Designation: D 5647 – 95

Standard Guide for
Measuring Hairiness of Yarns by the Photo-Electric Apparatus[1]

This standard is issued under the fixed designation D 5647; 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 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 This guide shows the values in SI units. "SI units" is the technically correct name for a system of metric units known as the International System of Units.

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:*
D 123 Terminology Relating to Textile Materials[2]
D 1776 Practice for Conditioning Textiles for Testing[2]
D 2258 Practice for Sampling Yarn for Testing[2]

3. Terminology

3.1 *Definitions:*

3.1.1 *broken filament, n—in multifilament yarn*, breaks in one or more filaments. (See also *stripback, skinback*.)

3.1.2 *frayed, adj—in textiles*, a worn condition characterized by damaged yarn surfaces, projecting yarn ends, hairiness, etc.

3.1.3 *fuzzy, adj*—characterized by a hairy appearance due to broken fibers or filaments. (Syn., hairy.)

3.1.4 *hair, n*—natural animal fiber other than sheep's wool or silk.

3.1.5 *hairiness, n—of yarns*, an overall condition characterized by tangled hairs, filaments, or fibers protruding from the yarn surface and uniformly distributed along the yarn length. (Compare wild fibers.)

3.1.6 *loopy, adj*—a descriptive term for yarns having randomly sized loops of hairs, fibers or filaments protruding from the yarn surface.

3.1.6.1 *Discussion*—Loopiness may or may not be desirable depending on the yarn's end-use.

3.2 For definitions of other textile terms used in this guide, refer to Terminology D 123.

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 In such a case, if there is a disagreement arising from differences in values reported by the purchaser and the supplier when using this guide for acceptance testing, the statistical bias, if any, between the laboratories and between the machines in each laboratory should be determined. Competent statistical assistance is recommended for the investigation of bias. As a minimum, the two parties should take a group of test specimens that are as homogeneous as possible and that are from a lot of material of the type in question. The test specimens should then be randomly assigned in equal numbers to each laboratory for testing. The average results from the two laboratories should be compared using Student's t-test for unpaired data and an acceptable probability level chosen by the two parties before the testing begins. If a bias is found, either its cause must be found and corrected or the purchaser and the supplier must agree to interpret future test results with consideration for 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.

---

[1] This guide is under the jurisdiction of ASTM Committee D-13 on Textiles and is the direct responsibility of Subcommittee D13.58 on Yarn Test Methods, General.
Current edition approved Sept. 10, 1995. Published November 1995.
[2] *Annual Book of ASTM Standards*, Vol 07.01.