



Designation: D3822/D3822M – 14 (Reapproved 2020)

Standard Test Method for Tensile Properties of Single Textile Fibers¹

This standard is issued under the fixed designation D3822/D3822M; 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 covers the measurement of tensile properties of natural and man-made single textile fibers of sufficient length to permit mounting test specimens in a tensile testing machine.

1.2 This test method is also applicable to continuous (filament) and discontinuous (staple) fibers or filaments taken from yarns or tow. When the fibers to be tested contain crimp, or if the tow or yarns have been subjected to bulking, crimping, or texturing process, the tensile properties are determined after removal of the crimp.

NOTE 1—Testing of filaments taken from yarns or tow, included in this test method was originally covered in Test Method **D2101**, that is discontinued.

1.3 The words “fiber” and “filament” are used interchangeably throughout this test method.

1.4 This test method is also applicable to fibers removed from yarns, or from yarns processed further into fabrics. It should be recognized that yarn and manufacturing processes can influence or modify the tensile properties of fibers. Consequently, tensile properties determined on fibers taken from yarns, or from yarns that have been processed into fabrics, may be different than for the same fibers prior to being subjected to yarn or fabric manufacturing processes.

1.5 This test method provides directions for measuring the breaking force and elongation at break of single textile fibers and for calculating breaking tenacity, initial modulus, chord modulus, tangent modulus, tensile stress at specified elongation, and breaking toughness.

1.6 Procedures for measuring the tensile properties of both conditioned and wet single fibers are included. The test method is applicable to testing under a wide range of conditions.

1.7 As the length of the test specimen decreases, the tensile strength is likely to increase, but the accuracy of the tensile properties determined may decrease, which may require the need to increase the number of test specimens. This is

particularly true for those properties dependent on the measurement of elongation, since the shorter lengths increase the relative effect of slippage and stretching of the test specimens within the jaws of either clamp.

1.8 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system are not necessarily exact equivalents; therefore, to ensure conformance with the standard, each system shall be used independently of the other, and values from the two systems shall not be combined.

1.9 *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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.10 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 ASTM Standards:²

- [D76 Specification for Tensile Testing Machines for Textiles](#)
- [D123 Terminology Relating to Textiles](#)
- [D629 Test Methods for Quantitative Analysis of Textiles](#)
- [D1577 Test Methods for Linear Density of Textile Fibers](#)
- [D1776 Practice for Conditioning and Testing Textiles](#)
- [D2101 Test Method for Tensile Properties of Single Man-Made Textile Fibers Taken From Yarns and Tows \(Withdrawn 1995\)³](#)
- [D2258 Practice for Sampling Yarn for Testing](#)
- [D3333 Practice for Sampling Manufactured Staple Fibers, Sliver, or Tow for Testing](#)
- [D4849 Terminology Related to Yarns and Fibers](#)
- [E178 Practice for Dealing With Outlying Observations](#)

¹ This test method 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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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.

³ The last approved version of this historical standard is referenced on www.astm.org.