



Designation: D4974/D4974M – 22

Standard Test Method for Hot Air Thermal Shrinkage of Yarn and Cord Using a Thermal Shrinkage Oven¹

This standard is issued under the fixed designation D4974/D4974M; 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 shrinkage of yarns and cords when exposed in a thermal shrinkage oven.

1.2 This test method is applicable to yarns and cords made of nylon, polyester, and other polymers not detrimentally affected by the temperature used and with linear densities in the range from 20 to 700 tex [180 to 6300 denier].

1.2.1 Yarns or cords for testing may be taken from yarn or cord packages or from fabrics.

1.3 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. Referee decisions are to use SI units.

1.4 *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.* Specific hazard statements are given in Section 8.

1.5 *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

D123 Terminology Relating to Textiles

¹ This test method is under the jurisdiction of ASTM Committee D13 on Textiles and is the direct responsibility of Subcommittee D13.19 on Industrial Fibers and Metallic Reinforcements.

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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.

D885/D885M Test Methods for Tire Cords, Tire Cord Fabrics, and Industrial Filament Yarns Made from Manufactured Organic-Base Fibers

D1776/D1776M Practice for Conditioning and Testing Textiles

D6477 Terminology Relating to Tire Cord, Bead Wire, Hose Reinforcing Wire, and Fabrics (Withdrawn 2022)³

3. Terminology

3.1 *Definitions:*

3.2 For definitions of terms relating to tire cord, bead wire, hose wire, and tire cord fabrics, refer to Terminology **D6477**.

3.2.1 The following terms are relevant to this standard: greige cord, *in tire cords*; standard atmosphere for testing textiles; thermal shrinkage; tire cord.

3.3 For definitions of other terms related to textiles, refer to Terminology **D123**.

3.3.1 The following terms are relevant to this standard: yarn.

4. Summary of Test Method

4.1 A relaxed, conditioned specimen of yarn or cord is subjected to dry heat for a specified time while under a specified tension. The percent shrinkage is read directly from a scale or display on the instrument while the specimen is still under tension and exposed to heat.

5. Significance and Use

5.1 This test method may be used for the acceptance testing of commercial shipments of yarns and cords. Caution is advised because yarn and cord may contract in length over a period of time due to room temperature retraction. Thermal shrinkage values are reduced proportionately by the amount of room temperature retraction.

NOTE 1—Experience, especially with nylon, shows that yarn retraction, which may be observed directly as shortening of length (or indirectly as denier increase), will occur in unrestrained yarn or cord that is not at equilibrium (equilibrium in this case being defined as essentially zero thermal shrinkage yarn or fully relaxed yarn). Normally, retractive forces

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