



Designation: D7028 – 07 (Reapproved 2024)

Standard Test Method for Glass Transition Temperature (DMA T_g) of Polymer Matrix Composites by Dynamic Mechanical Analysis (DMA)¹

This standard is issued under the fixed designation D7028; 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 covers the procedure for the determination of the dry or wet (moisture conditioned) glass transition temperature (T_g) of polymer matrix composites containing high-modulus, 20 GPa (> 3 × 10⁶ psi), fibers using a dynamic mechanical analyzer (DMA) under flexural oscillation mode, which is a specific subset of the Dynamic Mechanical Analysis (DMA) method.

1.2 The glass transition temperature is dependent upon the physical property measured, the type of measuring apparatus and the experimental parameters used. The glass transition temperature determined by this test method (referred to as “DMA T_g”) may not be the same as that reported by other measurement techniques on the same test specimen.

1.3 This test method is primarily intended for polymer matrix composites reinforced by continuous, oriented, high-modulus fibers. Other materials, such as neat resin, may require non-standard deviations from this test method to achieve meaningful results.

1.4 The values stated in SI units are standard. The values given in parentheses are non-standard mathematical conversions to common units that are provided for information only.

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

1.6 *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.*

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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2. Referenced Documents

2.1 ASTM Standards:²

D3878 Terminology for Composite Materials

D4065 Practice for Plastics: Dynamic Mechanical Properties: Determination and Report of Procedures

D4092 Terminology for Plastics: Dynamic Mechanical Properties

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

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

E1309 Guide for Identification of Fiber-Reinforced Polymer-Matrix Composite Materials in Databases (Withdrawn 2015)³

E1434 Guide for Recording Mechanical Test Data of Fiber-Reinforced Composite Materials in Databases (Withdrawn 2015)³

E1471 Guide for Identification of Fibers, Fillers, and Core Materials in Computerized Material Property Databases (Withdrawn 2015)³

E1640 Test Method for Assignment of the Glass Transition Temperature By Dynamic Mechanical Analysis

E1867 Test Methods for Temperature Calibration of Dynamic Mechanical Analyzers

3. Terminology

3.1 *Definitions*—Terminology D3878 defines terms relating to polymer matrix composites. Terminology D4092 defines terms relating to dynamic mechanical property measurements on polymeric materials.

3.2 *Symbols*: E' = storage modulus

E'' = loss modulus

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.