



Standard Test Method for Tensile Creep Rupture of Fiber Reinforced Polymer Matrix Composite Bars¹

This standard is issued under the fixed designation D7337/D7337M; 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 outlines requirements for tensile creep rupture testing of fiber reinforced polymer matrix (FRP) composite bars commonly used as tensile elements in reinforced, prestressed, or post-tensioned concrete.

1.2 Data obtained from this test method are used in design of FRP reinforcements under sustained loading. The procedure for calculating the one-million hour creep-rupture capacity is provided in [Annex A1](#).

1.3 The values stated in either SI units or inch-pound units are to be regarded separately as standard. Within the text, the inch-pound units are shown in brackets. The values stated in each system are not exact equivalents; therefore, each system must be used independently of the other. Combining values from the two systems may result in nonconformance with the standard.

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

2. Referenced Documents

2.1 ASTM Standards:²

[D883 Terminology Relating to Plastics](#)

[D3878 Terminology for Composite Materials](#)

[D5229/D5229M Test Method for Moisture Absorption Properties and Equilibrium Conditioning of Polymer Matrix Composite Materials](#)

[D7205/D7205M Test Method for Tensile Properties of Fiber Reinforced Polymer Matrix Composite Bars](#)

[E4 Practices for Force Verification of Testing Machines](#)

[E456 Terminology Relating to Quality and Statistics](#)

[E1012 Practice for Verification of Testing Frame and Specimen Alignment Under Tensile and Compressive Axial Force Application](#)

3. Terminology

3.1 Terminology in [D3878](#) defines terms relating to high-modulus fibers and their composites. Terminology in [D883](#) defines terms relating to plastics. Terminology in [E6](#) defines terms relating to mechanical testing. Terminology in [E456](#) defines terms relating to statistics and the selection of sample sizes. In the event of a conflict between terms, Terminology in [D3878](#) shall have precedence over the other terminology standards.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *anchor, n*—a protective device placed on each end of a bar, between the bar and the grips of the tensile testing apparatus, to prevent grip-induced damage. Usually used on bars with irregular surfaces, as opposed to flat strips where bonded tabs are more typical.

3.2.2 *anchoring section, n*—the end parts of the specimen where an anchor is fitted to transmit the forces from the testing apparatus to the test section.

3.2.3 *bar, n*—a linear element, often with surface undulations or a coating of particles that promote mechanical interlock with concrete.

3.2.4 *creep, n*—time-dependent deformation (or strain) under sustained force (or stress).

3.2.5 *creep rupture, n*—material failure caused by sustained force (or stress) over time.

3.2.6 *creep rupture capacity, n*—the force at which failure occurs after a specified period of time from initiation of a sustained force. The predicted force causing failure at 1 million hours is referred to as the million-hour creep rupture capacity. This capacity is determined by the method described in the Annex.

3.2.7 *creep rupture strength, n*—the stress causing failure after a specified period of time from initiation of a sustained force.

3.2.8 *creep rupture time, n*—the lapsed time between the start of a sustained force and failure of the test specimen.

¹ This test method is under the jurisdiction of ASTM Committee D30 on Composite Materials and is the direct responsibility of Subcommittee D30.10 on Composites for Civil Structures.

Current edition approved Sept. 1, 2012. Published December 2012. Originally approved in 2007. Last previous edition approved in 2007 as D7337/D7337M – 07. DOI: 10.1520/D7337_D7337M-12.

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.