



Standard Test Method for Elastic Properties of Elastomeric Yarns (CRE Type Tensile Testing Machines)¹

This standard is issued under the fixed designation D 2731; 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 determination of elastic properties of “as produced” elastomeric yarns made from rubber, spandex or other elastomers. Elastic properties include force at specified elongations, permanent deformation and stress decay. Other hysteresis related properties can be calculated.

NOTE 1—For a method designed specifically for testing rubber threads, refer to Test Method D 2433.

1.2 This test method is not applicable to covered, wrapped, or core-spun yarns or yarns spun from elastomeric staple.

1.3 This test method is applicable to elastomeric yarns having a range of 40 to 3200 dtex (36 to 2900 denier).

1.4 The values stated in either SI units or U.S. Customary units are to be regarded separately as standard. Within the text, the U.S. Customary units are in parentheses. The values stated in each system are not exact equivalents; therefore, each system shall be used independently of the other.

1.5 *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 76 Specification for Tensile Testing Machines for Textiles²

D 123 Terminology Relating to Textiles²

D 1776 Practice for Conditioning and Testing Textiles²

D 2258 Practice for Sampling Yarn for Testing²

D 2433 Test Methods for Rubber Thread³

D 2591 Test Method for Linear Density of Elastomeric Yarns (Short-Length Specimens)²

D 2653 Test Method for Tensile Properties of Elastomeric Yarns (CRE Type Tensile Testing Machines)²

D 4848 Terminology for Force, Deformation and Related Properties of Textiles⁴

D 6717 Test Method for Linear Density of Elastomeric Yarns (Skein Specimens)⁴

3. Terminology

3.1 Definitions:

3.1.1 *deformation, n*—a change in shape of a material caused by forces of compression, shear, tension, or torsion.

3.1.2 *elastomeric yarn, n*—a nontextured yarn which can be stretched repeatedly at room temperature to at least twice its original length and which after removal of the tensile force will immediately and forcibly return to approximately its original length.

3.1.3 *elongation, n*—the ratio of the extension of a material to the length of the material prior to stretching.

3.1.4 *force at specified elongation (FASE), n*—the force associated with a specific elongation on the force-extension or force-elongation curve.

3.1.5 *linear density, n*—for fiber and yarn, mass per unit length.

3.1.6 *permanent deformation, n*—the net long-term change in a dimension of a specimen after deformation and relaxation under specified conditions.

3.1.6.1 *Discussion*—Permanent deformation in elastomeric yarns is frequently referred to as “set”. Elastomeric yarns which have been deformed will eventually return to, or nearly to, the original dimension with relaxation.

3.1.7 *stress, n*—the resistance to deformation developed within a material subjected to an external force.

3.1.8 *stress decay, n*—in mechanics, the reduction in force to hold a material at a fixed deformation over a period of time.

3.1.9 For definitions of other terms related to force and deformation, refer to Terminology D 4848. For definitions of other terms related to textiles used in this standard, refer to Terminology D 123.

4. Summary of Test Method

4.1 A specimen, mounted in a CRE-type tensile machine, is initially subjected to a series of five loading/unloading cycles in which the specimen is extended and relaxed between zero

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.

Current edition approved Sept. 10, 2001. Published November 2001. Originally published as D 2731 – 68. Discontinued 1979 and reinstated as D 2731 – 01.

² *Annual Book of ASTM Standards*, Vol 07.01.

³ *Annual Book of ASTM Standards*, Vol 09.02.

⁴ *Annual Book of ASTM Standards*, Vol 07.02.