



Standard Test Method for Density of High-Modulus Fibers¹

This standard is issued under the fixed designation D3800; 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 covers the determination of the density of high-modulus fibers and is applicable to both continuous and discontinuous fibers.

1.2 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.3 *This standard may involve hazardous materials, operations, and equipment. 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.* See Section 9 for additional information.

2. Referenced Documents

2.1 ASTM Standards:²

D891 Test Methods for Specific Gravity, Apparent, of Liquid Industrial Chemicals

D1505 Test Method for Density of Plastics by the Density-Gradient Technique

D3878 Terminology for Composite Materials

D5229/D5229M Test Method for Moisture Absorption Properties and Equilibrium Conditioning of Polymer Matrix Composite Materials

D6308 Guide for Identification of Composite Materials in Computerized Material Property Databases (Withdrawn 1999)³

E12 Terminology Relating to Density and Specific Gravity of Solids, Liquids, and Gases (Withdrawn 1996)³

¹ This test method is under the jurisdiction of ASTM Committee D30 on Composite Materials and is the direct responsibility of Subcommittee D30.03 on Constituent/Precursor Properties.

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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.

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

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

3. Terminology

3.1 **Definitions**—Terminology **D3878** defines terms relating to composite materials. Terminology **E12** defines terms relating to density. Practice **E177** defines terms relating to statistics. In the event of a conflict between terms, Terminology **D3878** shall have precedence over other standards.

3.2 Symbols:

3.2.1 ρ_s —density of standard

3.2.2 ρ_l —density of liquid

3.2.3 ρ_f —density of fiber

3.2.4 ρ_{mf} —density of the measured fiber containing sizing

3.2.5 ρ_{ml} —density of the measured liquid containing surfactant

3.2.6 ρ_{sur} —density of surfactant

3.2.7 ρ_{sz} —density of sizing

3.2.8 ρ_w —density of water

3.2.9 s —standard deviation

3.2.10 M_I —weight of suspension wire in air

3.2.11 M_2 —weight of suspension wire in liquid (to immersion point)

3.2.12 M_3 —weight of suspension wire plus item whose density is to be determined (in air)

3.2.13 M_4 —weight of suspension wire plus item whose density is to be determined (in liquid)

3.2.14 $M_3 - M_I$ —weight of item for density to be determined in air

3.2.15 $M_4 - M_2$ —weight of item for density to be determined in liquid

4. Summary of Test Method

4.1 Procedure A—Buoyancy (Archimedes) Method:

4.1.1 The sample is weighed in air and weighed in a liquid that will thoroughly wet the sample and is of a lower density.

4.1.2 The difference in weight of the sample in the two media is the buoyancy force. This force is converted to sample