



Designation: D3916 – 22

Standard Test Method for Tensile Properties of Pultruded Glass-Fiber-Reinforced Plastic Rod¹

This standard is issued under the fixed designation D3916; 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.

This standard has been approved for use by agencies of the U.S. Department of Defense.

1. Scope*

1.1 This test method describes a procedure for determining the tensile properties of a pultruded, glass-fiber-reinforced thermosetting plastic rod of diameters ranging from 2.03 mm (0.08 in.) to 12.7 mm (0.5 in.). Test Method **D7205/D7205M** is an alternative test method to determine tensile properties of fiber-reinforced composite rods of diameters bigger than 12.7 mm (0.5 in.).

1.2 The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.

1.3 *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 hazards statements are given in **6.1** and **8.4.3**.

NOTE 1—There is no known ISO equivalent to this standard.

1.4 *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

D618 Practice for Conditioning Plastics for Testing

D883 Terminology Relating to Plastics

D7205/D7205M Test Method for Tensile Properties of Fiber

Reinforced Polymer Matrix Composite Bars

E4 Practices for Force Calibration and Verification of Testing Machines

E83 Practice for Verification and Classification of Extensometer Systems

E177 Practice for Use of the Terms Precision and Bias in ASTM Test Methods

E691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method

3. Terminology

3.1 For definitions of terms used in this standard and associated with plastics issues refer to the terminology contained in **D883** unless otherwise specified.

4. Significance and Use

4.1 The high axial-tensile strength and the low transverse-compressive strength of pultruded rod combine to present some unique problems in determining the tensile strength of this material with conventional test grips. The high transverse-compressive forces generated in the conventional method of gripping tend to crush the rod, thereby causing premature failure. In this test method, aluminum-alloy tabs contoured to the shape of the rod reduce the compressive forces imparted to the rod, thus overcoming the deleterious influence of conventional test grips.

4.2 Tensile properties are influenced by specimen preparation, strain rate, thermal history, and environmental conditions at the time of testing. Consequently, where precise comparative results are desired, these factors must be carefully controlled.

4.3 Tensile properties provide useful data for many engineering design purposes. However, due to the high sensitivity of these properties to strain rate, temperature, and other environmental conditions, data obtained by this test method shall not, by themselves, be considered for applications involving load-time scales or environmental conditions that differ widely from the test conditions. In cases where such dissimilarities are apparent, the sensitivities to strain rate, including impact and creep, as well as to the environment, shall be

¹ This test method is under the jurisdiction of ASTM Committee **D20** on Plastics and is the direct responsibility of Subcommittee **D20.18** on Reinforced Thermosetting Plastics.

Current edition approved Dec. 15, 2022. Published January 2023. Originally approved in 1980. Last previous edition approved in 2016 as D3916 - 08(2016). DOI: 10.1520/D3916-22.

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.

*A Summary of Changes section appears at the end of this standard