

Ethanol (90% by volume). dilute 90 mL of absolute ethanol with water to a final volume of 100 mL.

5.3.4

Anhydrous ethyl acetate. analytically pure.

5.3.5

Collodion. analytically pure.

5.3.6

Glycerol. analytically pure.

5.3.7

Liquid paraffin. analytically pure (refractive index between 1.43~1.53).

5.3.8

Sectioning paraffin.

6 Specimens

Specimen preparation and pre-treatment shall be carried out in accordance with FZ/T 01057.1.

7.1 Longitudinal view observation

Spread an appropriate number of fibers evenly onto a microscope slide (5.2.1). Using a dropper (5.2.3), add a drop of glycerol (5.3.6) or liquid paraffin (5.3.7), taking care to avoid trapping air bubbles. Place a coverslip (5.2.2). Position the slide on the stage of a biological microscope (5.1.1) or a microscopic image analyzer (5.1.2). Observe the morphology at a magnification of at least 100x and record the observations.

7.2.1 Prepare sections using a Harris microtome

7.2.1.1

Loosen the clamping screw 4 of the Hardy microtome (5.1.3). Pull out the locating pin 5. Rotate the holder base 6 to a position perpendicular to the groove 2 in the metal plate. Pull out the metal plate tab 1. See Figure A.1 in Appendix A for a schematic diagram of the Hardy microtome.

7.2.1.2

Comb a bundle of fiber specimens until neat and aligned. Clamp it tightly into the center of the slot of the Hardy microtome (5.1.3). First, use a sharp blade (5.2.4) to cut off the protruding fibers. Then, attach the upper spring mechanism and tighten the screw.

7.2.1.3

Slightly turn the scale screw 3 to cut off the exposed fiber.

7.2.1.4

Tighten screw 3 slightly. Using a dropper (5.2.3), apply a small drop of collodion (5.3.5). After it evaporates, carefully cut off the section using a blade (5.2.4) and set it aside.

NOTE: Alternatively, use other reagents or methods to fix the fiber sections for later use.

7.2.2 Prepare sections using a rotary microtome**7.2.2.1**

Take a bundle of fibers and straighten it by hand-pulling. First, immerse the bundle in 80% ethanol (5.3.2) for 2 min, then remove and twist it between your fingers two or three times. Subsequently, treat the bundle sequentially in the same manner using

90% ethanol (5.3.3), absolute ethanol (5.3.1), a (1.1) mixture of absolute ethanol (5.3.1) and anhydrous ethyl acetate (5.3.4), and finally collodion (5.3.5). Remove the bundle, allow it to air-dry, and then proceed with paraffin (5.3.8) embedding and sectioning.

7.2.2.2

Mount the trimmed, embedded fiber wax block onto a wooden block.

7.2.2.3

Clamp one end of the wooden block into the specimen holder. Turn the wax block locking screw to clamp the wax block securely, ensuring it is parallel to the microtome knife. Adjust the position so that the wax block is close to the knife edge.

7.2.2.4 Adjust the setting on the rotary microtome (5.1.4) to the required section

thickness. A thickness of 6 μm ~10 μm is generally most suitable for fiber sections. A schematic diagram of the rotary microtome is shown in Figure A.2 of Annex A.

7.2.2.5 Turn the handwheel clockwise to move the wood block up and down. Cut continuous