



Designation: D2731 – 21

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

This standard is issued under the fixed designation D2731; 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 [D2433](#).

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

1.6 *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

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.

[D123](#) Terminology Relating to Textiles

[D1776](#) Practice for Conditioning and Testing Textiles

[D2258](#) Practice for Sampling Yarn for Testing

[D2433](#) Test Methods for Rubber Thread (Withdrawn 2012)³

[D2591](#) Test Method for Linear Density of Elastomeric Yarns (Short Length Specimens)

[D2653](#) Test Method for Tensile Properties of Elastomeric Yarns (CRE Type Tensile Testing Machines)

[D4848](#) Terminology Related to Force, Deformation and Related Properties of Textiles

[D4849](#) Terminology Related to Yarns and Fibers

[D6717](#) Test Method for Linear Density of Elastomeric Yarns (Skein Specimens)

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: deformation, elastomeric yarn, elongation, force at specified elongation, linear density, permanent deformation, stress, stress decay.

3.2 For definitions of other terms related to force and deformation, refer to Terminology [D4848](#). For all other terms related to textiles, refer to Terminology [D123](#).

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 and 75 % of the elongation at first filament break (FFB). During the fifth cycle, the specimen is held at the maximum extension point for 30 s, then unloaded to allow a return to its original gauge length position. The specimen is then subjected to a sixth load/unload cycle.

4.2 Force at specified elongations are calculated from the force-elongation curve for the first and fifth loadings and for the fifth unloading. Stress decay is calculated on the fifth cycle. Extension at a specified force is determined on the sixth loading and is used to calculate the permanent deformation.

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