



Designation: D3531/D3531M – 16

Standard Test Method for Resin Flow of Carbon Fiber-Epoxy Prepreg¹

This standard is issued under the fixed designation D3531/D3531M; 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 amount of resin flow that will take place from prepreg tape or sheet under given conditions of temperature and pressure.

1.2 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in non-conformance with the standard.

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

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

2. Referenced Documents

2.1 *ASTM Standards:*²

D883 Terminology Relating to Plastics

D3878 Terminology for Composite Materials

3. Terminology

3.1 *Definitions*—Terminology D3878 defines terms relating to high-modulus fibers and their composites. Terminology D883 defines terms relating to plastics. In the event of a conflict between terms, Terminology D3878 shall have precedence over other standards.

3.2 *Symbols:*

3.2.1 *RF*—resin flow

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.

Current edition approved Nov. 1, 2016. Published November 2016. Originally approved in 1976. Last previous edition approved in 2011 as D3531 – 11. DOI: 10.1520/D3531_D3531M-16.

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.

3.2.2 W_1 —weight of the prepreg specimen prior to flow test

3.2.3 W_2 —weight of the specimen assembly prior to heating

3.2.4 W_3 —weight of the specimen assembly after heating

3.2.5 W_4 —weight of the prepreg specimen after flow test

4. Summary of Test Method

4.1 A weighed specimen consisting of two plies a minimum size of 50-mm [2.0-in.] square, oriented in a 0°/ 90° crossply configuration, and sandwiched between bleeder material and release film. The sandwich is placed in a platen press heated to either temperature A, 120°C [250°F], or temperature B, 175°C [350°F] or another specified temperature. The press is closed to provide a pressure of 700 kPa [100 psi]. The pressure is held for 15 min or until the resin gels. The cooled sandwich assembly is removed and the resin that has flowed to the edges of the specimen is removed and the specimen reweighed. The change in weight is expressed as a percent of the original weight and reported as percent flow.

5. Significance and Use

5.1 This test method is used to obtain the resin flow of carbon fiber-epoxy prepreg tape or sheet material. It is suitable for comparing lots of material of supposedly the same characteristics and also for comparative evaluation of materials produced by different vendors using different resin-fiber combinations.

5.2 Composite parts are laminated from prepreg material at various pressures and temperatures. Production process design will require a flow test be run at a temperature and a pressure close to that of the actual molding conditions. All methods of measuring resin flow are dependent on the size and geometry of the specimen. This test method uses the smallest quantity of tape that will give reproducible results.

5.2.1 The percent resin flow of a single fiber and resin system at a temperature and pressure varies with the volatile content, degree of advancement of epoxy resin, and with the resin content of the prepreg tape or sheet.

5.2.2 As volatile content and degree of resin cure (advancement) change with time, this test method is useful in comparing the life of prepreg tape and sheet.