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# Standard Guide for Measuring Hairiness of Yarns by the Photo-Electric Apparatus<sup>1</sup>

This standard is issued under the fixed designation D5647; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

## 1. Scope

1.1 This guide covers the determination of the hairiness of most filament and spun yarn using a photo-electric sensor apparatus. It is not intended for use on novelty yarns.

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:*<sup>2</sup>

D123 Terminology Relating to Textiles

D2258 Practice for Sampling Yarn for Testing

D4849 Terminology Related to Yarns and Fibers

## 3. Terminology

3.1 For all terminology relating to D13.58, Yarns and Fibers, refer to Terminology D4849.

3.1.1 The following terms are relevant to this standard: broken filament, frayed, fuzzy, hairiness, loopy.

3.2 For all other terminology related to textiles, refer to Terminology D123.

## 4. Summary of Guide

4.1 A yarn is passed through a photo-electric device containing a light beam that is interrupted by the occurrence of protruding fibers or filaments. By the use of a digital volt meter

or computer interface, the number of protruding fibers or filaments of a specific length along a specified surface length of yarn are counted and reported as hairiness.

## 5. Significance and Use

5.1 The photo-electric method for measuring the hairiness of yarns is not recommended for acceptance testing of commercial shipments since experience has shown that results obtained from machines produced by one manufacturer cannot usually be verified by machines produced by another manufacturer. This guide is intended to increase the awareness of the user to available techniques for measuring hairiness. In some cases the purchaser and the supplier may have to test a commercial shipment of one or more specific materials by the best available guide though it has not been recommended for acceptance testing of commercial shipments.

5.1.1 If there are differences of practical significance between reported test results for two laboratories (or more), comparative tests should be performed to determine if there is a statistical bias between them, using competent statistical assistance. As a minimum, test samples that are as homogenous as possible, drawn from the material from which the disparate test results were obtained, and randomly assigned in equal numbers to each laboratory for testing. The test results from the two laboratories should be compared using a statistical test for unpaired data, at a probability level chosen prior to the testing series. If a bias is found, either its cause must be found and corrected or future test results for that material must be adjusted in consideration of the known bias.

5.2 There may be a distinct difference in testing speed and tension devices of machines supplied by different manufacturers that may give differences in reported test results.

5.3 The measurement of hairiness is important to yarn producers. This guide is useful for process control and research of the yarn surface design at an individual manufacturing facility. Hairiness also is used to provide yarn processing machine design, and indications of malfunctioning process equipment, such as rotors, doffing mechanisms, guides, and travelers. It can be used to identify some causes of barrenness and shade variation in fabrics.

<sup>1</sup> This guide is under the jurisdiction of ASTM Committee D13 on Textiles and is the direct responsibility of Subcommittee D13.58 on Yarns and Fibers.

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<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.