



Designation: D3530 – 20

# Standard Test Method for Volatiles Content of Composite Material Prepreg<sup>1</sup>

This standard is issued under the fixed designation D3530; 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 ( $\epsilon$ ) 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 volatiles content, in mass percent of composite material prepregs. This standard focuses on composites with thermosetting resins, which tend to lose a few percent of the matrix mass when heated due to loss of both retained water and low molecular weight matrix constituents that volatilize during heating.

1.2 Use of this test method is limited to maximum temperature of circulating air ovens, approximately 300 °C (572 °F).

1.3 Use of this test method is limited to temperatures below which the matrix flows from the reinforcement.

1.4 *Units*—The values stated in SI units are to be regarded as standard. The values given in parentheses after SI units are provided for information only and are not considered standard.

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.* Specific precautionary statements are given in Section 8.

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.*

## 2. Referenced Documents

2.1 *ASTM Standards*:<sup>2</sup>

D883 Terminology Relating to Plastics

D3878 Terminology for Composite Materials

<sup>1</sup> 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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<sup>2</sup> 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.

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

2.2 *NFPA Standard*:<sup>3</sup>

NFPA 86 Standard for Ovens and Furnaces

## 3. Terminology

3.1 *Definitions*—Terminology D3878 defines terms relating to composite materials. Terminology D883 defines terms relating to plastics. Practice E177 defines terms relating to statistics. In the event of a conflict between terms, Terminology D3878 shall have precedence over other documents.

3.1.1 *prepreg, n*—the admixture of fibrous reinforcement and polymeric matrix used to fabricate composite materials; its form may be sheet, tape, or tow.

3.1.1.1 *Discussion*—For thermosetting matrices, it has been partially cured to a controlled viscosity called “B stage.” See Terminology D3878.

3.2 *Definitions of Terms Specific to This Standard*:

3.2.1 *volatiles, n*—the solvent(s), water, low molecular weight matrix components, and other constituents that volatilize or evaporate during heating.

3.2.2 *volatiles content, n*—the amount of volatiles present in a prepreg expressed as a mass percent.

3.3 *Symbols*:

$M_f$ —the final mass of the sample, after oven exposure.

$M_i$ —the initial mass of the sample, before oven exposure.

$V_c$ —the mass percent volatiles content.

## 4. Summary of Test Method

4.1 Specimens of prepreg are cut and weighed gravimetrically ( $M_i$ ). These specimens are then exposed to elevated temperature for a specified time, equal to the nominal cure or consolidation temperature of the material, in an air-circulating oven to remove the volatiles. After a specified time in the oven, the specimens are removed and reweighed ( $M_f$ ). The percent change in mass is expressed as volatiles content.

<sup>3</sup> Available from National Fire Protection Association (NFPA), 1 Batterymarch Park, Quincy, MA 02269-9101.