



Designation: D3552 – 24

Standard Test Method for Tensile Properties of Fiber Reinforced Metal Matrix Composites¹

This standard is issued under the fixed designation D3552; 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 tensile properties of metal matrix composites reinforced by continuous and discontinuous high-modulus fibers. Nontraditional metal matrix composites as stated in 1.1.6 also are covered in this test method. This test method applies to specimens loaded in a uniaxial manner tested in laboratory air at either room temperature or elevated temperatures. The types of metal matrix composites covered are:

1.1.1 Unidirectional laminates (all fibers aligned in a single direction) containing either continuous or discontinuous reinforcing fibers. Both longitudinal and transverse properties may be obtained.

1.1.2 0°/90° balanced crossply laminates containing either continuous or discontinuous reinforcing fibers.

1.1.3 Angleply laminates containing continuous reinforcing fibers, with layups that do not include 0° reinforcing fibers (that is, $(\pm 45)_{ns}$, $(\pm 30)_{ns}$, and so forth).

1.1.4 Multidirectional laminates containing continuous reinforcing fibers, with layups including 0° reinforcing fibers (that is, $(0/\pm 45/90)_{ns}$ quasi-isotropic laminates, $(0/\pm 30)_{ns}$ laminates, and so forth).

1.1.5 Laminates containing unoriented and random discontinuous fibers.

1.1.6 Directionally solidified eutectic composites.

1.2 The technical content of this standard has been stable since 1996 without significant objection from its stakeholders. As there is limited technical support for the maintenance of this standard, changes since that date have been limited to items required to retain consistency with other ASTM D30 Committee standards. The standard therefore should not be considered to include any significant changes in approach and practice since 1996. Future maintenance of the standard will only be in response to specific requests and performed only as technical support allows.

¹ This test method is under the jurisdiction of ASTM Committee D30 on Composite Materials and is the direct responsibility of Subcommittee D30.04 on Lamina and Laminate Test Methods.

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

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

1.5 *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

D3878 Terminology for Composite Materials

E4 Practices for Force Calibration and Verification of Testing Machines

E8 Test Methods for Tension Testing of Metallic Materials [Metric] E0008_E0008M

E83 Practice for Verification and Classification of Extensometer Systems

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

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 *Definitions*—Terminology D3878 defines terms relating to high-modulus fibers and their composites. Terminology E6 defines terms relating to mechanical testing. Terminology E456 and Practice E177 define terms relating to statistics. In the

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.