SAE The Engineering Society For Advancing Mobility Land Sea Air and Space ®
INTERNATIONAL
400 Commonwealth Drive, Warrendale, PA 15096

AEROSPACE MATERIAL SPECIFICATION

SAE AMS 2980/3

Issued NOV 1996

Submitted for recognition as an American National Standard

TECHNICAL SPECIFICATION: CARBON FIBER FABRIC AND EPOXY RESIN WET LAY-UP REPAIR MATERIAL PURCHASING SPECIFICATION - FABRIC

FOREWORD

This Purchasing Specification (PS) is part of the Technical Specification system described in AMS 2980.

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1. SCOPE:

This PS specifies the batch release and delivery requirements for carbon fiber and carbon fabric used for wet lay-up repair purposes.

1.1 Limitation:

This specification relates to qualified carbon fiber and carbon fabric listed in the associated QPL.

2. REFERENCES:

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 the issue in effect on the date of the purchase order unless otherwise specified.

2.1 SAE Publications:

Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

AMS 2980	Technical Specification: Carbon Fiber Fabric and Epoxy Resin Wet Lay-Up Repair Material - Part 0 - Introduction
AMS 2980/1	Technical Specification: Carbon Fiber Fabric and Epoxy Resin Wet Lay-Up Repair Material - General Requirements

2.2 ASTM Publications:

Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

ASTM D 3990	Terminology Relating to Fabric Defects

2.3 ISO Publications:

Available from ISO, Central Secretariat, 1 Rue de Varembé, Case postale 56, CH-1211 Geneve 20, Switzerland.

IS0 1890	Carbon Fiber - Twist
IS0 10119	Carbon Fiber - Density
IS0 10120	Carbon Fiber - Linear Density
IS0 10548	Carbon Fiber - Size Content
IS0 10618	Carbon Fiber - Tensile Properties by Resin Impregnated Yarn Specimens

3. DEFINITIONS:

Refer to AMS 2980/1.

4. REQUIREMENTS:

The carbon fiber and carbon fabric to be delivered shall meet the general requirements in accordance with AMS 2980/1 and the requirements of this PS and the IPS of the material to be purchased.

4.1 Woven Fabric Defects:

Definition of defect description terms are per ASTM D 3990.

A defect area is defined as the length of the defect, if that defect exceeds specified limits, multiplied by the roll width. The cumulative defective area of a roll shall not exceed 10% of the roll area.

Single yarn defects such as broken fibers, distortions and wrinkles shall not number more than three over 2.0 meters of fabric. Each defect shall be spaced apart 150 mm minimum. If two single yarn defects are closer than 150 mm, they shall be considered as a continuous defect.

Weaving defects such as wrinkles, cut fibers, and crushed distorted yarns shall be considered a continuous defect if they involve more than one yarn. Multiple defects such as missed pick, missing end, whipped-in weft, loose pick, slab, kink, fuzz-ball, etc., shall be considered a continuous defect if they involve more than one yarn.

A continuous defect, i.e. a continuous single yarn or weaving defect, shall not exceed 170 mm in any linear meter with no defect closer than 150 mm to another.

Splices of adjacent yarns shall be spaced apart 12.5 mm minimum. A fabric roll shall contain not more than one splice across the fabric width.

Warp yarn deviation from a straight line shall be 5 mm maximum over 1.0 meter of fabric length. Weft yarn deviation from a straight line shall be 50 mm maximum over 1.0 meter of fabric width.

4.2 Defect Credit for Fabric:

Defective areas as defined in AMS 2980/1 shall not be considered as part of the total length of the roll or its weight. The purchaser shall not be charged for any defective area. In addition, credit shall be given to the purchaser by the fabric manufacturer for any manufacturing defect of the fabric discovered during use that had not been previously identified and credited.

5. RELEASE TESTING:

5.1 Fiber:

Fiber batches used to weave the fabric in accordance with this specification shall be inspected and tested in accordance with Table 1, the sampling plan referenced in the IPS and the requirements of the relevant IPS.

TABLE 1 - Batch Release Tests for Carbon Fiber Yarn

Property	Test Method[1]	Requirement
Tensile Impregnated yarn	ISO 10618 and AMS 2980/1	see relevant IPS
Fiber Density	ISO 10119	see relevant IPS
Filament Count	refer to IPS	see relevant IPS
Sizing Content	ISO 10548	see relevant IPS
Linear Density	ISO 10120	see relevant IPS
Twist	ISO 1890	see relevant IPS

[1] Use the test method specified in the IPS.

The fiber batch release test report shall be kept at the fabric manufacturer and be made available to the purchaser on request.

Additional packaging and inspection requirements shall be agreed to between the fiber manufacturer and fabric manufacturer.

5.2 Fabric:

The fabric manufacturer shall test each fabric batch in accordance with Table 2 using the sampling plan of paragraph 5.6. The fabric manufacturer shall provide the purchaser with a test report certifying that the fabric batch meets the requirements of Section 4.

TABLE 2 - Batch Release Tests for Carbon Fabric

Property	Test Method	Requirement
Weaving Style and	-	see relevant IPS
Yarn Count	AMS 2980/1	see relevant IPS
Fiber Areal Mass	AMS 2980/1	see relevant IPS
Weaving Defects	-	see paragraph 4.1

5.2 (Continued):

The fabric release test report shall contain at least the following:

a. Specification and IPS number
b. Manufacturer's batch number and production date
c. Manufacturer's identification
d. List of fabric defects traceable to each individual roll
e. Fiber designation of fiber manufacturer, batch number(s), bobbin numbers
f. Test results

The purchaser reserves the right to perform any of the inspections and/or tests required by this specification and may reject any material which fails to meet the requirements.

5.3 Fabric Manufacturer Additional Inspection:

5.3.1 Conformance to Weight and Dimensional Requirements: The fabric rolls shall be inspected for conformance to weight and dimensional requirements in the IPS and the requirements of paragraph 6.1.3.

5.3.2 Inspection of Packaging: The manufacturer shall perform inspections as necessary to assure that the packaging, packing, preservation, and shipment requirements of paragraphs 6.1 and 6.2 are met.

5.4 Fabric Retest:

If batch release test data fails to meet the requirements of this PS and/or the IPS, a review of all test results, test procedures, specimen manufacturing and test specimen(s) shall be performed. If a cause for discrepancy is found, retests shall be performed on the same roll and either the preceding or the next roll. The material may be retested one time. The results of the original test, together with those of the retest and the reasons for the first failure shall be included in the test report.

5.5 Rejection:

Any failure of the fabric to meet the batch release requirements of this specification shall be cause for rejection of the material. Any defect not detected during acceptance inspection, but which becomes apparent during the subsequent use of the material, shall be cause for rejection of the unused portion of the batch, provided such a defect is cause for rejection under the requirements of this specification.

5.6 Sampling:

The sampling plan and roll size definition for batch release testing shall be agreed to between the fabric manufacturer and PRI. The sampling plan and roll size definition shall be specified in the fabric manufacturer's PCD and/or IPS. A preferred sampling plan is shown in Table 3.

TABLE 3 - Sampling for Carbon Fiber Fabric

Rolls in the Fabric Batch	Minimum Rolls to be Sampled
1	1 roll
2 to 8	first and last roll
9 and more	First roll and every 5 rolls or portion of it

A minimum of three specimens shall be taken, evenly spaced across the width of the fabric, at the beginning of the roll to be sampled.

6. PREPARATION FOR DELIVERY:

6.1 Packing:

6.1.1 General: Carbon fiber and fabric shall be packaged in clean, dry, shipping containers so constructed as to ensure acceptance by common or other carrier for safe transportation to the place of delivery specified by purchase order or contract and to retain the requirements of the TS and this PS.

6.1.2 Carbon Fibers: Continuous carbon fiber material shall be packaged under tension on bobbins with an outside diameter not less than 30 mm.

NOTE: Minimum outside bobbin diameter is the minimum permissible diameter in which the carbon fiber material shall be rolled.

6.1.3 Fabric Rolls:

6.1.3.1 Roll Characteristics: Each roll shall be individually packaged in a noncontaminating material (polyethylene or equivalent) with minimum thickness of 0.15 mm. The packaging shall be such that the material shall not deform under its own mass and shall meet the requirements of this specification after delivery. Each individual roll shall be accompanied with its defect log.