Designation: D7879 – 13

Standard Test Method for Determining Flax Fiber Widths Using Image Analysis[1]

This standard is issued under the fixed designation D7879; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This test method involves the measurement and analysis of two-dimensional projections of flax fibers using image analysis software in the longitudinal plane to determine the average and distribution of fiber widths.

1.2 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]
D123 Terminology Relating to Textiles
D1776 Practice for Conditioning and Testing Textiles
D6798 Terminology Relating to Flax and Linen

3. Terminology

3.1 *Definitions:*
3.1.1 For all terminology related to Flax and Linen see Terminology D123.
3.1.1.1 The following terms are relevant to this standard: average fiber width (μm).
3.1.1.2 For definitions of all other textile terms see Terminology D6798.

4. Summary of Test Method

4.1 This test method involves the preparation of flax fibers for digital capture, the scanning of the fibers for analysis, and the calibration and standardization of the image processing. From the image analysis, the arithmetic mean and its standard deviation, median, and numerical distribution of the fiber widths are calculated.

5. Significance and Use

5.1 Longitudinal preparation is much quicker and less damaging than cross-sectional analysis and allows the fibers to be evaluated in their natural state.

5.2 This test method provides measurement of a flax fiber specimen that uses less specimen preparation, produces consistent results, and minimal specimen modification. It has been shown that the median values of width correlate very well with the Optical Fiber Diameter Analyzer (OFDA), an apparatus developed for measuring the value and distribution of wool fiber diameters.

6. Interferences

6.1 Out of focus objects.

6.2 Real resolution of image capturing device impacts measurements.

6.3 Fingerprints, cracks, scratches, tape, dust and other impurities (non-fibrous objects) on the glass slides can bias measurement results.

6.4 Results will be incorrect or misleading if the operator of the software has not properly set up the image capture parameters.

6.5 Image processing techniques employed to complete missing or incompletely developed fiber boundaries must be used with caution as false boundaries may be created.

6.6 Vibrations or movement of the sample during image capture can blur the image and must be minimized or eliminated when using automatic image analysis.

6.7 Non-uniform illumination can influence feature detection and threshold using automatic image analyzers.

6.8 Operation of the equipment in a non-environmentally controlled room may result in fiber shape deviations after initial fiber conditioning has occurred.

7. Apparatus

7.1 *Fiber Preparation Apparatus:*

[1] This test method is under the jurisdiction of ASTM Committee D13 on Textiles and is the direct responsibility of Subcommittee D13.17 on Flax and Linen.
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[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.