



AEROSPACE MATERIAL SPECIFICATION

AMS2980™/1

REV. B

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Superseding AMS2980/1A

(R) Carbon Fiber Fabric and Epoxy Resin Wet Lay-Up Repair Material Part 1 - General Requirements

RATIONALE

AMS2980/1B is a Five Year Review and update of this specification.

FOREWORD

AMS2980/1 belongs to the Technical Specification system explained in AMS2980.

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For more information on this standard, visit
<https://www.sae.org/standards/content/AMS2980/1B/>

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Document Sharing Hub

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1. SCOPE

AMS2980/1 gives information about the technical requirements and qualification procedure for carbon fiber fabric and epoxy resin systems used for wet lay-up repair of carbon fiber reinforced epoxy structures.

2. APPLICABLE DOCUMENTS

The issue of the following documents in effect on the date of the purchase order forms a part of this specification to the extent specified herein. The supplier may work to a subsequent revision of a document unless a specific document issue is specified. When the referenced document has been cancelled and no superseding document has been specified, the last published issue of that document shall apply

2.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or 724-776-4970 (outside USA), www.sae.org.

AMS2980	Carbon Fiber Fabric and Epoxy Resin Wet Lay-Up Repair Material Part 0 – Introduction
AMS2980/2	Carbon Fiber Fabric and Epoxy Resin Wet Lay-Up Repair Material Part 2 - Qualification Program
AIR4844	Composites and Metal Bonding Glossary
ARP4916	Masking and Cleaning of Epoxy and Polyester Matrix Thermosetting Composite Materials

2.2 ASTM Publications

Available from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, www.astm.org.

ASTM C 297	Standard Test Method for Flatwise Tensile Strength of Sandwich Constructions
ASTM D 740	Standard Specification for Methyl Ethyl Ketone
ASTM D 792	Standard Test Method for Density and Specific Gravity (Relative Density) of Plastics by Displacement
ASTM D 1652	Standard Test Method for Epoxy Content of Epoxy Resins
ASTM D 1655	Standard Specification for Aviation Turbine Fuels
ASTM D 1875	Standard Test method for Density of Adhesives in Fluid Form
ASTM D 2344/D2344M	Standard Test Method for Short-Beam Strength for Polymer Matrix Composite Materials and Their Laminates
ASTM D 2471	Standard Test Method for Gel Time and Peak Exothermic Temperature of Reacting Thermosetting Resins
ASTM D 2896	Total Base Number of Petroleum Products by Potentiometric Perchloric Acid Titration
ASTM D 3039/D 3039M	Tensile Properties of Polymer Matrix Composite Materials
ASTM D 3171	Standard Test Methods for Constituent Content of Composite Materials
ASTM D 3518/D 3518M	In Plane Shear Response of Polymer Matrix Composite Materials by Tensile Test of a ± 45 degree Laminate
ASTM D 3990	Terminology Relating to Fabric Defects

ASTM D 4440	Standard Practice for Rheological Measurement of Polymer Melts Using Dynamic Mechanical Procedures
ASTM D 5229/D 5229M	Standard Test Method for Moisture Absorption Properties and Equilibrium Conditioning of Polymer Matrix Composite Materials
ASTM D 5766/D5766M	Open Hole Tensile Strength of Polymer Matrix Composite Laminates
ASTM D 6484/D 6484M	Standard Test Method for Open Hole Compressive Strength of Polymer Matrix Composite Laminates
ASTM D 7136/D 7136M	Standard Test Method for Measuring the Damage Resistance of a Fiber-Reinforced Polymer Matrix Composite to a Drop-Weight Impact Event
ASTM D 7137/D 7137M	Standard Test Method for Compressive Residual Strength Properties of Damaged Polymer Matrix Composite Plates
ASTM D 7249/D 7249M	Standard Test Method for Facing Properties of Sandwich Constructions by Long Beam Flexure
ASTM E 4	Standard Practices for Force Verification of Testing Machines
ASTM E 203	Standard Test Method for Water Using Volumetric Karl Fischer Titration
ASTM E 1252	Standard Practice for General Techniques for Qualitative Infrared Analysis
ASTM E 1640	Standard Test Method for Assignment of the Glass Transition Temperature by Dynamic Mechanical Analysis

2.3 EN Publications

Available from CEN-Comité Européen de Normalisation, Secrétariat Central, Rue de Stassart 36, B-1050 Bruxelles, Belgium, www.cenorm.be. Alternative site: EN and prEN (prestandard) Specifications available from The European Association of Aerospace Industries – Standardization Gulledele 94 - B-1200 Brussels - Tel. + 32 2 775 8110 - Fax. + 32 2 775 8111 www.aecma-stan.org.

EN 2379	Aerospace Series: Test Fluids for Non Metallic Materials
EN 2489	Aerospace Series: Fiber Reinforced Plastics - Determination of the Action of Liquid Chemicals
EN 2561	Aerospace Series: Unidirectional Laminates - Carbon Thermosetting Resin, Tensile Test Parallel to the Fiber Direction
EN 2563	Aerospace Series: Carbon Fiber Reinforced Plastics – Unidirectional Laminates – Determination of the Apparent Interlaminar Shear Strength
EN 2564	Aerospace Series: Carbon Fiber Laminates - Test Method for the Determination of the Fiber and Resin Fraction and Porosity Content
EN 2823	Aerospace Series: Fiber Reinforced Plastic, Test Method for the Determination of the Effect of Exposure to Humid Atmospheres on Physical and Mechanical Characteristics
EN 2850	Aerospace Series: Fiber Reinforced Plastics, Testing Unidirectional Laminates and Woven Fabric Laminates - Compression Test
EN 6031	Aerospace Series: Fiber Reinforced Plastic, Determination of In-Plane Shear Properties (± 45 degree Tensile Test)
EN 6032	Aerospace Series: Determination of Glass Transition Temperature (DMA)
EN 6035	Aerospace Series: Fiber Reinforced Plastics, Determination of Notched and Unnotched Tensile Strength

EN 6037	Aerospace Series: Fiber Reinforced Plastics - Test Method - Determination of Bearing Strength
EN 6038	Aerospace Series: Fiber Reinforced Plastic, Determination of Compression Strength after Impact
EN 6041	Aerospace Series: Analysis of Non-Metallic Materials (Uncured) by Differential Scanning Calorimetry (DSC)
EN 6042	Aerospace Series: Analysis of Organic Compounds by Infrared Spectroscopy
EN 6043	Aerospace Series: Fiber Reinforced Plastics, Determination of Gel Time and Viscosity
EN 6061	Aerospace Series: Fiber Reinforced Plastics, Sandwich Flexural Test 4 Point Bending
EN 6062	Aerospace Series: Fiber Reinforced Plastics, Flatwise Tensile Test of Composite Sandwich Panel
EN 6064	Aerospace Series: Analysis of Non-Metallic Materials (Cured) for the Determination of the Extent of Cure by DSC

2.4 DIN EN Publications

Available from Deutsches Institut für Normung e. V., (DIN German Institute For Standardization) Am DIN-Platz, Burggrafenstraße 6, 10787 Berlin, Germany, Tel: +49 30 2601 1231, www.din.de.

DIN EN 6066 Aerospace Series: Fiber Reinforced Plastics, Determination of Stepped and Tapered Joint Strength

2.5 ISO Publications

Available from International Organization for Standardization, 1, rue de Varembe, Case postale 56, CH-1211 Geneva 20, Switzerland, Tel: +41 22 749 01 11, www.iso.org.

ISO 472	Plastics – Vocabulary
ISO 760	Determination of Water. Karl Fischer Method (General Method) – First Edition
ISO 868	Plastics and Ebonite - Determination of Indentation Hardness by Means of a Durometer (Shore Hardness)
ISO 1183	Plastics - Methods for Determining the Density of Non-Cellular Plastics - Part 1: Immersion Method, Liquid Pyknometer Method and Titration Method
ISO 1889	Carbon Fibre - Determination of Linear Density First Edition
ISO 1890	Reinforcement Yarns - Determination of Twist
ISO 2555	Plastics - Resins in the Liquid State or as Emulsions or Dispersions - Determination of Apparent Viscosity by the Brookfield Test Method
ISO 3001	Plastics - Epoxy Compounds - Determination of Epoxy Equivalent
ISO 11357-5	Plastics — Differential Scanning Calorimetry (DSC) — Part 5: Determination of Characteristic Reaction-Curve Temperatures and Times, Enthalpy of Reaction and Degree of Conversion
ISO 10119	Carbon Fibre - Determination of Density
ISO 10548	Carbon Fibre - Determination of Size Content
ISO 10618	Carbon Fibre - Determination of Tensile Properties of Resin-Impregnated Yarn

2.6 PRI Publications

Available from Performance Review Institute, 161 Thornhill Road, Warrendale PA 15086-7527, Tel: 724-772-1616, www.pri-network.org.

PD 2000 Governance and Administration of an Industry Managed Product Qualification Program

PD 2001 Manufacturer Request for Product Approval and Qualification Process

PRI QPL AMS2980 Qualified Product List of AMS2980.

2.7 SACMA Publications

Available from American Composites Manufacturers Association, 1010 North Glebe Road, Suite 450, Arlington, VA 22201 or www.acmanet.org.

SACMA SRM 1R-94 Compression Properties of Oriented Fiber-Resin Composites

SACMA SRM 3R-94 Open-Hole Compression Properties of Oriented Fiber-Resin Composites

2.8 U.S. Government

Available from DLA Document Services, Building 4/D, 700 Robbins Avenue, Philadelphia, PA 19111-5094, Tel: 215-697-6396, <http://quicksearch.dla.mil/>.

MIL-PRF-83282 Performance Specification Hydraulic Fluid, Fire Resistant, Synthetic Hydrocarbon Base, Metric, NATO Code Number H-537 and Interim Amendment 1.

MIL-DTL-83133 Turbine Fuels, Aviation, Kerosene Types, JP-8 (NATO F-34) and NATO F-35 and JP-8+100 (NATO F-37).

3. DEFINITIONS

3.1 General

For the purpose of this standard the definitions in ISO 472 apply with the following additions or modifications. For further definitions or explanation of terms, refer to AIR4844.

3.2 Specific for Carbon Fiber/Fabric and Resin Materials

BOBBIN: All yarn contained on one spool.

CARBON FIBER BATCH: Bobbins produced in one continuous manufacturing operation that conforms to a fixed manufacturing process in accordance with the Process Control Document (PCD) and is made of one creel set of precursor. A continuous manufacturing operation is defined as one in which the process is not interrupted for more than 24 hours or by a different production run.

FABRIC ROLL: Woven fabric contained on one support tube. The fabric on the roll shall originate from one single master roll of woven fabric.

MASTER ROLL OF WOVEN FABRIC: Woven fabric material that is manufactured in one continuous operation from which several smaller fabric rolls are taken.

PROCESS CONTROL DOCUMENT (PCD): Document defining the material and its manufacturing process. The PCD shall include description of raw materials, equipment, procedures, processes and manufacturing standards.

RESIN BATCH: A quantity of homogeneous resin (base resin and curing agent) prepared in one operation with traceability to individual component batches as defined in the PCD of the resin system manufacturer.

REPLICA: Production of a defined material of an original source on another production line and/or a different site using the same raw materials and processes as the original source.

SIZING: An organic coating. It is applied during fiber manufacture to improve handling properties during weaving.

WOVEN FABRIC: Fiber yarns woven into a fabric of any two-dimensional weave pattern. Warp and weft tracer fibers of another material may be incorporated into the fabric.

WOVEN FABRIC BATCH: A quantity of fabric of a certain weaving style produced on a certain loom in accordance with the PCD. The production run of the batch shall be a continuous operation and shall not be interrupted by a run of a different material.

YARN: A bundle of fibers usually twisted and suitable for making fabric.

4. REQUIREMENTS

4.1 General Requirements

4.1.1 Qualification

All products sold to this specification shall be listed, or approved for listing, on the qualified products list PRI QPL AMS2980. The qualified products list shall be in accordance with PD 2000.

4.1.2 Process Control Document

Prior to manufacturing the first qualification fiber, fabric or resin batch, the manufacturer shall have established the PCD. The PCD shall be presented to the CACRC-QPG upon request. CACRC-QPG shall treat any information contained in the PCD as confidential.

Changes to the PCD of a qualified material are subject to the written approval of the CACRC-QPG in accordance with PD 2000. Such changes may require side qualification. The batch release test report for the first delivery made after any change to the PCD shall contain a reference to the change.

4.1.3 Traceability

Each individual material shall be identifiable at all stages of manufacture and delivery. The material manufacturer shall present evidence of the material traceability upon request.

4.1.4 Health and Safety Requirements

The delivered fiber, fabric and resin system shall fulfill the local requirements of the health and safety laws of the country of the purchaser.

In processing the materials in the composite shop, the fabric/resin combination shall not cause any health problems or cause an emission which requires special measures to be taken to protect the environment.

The manufacturer shall inform the purchaser regarding safe handling procedures of the material. The resin system formulation given to the CACRC-QPG during qualification shall also be inspected for health and safety requirements.

4.1.5 Manufacturer's Responsibility

The manufacturer is responsible for the development and manufacture of any material submitted in accordance with this TS. Quality control by the manufacturer shall be in accordance with this TS. The material manufacturer commits itself to supply a qualified material for a minimum of ten years.

Adjustment of manufacturing techniques and/or procedures to the state of the art technology is the manufacturer's responsibility and may require re-qualification to this specification.

4.1.6 Quality Assurance

The manufacturer's quality system shall be approved as defined in ISO 9000 or equivalent.

4.2 Technical Requirements

4.2.1 Technical Requirements for Carbon Fibers

4.2.1.1 Fiber

The carbon fiber used to weave the fabric according to this TS shall be a material qualified in prepreg form for one of the epoxy prepreg specifications used to manufacture assemblies for a commercial aircraft by an OEM. For this qualification program re-qualification of the fiber is not required provided that the specified tests have been performed in the original qualification program. The original qualification test data shall be used for evaluation of the properties. The carbon fiber yarn shall meet the requirements of the MS.

4.2.1.2 Pretreatment and Sizing

The PCD shall specify appropriate control of fiber pretreatment and sizing chemistry. The sizing when applied shall meet the requirements of the MS. After qualification the size type and content shall be defined in relevant Appendix PRI QPL AMS2980.

4.2.1.3 Fiber Splices

The fiber yarn on each bobbin shall contain no more than seven splices per kilogram of yarn.

4.2.2 Technical Requirements for Fabric

4.2.2.1 Woven Fabric

The fabric shall be woven from fiber qualified in accordance with paragraph 4.2.1. Looms used to weave fabrics for wet lay-up repair shall also be in use for weaving fabrics that are qualified in a prepreg form used to manufacture assemblies for a commercial aircraft by an OEM. No more than three fiber batches shall be used in the warp direction and one fiber batch in the weft direction for any single fabric batch. Alternatively, if one batch is used in the warp direction, no more than three batches shall be used in the weft direction. The fiber orientation for the warp and the weft shall be 0 degrees and 90 degrees, respectively. The material, tooling and methods used for weaving and handling shall not affect the carbon fiber or cause contamination of the fabric. Each roll in a fabric batch shall meet the length requirements of the PS for carbon fabric.

4.2.2.2 Fabric Requirements

The incorporation of glass tracer yarns may be agreed upon between the purchaser and the fabric manufacturer. The tracers shall be woven approximately every 50 mm in the warp direction and every 150 mm in the weft direction. Aramid fiber tracers shall not be used.

The selvage shall be of such width (38 mm maximum) as to cause no distortion of the fabric when the material is unrolled.

The fabric width, which excludes selvage, shall be specified in the relevant Appendix of PRI QPL AMS2980. The width tolerance shall be ± 12.5 mm for each meter of fabric width.

The material shall be wound on the support tube, in a way that when unrolled on a flat surface, it will retain edges that are straight within ± 25 mm in a 15 m length.

Carbon fabric may be spliced to meet material roll length requirements. Splices shall be overlapped a maximum of 300 mm with a maximum of one splice per roll. Material splices shall not be within 10 m of the end of the roll. Material splicing deviations shall be allowed when agreed upon between purchaser and the fabric manufacturer.

Each defect shall be identified and flagged with a colored mark positioned on the fabric. A continuous defect shall be identified with a colored mark at the start and with a different colored mark at the end of the defect.

Each roll shall have a defect record attached, recording the location and length of each defect (if any) in that roll.

4.2.2.3 Woven Fabric Defects

Definition of defect description terms are in accordance with ASTM D 3990.

Fabric defects criteria shall be counted as follows:

- Two defects in accordance with the criteria of Table 1 below within 1 meter length are considered as a defective length.
- The number of defects in accordance with the criteria of Table 1 below shall not exceed three per 50 linear meters of roll length.
- Continuous weaving defects shall be considered a continuous defect if they involve more than one yarn.
- Multiple defects shall be considered a continuous defect if they involve more than one yarn.
- A defect area is 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.

Defect criteria are defined in Table 1 below:

TABLE 1 - DEFECT DEFINITIONS AND CRITERIA

Defect	Defect Description (Ref. ASTM D 3990)	Criteria
<i>Contamination</i>	Any foreign object or dust or dirty yarn present on the fabric	Is a defect whatever the size (no minimum or maximum limit)
<i>Crease or Wrinkle</i>	A break, line or mark in the fabric, generally caused by a sharp fold	If the crease / wrinkle remains when unwinding the fabric
<i>Different Aspect of Yarn</i>	Slug, thin filling or any defects on the yarn that creates a variation of thickness	Is a defect whatever the size (no minimum or maximum limit)
<i>Float</i>	That portion of a yarn that extends unbound over two or more yarns	If more than one per 50 cm of fabric length
<i>Fuzz Ball</i>	Loose and frayed fibers that have formed into a ball and then been woven into the fabric	If it creates an extra thickness.
<i>Hang Pick (Weft)</i>	A pick caught on a warp yarn knot for a short distance producing a triangular shaped hole in the fabric	If it creates a gap > 2 mm on a length > 20 mm
<i>Kink (or Looped Yarn)</i>	A short length of yarn that has doubled back on itself to form a loop	Is a defect whatever the size (no minimum or maximum limit)
<i>Mispick or Pulled-In Weft Yarn</i>	A yarn not properly interlaced which causes a break in the weave pattern	If more than one per 50 cm of fabric length
<i>Missing or Broken Warp Yarn</i>	Broken end or missing end	If missing or broken on more than 1 cm of length and visible
<i>Missing or Broken Weft Yarn</i>	Broken pick or missing pick	If missing or broken on more than 1 cm of length and visible
<i>Selvage Defect</i>	Cuts or breaks that occur in the selvage only	Is a defect whatever the size (no minimum or maximum limit)
<i>Slack End (Warp) or Slack Pick (Weft)</i>	Yarn woven under insufficient tension	More than one yarn
<i>Slug</i>	An abrupt thickening of the yarn	If it creates an extra thickness.
<i>Smash Hole</i>	A relatively large hole characterized by broken warp ends and floating picks	It is a defect whatever the size (no minimum or maximum limit)
<i>Stain</i>	Blotch or spot	Is a defect whatever the size (no minimum or maximum limit)
<i>Stop Mark</i>	A visible change in the density of the weave across the width of the fabric	Is a defect whatever the size (no minimum or maximum limit)
<i>Stripe</i>	Streak	Is a defect whatever the size (no minimum or maximum limit)
<i>Tight End (Warp) or Tight Pick (Weft)</i>	Yarn that was woven under excessive tension or has shrunk more than a normal amount	If it creates creases or a deformation of the fabric
<i>Weave Distortion or Skewing</i>	Condition resulting when yarns are angularly displaced from a line perpendicular to the edge or side of the fabric	If more than 2 cm per 50 cm of fabric width for weft yarns Warp yarn deviation from a straight line shall be 5 mm maximum over 1.0 m of fabric length
<i>Weaving Separation or Gap</i>	Bow or tear drop or abnormal distance between two yarns	If > 2 mm on a length > 20 mm
<i>Yarn Splice</i>	A yarn which has been broken and rejoined	Is a defect whatever the size (no minimum or maximum limit)

Kits will be defect-free when the length is ≤ 10 linear meters (lm). When kits are more than 10 linear meters (lm) in length, fabric roll requirements will apply.

4.2.2.4 Storage Conditions for Carbon Fabrics

The fabric shall be stored wrapped in plastic in a clean and dry area. The fabric roll shall not be allowed to lay on a surface, stand on its end, and/or have any other rolls or objects placed on top of it.

4.2.2.5 Storage Life of Carbon Fabrics

When stored in accordance with paragraph 4.2.2.4 the fabrics shall have a minimum storage life of 36 months from the fiber manufacture date with a minimum of 12 months from the date of receipt of the fabric. The maximum storage life shall be specified by the fiber manufacturer and shall be stated in the IPS. The maximum storage life shall be calculated from the fiber manufacturing date and included in the fabric release test report of each shipment (See AMS2980/3, paragraph 5.2). The storage life shall be guaranteed by the weaver and the fiber manufacturer. The fabric kits shall be supplied with a copy of the original fabric release test report and the kits maximum storage life shall be corrected as appropriate in the label attached to the kit. The kit storage life shall be a minimum of 9 months. Kits with shorter remaining life can be supplied with customer agreement. At the end of the storage life, the fiber, fabric and composite shall meet the requirements of this TS and the MS. Storage life extension procedures may be described in the relevant Appendix of PRI QPL AMS2980.

4.2.3 Technical Requirements for Resin System

4.2.3.1 Nominal Process Parameters for Qualification

Prior to qualification the manufacturer and CACRC-QPG shall agree upon the nominal blending proportions of the base resin and the curing agent, the blending instructions and the nominal cure cycle; see paragraphs 4.2.3.3 and 4.2.3.8. These nominal process parameters shall be specified in the relevant Appendix of PRI QPL AMS2980. The nominal cure cycle may contain a dwell to comply with viscosity requirements and shall be defined to avoid exothermic reaction during the cure of the materials. AMS2980/2 specifies process parameters based on the nominal parameters. Cure cycles and blending ratios not tested in accordance with this TS are non-qualified process parameters and shall not be included in the relevant Appendix of PRI QPL AMS2980.

4.2.3.2 Appearance

Each component of the resin system shall be a homogeneous material and shall meet the requirements of this TS and the MS.

4.2.3.3 Blending

The blending ratio shall be the amount of the curing agent expressed in terms of parts by mass of curing agent for 100 parts by mass of base resin. Base resin and curing agent shall blend readily to produce a uniform material when mixed by hand for a minimum of 3 minutes in a suitable container.

4.2.3.4 Water Content

The resin manufacturer shall recommend a maximum water content for both base resin and curing agent based on the material manufacturer and repair shop conditions. This maximum value shall be demonstrated acceptable at time of qualification in accordance with TS and shall be specified in the relevant Appendix PRI QPL AMS2980. All base resin and curing agent delivered in accordance with this specification shall have a water content less than this amount.

4.2.3.5 Color

Color shall be used for visual identification of the materials. The color of the resin shall be different from the color of the curing agent to avoid exchange by mistake. There are no special requirements for the color of the resin system unless otherwise specified in the MS. The color of the base resin and the curing agent shall be uniform.

4.2.3.6 Storage Life of the Resin System

At the end of the defined storage life the base resin and curing agent shall meet all requirements of this TS and the MS. Storage life extension procedures may be described in the relevant Appendix PRI QPL AMS2980. The storage life of base resin and curing agent shall meet the following requirements:

- a. The storage life of unopened containers from the date of receipt at any purchaser worldwide: 12 months minimum at storage conditions to be defined by the manufacturer and specified in the relevant Appendix PRI QPL AMS2980.
- b. Storage life of kitted and unopened containers at room temperature shall be six months minimum and shall be specified in the relevant Appendix of PRI QPL AMS2980.
- c. Specific tests as per AMS2980/2 shall be conducted during qualification with the aim of extending the storage life of the base resin and curing agent beyond the periods of time specified above.

4.2.3.7 Properties of the Base Resin and Curing Agent

The base resin and curing agent shall meet the requirements of the MS when tested in accordance with AMS2980/2.

4.2.3.8 Properties of the Uncured and Cured Neat Resin

The uncured resin system shall meet the requirements of the MS when blended and tested in accordance with AMS2980/2. The cured neat resin shall meet the requirements of the MS when blended, cured and tested in accordance with AMS2980/2.

4.3 Requirements for Composite Materials

The performance level of the composite material, achieved in the qualification testing as specified in AMS2980/2, shall meet the values specified in the MS when subjected to the statistical method of paragraph 5.6.

4.4 Test Methods

Test methods shall be in accordance with the standard test procedures given in this TS. This section describes modifications or additions to the standard test methods. If there is no standard test method available, this section specifies the test method to be used.

4.4.1 Required Number of Specimens

The required numbers of test specimens are listed in AMS2980/2.

4.4.2 Test Methods for Fiber

Test methods for the fiber properties are listed in AMS2980/2. These test methods shall be used unless written approval is given by the CACRC-QPG for using alternative test procedures. It is the responsibility of the fiber manufacturer to demonstrate the correlation of his proposed test method with the methods specified.

4.4.3 Test Methods for Fabric

The fabric test methods are defined in AMS2980/2.

4.4.3.1 Fiber Areal Mass

The fiber areal mass shall be determined by weighing a 100 mm by 100 mm sample and dividing the mass in grams by the measured sample area in square meters. The fiber areal mass to be reported is the average of three samples taken across the width of the roll.