



AEROSPACE MATERIAL SPECIFICATION

AMS3894™

REV. F

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Superseding AMS3894E

Carbon Fiber Tape and Sheet
Epoxy Resin Impregnated

RATIONALE

This document has been determined to contain basic and stable technology which is not dynamic in nature.

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Documents

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1. SCOPE:

- 1.1 Form:** This specification and its supplementary detail specifications cover tape and sheet fabricated using carbon fibers impregnated with epoxy resin.
- 1.2 Application:** Primarily for fabricating high-strength and high-modulus composite parts, using either hand-layup or a machine for automated-tape-layup.
- 1.3 Classification:** The tapes and sheets shall be as specified in the applicable detail specifications, wherein each product is defined by property characteristics and continuous service temperature. An example is shown in 8.2. The product covered by each detail specification appears as part of the title.
- 1.4 Safety - Hazardous Materials:** While the materials, methods, applications, and processes described or referenced in this specification may involve the use of hazardous materials, this specification does not address the hazards which may be involved in such use. It is the sole responsibility of the user to ensure familiarity with the safe and proper use of any hazardous materials and to take necessary precautionary measures to ensure the health and safety of all personnel involved.

2. APPLICABLE DOCUMENTS: The following publications form a part of this specification to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other publications shall be as specified in AMS 2350.

2.1 SAE Publications: Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096.

2.1.1 Aerospace Material Specifications:

- AMS 2350 - Standards and Test Methods
- AMS 2825 - Material Safety Data Sheets
- AMS 3892 - Fibers, Carbon, Tow and Yarn, for Structural Composites
- AMS 3898 - Interleaf Carrier Material, Composite Tape

2.2 ASTM Publications: Available from ASTM, 1916 Race Street, Philadelphia, PA 19103.

- ASTM D 792 - Specific Gravity (Relative Density) and Density of Plastics by Displacement
- ASTM D 1505 - Density of Plastics by the Density-Gradient Technique
- ASTM D 2344 - Apparent Interlaminar Shear Strength of Parallel Fiber Composites by Short Beam Method
- ASTM D 2734 - Void Content of Reinforced Plastics
- ASTM D 3039 - Tensile Properties of Fiber-Resin Composites
- ASTM D 3171 - Fiber Content of Resin-Matrix Composites by Matrix Digestion
- ASTM D 3410 - Compressive Properties of Unidirectional or Crossply Fiber-Resin Composites
- ASTM D 3529 - Resin Solids Content of Carbon Fiber-Epoxy Prepreg
- ASTM D 3530 - Volatiles Content of Carbon Fiber-Epoxy Prepreg
- ASTM D 3531 - Resin Flow of Carbon Fiber-Epoxy Prepreg
- ASTM D 3532 - Gel Time of Carbon Fiber-Epoxy Prepreg

2.3 U.S. Government Publications: Available from Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120.

2.3.1 Military Standards:

- MIL-STD-794 - Parts and Equipment, Procedures for Packaging and Packing of

2.4 AIA Publications: Available from National Standards Association, Inc., 1321 14th Street, N.W., Washington, DC 20005.

- NAS 992 - Reel, Composite Filament Tape, Automated Machine Layup

3. TECHNICAL REQUIREMENTS:

3.1 Detail Specifications: The requirements for a specific product shall consist of all the requirements specified herein in addition to requirements specified in the applicable detail specification. In case of conflict between requirements of this basic specification and an applicable detail specification, requirements of the detail specification shall govern.

3.2 Material:

3.2.1 Construction: The product shall consist of parallel, unidirectional carbon fibers meeting the requirements of AMS 3892 and its applicable detail specification, impregnated with an epoxy resin meeting the requirements of the applicable detail specification, and arranged in a single in-plane layer.

3.2.2 Ends: The product shall contain no unspliced yarn or tow ends. Splices in the same yarn or tow shall be not less than 10 feet (3 m) apart. Splices in adjacent yarns or tows shall be not less than 12 inches (305 mm) apart.

3.2.3 Storage Life: The product, when packaged in water resistant, heat-sealed bags, shall meet the requirements of the applicable detail specification after storage at standard conditions as specified therein.

3.2.4 Working Life: The product shall meet the requirements of the applicable detail specification after exposure for a continuous period at the relative humidity and temperature specified therein.

3.2.5 Bending: The product shall withstand, without visible material damage, bending through an angle of 180 degrees around a 1.0 inch (25 mm) diameter mandrel with the fiber direction perpendicular to the axis of bend; 10X magnification shall be used in examination for damage.

3.3 Properties of Uncured Impregnated Material: The as-received product shall conform to the requirements of this specification and the applicable detail specification, determined on the product as-supplied in accordance with test procedures specified herein.

3.4 Properties of Cured Laminate: Test laminates shall conform to the requirements of this specification and the applicable detail specification, determined on specimens cut from laminates prepared in accordance with 4.5.

3.5 Quality: The product, as received by purchaser, shall be uniform in quality and condition, free from foreign material and, except as specified in 3.5.1, free from imperfections detrimental to usage of the product.

- 3.5.1 Visual Imperfection Criteria:** Visible indications of dry spots, voids, crimps, crossed or broken fibers, twisted fibers, irregular carrier, over-impregnation or incomplete impregnation areas are not acceptable if the total length of each area exceeds limits indicated below for the total tape length of the roll:

Imperfections	Criteria
Filaments not wetted	1%, maximum
Tape not parallel to center line	Parallel within ± 0.5 degree
Crimps	1%, maximum
Wrinkle	None permitted
Unspliced yarn or tow	None permitted
End-butt spliced yarn or tow	None permitted
Cured resin particles	None permitted
Foreign materials	None permitted
Color uniformity	Natural Color
Twists (3.5.1.1)	2%, maximum
Scrim distortion (when scrim is present)	To be determined
Rippled interleaf	To be determined
Resin starved areas	To be determined
Fiber crossover	To be determined

- 3.5.1.1 Does not refer to twists inherent in the product.

3.6 Tolerances:

- 3.6.1 Width: Shall be as specified in Table I.

TABLE I

Nominal Width Inches	Tolerance Inch
Up to 1.000, excl	As agreed upon
1.000 to 3.000, excl	+0, -0.025
3.000	+0, -0.050
Over 3.000	±0.040 for each 3.000 inches of width

TABLE I(SI)

Nominal Width Millimetres	Tolerance Millimetres
Up to 25.40, excl	As agreed upon
25.40 to 76.20, excl	+0, -0.64
76.20	+0, -1.27
Over 76.20	±1.02 for each 76.20 mm of width