



Designation: D 3530/D 3530M – 97

Standard Test Method for Volatiles Content of Composite Material Prepreg¹

This standard is issued under the fixed designation D 3530/D 3530M; 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 Department of Defense.

1. Scope

1.1 This test method covers the determination of the volatiles content, in weight percent of composite material prepregs. This standard focuses on composites with thermosetting resins that 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).

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

1.4 The values stated in SI units are to be regarded as 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 and health practices and determine the applicability of regulatory limitations prior to use. Specific precautionary statements are given in Section 8.*

2. Referenced Documents

2.1 ASTM Standards:

Relating to Plastics²

D 3529/D 3529M Test Method for Matrix Solids Content and Matrix Content of Composite Prepreg³

D 3878 Terminology of High-Modulus Reinforcing Fibers and Their Composites³

E 177 Practice for Use of Terms Precision and Bias in ASTM Methods⁴

E 1309 Guide for the Identification of Composite Materials in Computerized Material Property Databases⁵

2.2 NFPA Standard:

NFPA 86 Standard for Ovens and Furnaces⁶

3. Terminology

3.1 *Definitions*—Terminology D 3878 defines terms relating to composite materials. Terminology D 883 defines terms relating to plastics. Practice E 177 defines terms relating to statistics. In the event of a conflict between terms, Terminology D 3878 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. See Terminology D 3878.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *Volatiles Content, n*—the amount of volatiles present in a prepreg expressed as a weight percent.

3.3 Symbols:

3.3.1 M_i —the initial mass of the sample.

3.3.2 M_f —the mass of the sample after oven exposure.

3.3.3 V_c —the weight percent volatiles content.

4. Summary of Test Method

4.1 Specimens of prepreg are weighed and then exposed to elevated temperature, equal to the nominal cure or consolidation temperature of the material, in an air circulating oven to remove the volatiles. The exposed samples are reweighed and the percent change in weight expressed as volatiles content.

5. Significance and Use

5.1 This test method is used to obtain the volatiles content of composite material prepreg. Knowledge of the volatiles content is useful in developing optimum manufacturing processes.

5.2 The volatiles content is determined after exposure to the nominal cure or consolidation temperature.

6. Interferences

6.1 *Airflow*—The amount of measured volatiles may be increased or decreased by changing the velocity of airflow. Since airflow in most ovens is not linear in each part, a velometer should be used to measure airflow where samples are placed. Samples should be placed only in positions of

¹ This test method is under the jurisdiction of ASTM Committee D-30 on Composites and is the direct responsibility of Subcommittee D30.03 on Constituent/Precursor Properties.

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² *Annual Book of ASTM Standards*, Vol 08.01.

³ *Annual Book of ASTM Standards*, Vol 15.03.

⁴ *Annual Book of ASTM Standards*, Vol 14.02.

⁵ *Annual Book of ASTM Standards*, Vol 14.01.

⁶ Available from National Fire Protection Association, Batterymarch Park, Quincy, MA.