



Designation: D6264/D6264M – 23

Standard Test Method for Measuring the Damage Resistance of a Fiber-Reinforced Polymer-Matrix Composite to a Concentrated Quasi-Static Indentation Force¹

This standard is issued under the fixed designation D6264/D6264M; 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 damage resistance of multidirectional polymer matrix composite laminated plates subjected to a concentrated indentation force (Fig. 1). Procedures are specified for determining the damage resistance for a test specimen supported over a circular opening and for a rigidly-backed test specimen. The composite material forms are limited to continuous-fiber reinforced polymer matrix composites, with the range of acceptable test laminates and thicknesses defined in 8.2. This test method may prove useful for other types and classes of composite materials.

1.1.1 Instructions for modifying these procedures to determine damage resistance properties of sandwich constructions are provided in Practice D7766/D7766M.

1.2 A flat, square composite plate is subjected to an out-of-plane, concentrated force by slowly pressing a hemispherical indenter into the surface. The damage resistance is quantified in terms of a critical contact force to cause a specific size and type of damage in the specimen.

1.3 The test method may be used to screen materials for damage resistance, or to inflict damage into a specimen for subsequent damage tolerance testing. The indented plate can be subsequently tested in accordance with Test Method D7137/D7137M to measure residual strength properties. Drop-weight impact per Test Method D7136/D7136M may be used as an alternate method of creating damage from an out-of-plane force and measuring damage resistance properties.

1.4 The damage resistance properties generated by this test method are highly dependent upon several factors, which include specimen geometry, layup, indenter geometry, force, and boundary conditions. Thus, results are generally not scalable to other configurations, and are particular to the combination of geometric and physical conditions tested.

¹ This test method is under the jurisdiction of ASTM Committee D30 on Composite Materials and is the direct responsibility of Subcommittee D30.05 on Structural Test Methods.

Current edition approved May 1, 2023. Published May 2023. Originally approved in 1998. Last previous edition approved in 2017 as D6264/D6264M – 17. DOI: 10.1520/D6264_D6264M-23.

1.5 *Units*—The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system are not necessarily exact equivalents; therefore, to ensure conformance with the standard, each system shall be used independently of the other, and values from the two systems shall not be combined.

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

1.6 *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.*

1.7 *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

D792 Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement

D883 Terminology Relating to Plastics

D3171 Test Methods for Constituent Content of Composite Materials

D3878 Terminology for Composite Materials

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

D5687/D5687M Guide for Preparation of Flat Composite Panels with Processing Guidelines for Specimen Preparation

D7136/D7136M Test Method for Measuring the Damage Resistance of a Fiber-Reinforced Polymer Matrix Composite to a Drop-Weight Impact Event

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.