



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

This standard is issued under the fixed designation D7205/D7205M; 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 determines the quasi-static longitudinal tensile strength and elongation properties of fiber reinforced polymer matrix (FRP) composite bars commonly used as tensile elements in reinforced, prestressed, or post-tensioned concrete.

NOTE 1—Additional procedures for determining tensile properties of polymer matrix composites may be found in test methods [D3039/D3039M](#) and [D3916](#).

1.2 Linear elements used for reinforcing Portland cement concrete are referred to as bars, rebar, rods, or tendons, depending on the specific application. This test method is applicable to all such reinforcements within the limitations noted in the method. The test articles are referred to as bars in this test method. In general, bars have solid cross-sections and a regular pattern of surface undulations and/or a coating of bonded particles that promote mechanical interlock between the bar and concrete. The test method is also appropriate for use with linear segments cut from a grid. Specific details for preparing and testing of bars and grids are provided. In some cases, anchors may be necessary to prevent grip-induced damage to the ends of the bar or grid. Recommended details for the anchors are provided in [Annex A1](#).

1.3 The strength values provided by this method are short-term static strengths that do not account for sustained static or fatigue loading. Additional material characterization may be required, especially for bars that are to be used under high levels of sustained or repeated loading.

1.4 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in non-conformance with the standard.

1.4.1 Within the text, the inch-pound units are shown in brackets.

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:²

- [A615/A615M](#) Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
- [D792](#) Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement
- [D883](#) Terminology Relating to Plastics
- [D3039/D3039M](#) Test Method for Tensile Properties of Polymer Matrix Composite Materials
- [D3171](#) Test Methods for Constituent Content of Composite Materials
- [D3878](#) Terminology for Composite Materials
- [D3916](#) Test Method for Tensile Properties of Pultruded Glass-Fiber-Reinforced Plastic Rod
- [D5229/D5229M](#) Test Method for Moisture Absorption Properties and Equilibrium Conditioning of Polymer Matrix Composite Materials
- [E4](#) Practices for Force Verification of Testing Machines
- [E6](#) Terminology Relating to Methods of Mechanical Testing
- [E83](#) Practice for Verification and Classification of Extensometer Systems
- [E122](#) Practice for Calculating Sample Size to Estimate, With Specified Precision, the Average for a Characteristic of a Lot or Process
- [E456](#) Terminology Relating to Quality and Statistics
- [E1012](#) Practice for Verification of Testing Frame and Specimen Alignment Under Tensile and Compressive Axial Force Application
- [E1309](#) Guide for Identification of Fiber-Reinforced

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 Nov. 1, 2016. Published November 2016. Originally approved in 2006. Last previous edition approved in 2011 as [D7205/D7205M-06\(2011\)](#). DOI: 10.1520/D7205_D7205M-06R16.

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.