



AEROSPACE MATERIAL SPECIFICATION

AMS3970™/1**REV. A**

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Superseding AMS3970/1

Carbon Fiber Fabric Repair Prepreg, 120 °C (250 °F) Vacuum Curing Part 1 - General Requirements

RATIONALE

AMS3970/1A has been reaffirmed to comply with the SAE five-year review policy.

FOREWORD

AMS3970/1 belongs to the Technical Specification system explained in AMS3970.

TABLE OF CONTENTS

1.	SCOPE.....	4
2.	APPLICABLE DOCUMENTS.....	4
2.1	SAE Publications.....	4
2.2	ASTM Publications.....	4
2.3	EN Publications.....	6
2.4	ISO Publications.....	7
2.5	SACMA Publications.....	8
2.6	Military Specifications.....	8
2.7	PRI Publications.....	8
3.	DEFINITIONS	8
3.1	General	8
3.2	Specific for Carbon Fiber Prepreg and Film Adhesive.....	8
4.	REQUIREMENTS	10
4.1	General Requirements:.....	10
4.1.1	Qualification	10
4.1.2	Process Control Document	10
4.1.3	Traceability.....	10
4.1.4	Health and Safety Requirements	10
4.1.5	Manufacturer's Responsibility	10
4.1.6	Quality Assurance	10
4.2	Technical Requirements	11
4.2.1	Technical Requirements for Carbon Fibers	11
4.2.2	Technical Requirements for Fabric.....	11
4.2.3	Technical Requirements for Resin.....	13
4.2.4	Technical Requirements for Carbon and Glass Prepreg	13

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4.2.5	Technical Requirements for Film Adhesive	13
4.2.6	Common Technical Requirements for Prepreg and Film Adhesive	14
4.3	Requirements for Composite Materials	15
4.4	Test Methods	15
4.4.1	Required Number of Specimens	16
4.4.2	Test Methods for Fiber	16
4.4.3	Test Methods for Fabric	16
4.4.4	Test Methods for Resin	16
4.4.5	Test Methods for Composites	16
5.	QUALIFICATION	17
5.1	Introduction	17
5.2	Material Qualification	17
5.2.1	General	17
5.2.2	Screening of the Prepreg System	17
5.2.3	Qualification of Material	17
5.2.4	Audit of a Manufacturer	18
5.2.5	Establishment of an Appendix of PRI QPL AMS3970	18
5.3	Material Qualification Program	18
5.3.1	Qualification Retests	18
5.3.2	Qualification Test Report	19
5.4	Side Qualification and Requalification	19
5.5	Material Safety Data Sheet	20
5.6	Evaluation of Test Data	20
6.	COMPOSITE TEST METHODS AND SPECIMEN MANUFACTURING	20
6.1	Specimen Manufacturing and Storage	20
6.1.1	Specimen Definition	20
6.1.2	Panel Size	20
6.1.3	Panel Manufacturing	21
6.1.4	Tabs	21
6.1.5	Specimen Machining	21
6.1.6	Specimen Selection	21
6.1.7	Storage of Panels and Specimens	21
6.1.8	Drying of Specimens	21
6.1.9	Strain Gauge Bonding	23
6.2	Fluid Immersion and Humidity Aging	23
6.2.1	Wet Conditioning Procedures	23
6.2.2	Traveler Specimens	23
6.2.3	Selected Fluids	23
6.2.4	Fluid Immersion Procedure	24
6.3	Report on Specimen Manufacturing, Conditioning and Storage	25
6.3.1	Panel Manufacturing	25
6.3.2	Specimen Manufacturing	25
6.3.3	Fluid Immersion	25
6.3.4	Humidity Aging	26
6.4	Test Procedure for Testing at Nonambient Conditions	26
6.4.1	Temperature Chamber	26
6.4.2	Testing at Elevated Temperatures	26
6.4.3	Testing at Sub-Zero Temperatures	26
6.5	Additions and Changes to Standard Test Methods	27
6.5.1	General	27
6.5.2	Tensile Weft / Warp	28
6.5.3	Compressive Weft / Warp	29
6.5.4	Tensile In-Plane Shear ($\pm 45^\circ$)	29
6.5.5	Interlaminar Shear Warp	30
6.5.6	DMA Composite	30
6.5.7	Tensile QI	31

6.5.8	Tensile QI Open-Hole	31
6.5.9	Compressive QI	32
6.5.10	Compressive QI Open Hole	32
6.5.11	Double Shear Bearing QI	33
6.5.12	Compression After Impact	34
6.5.13	Flatwise Tensile	35
6.5.14	Long Beam Sandwich Flexure	35
6.5.15	Tensile Tapered Joint.....	36
6.5.16	Tensile Stepped Joint.....	36
6.5.17	Tensile Single Lap Shear	36
6.5.18	Thick Adherent Shear	36
6.5.19	Moisture Uptake	36
6.5.20	Fracture Toughness Energy - G1c.....	37
6.5.21	Fracture Toughness Energy - G2c.....	37
6.6	Determination of Laminate Quality.....	37
6.6.1	C-Scan	37
6.6.2	Void Content (Porosity).....	38
6.6.3	Fiber Volume	39
6.7	Specimen Manufacturing	39
6.7.1	General	39
6.7.2	Equipment	39
6.7.3	Essential Expendable Materials.....	40
6.7.4	Other Expendable Materials	40
6.7.5	Manufacturing of Laminates.....	41
6.7.6	Manufacturing of Sandwich Panels.....	41
6.7.7	Manufacturing of Tapered and Stepped Joint Specimens.....	43
6.7.8	Manufacturing of Tensile Single Lap Shear Specimens	43
7.	NOTES	44
APPENDIX A	AUTHORIZED ANCILLARY MATERIALS	45
FIGURE 1	SETUP FOR LAMINATE CURING	42
FIGURE 2	SETUP FOR SANDWICH CURING.....	42
TABLE 1	SIDE QUALIFICATION PROGRAM	19
TABLE 2	FLUID TYPES FOR IMMERSION TESTING.....	22
TABLE 3	STORAGE CONDITIONS AND TIMES FOR LAMINATE PANELS AND LAMINATE SPECIMENS	22
TABLE 4	STORAGE CONDITIONS AND TIMES FOR SANDWICH PANELS AND SANDWICH SPECIMENS	24

1. SCOPE

AMS3970/1 gives information about the technical requirements and qualification procedure for carbon fiber fabric epoxy prepreg and a companion non-structural glass prepreg used for repair of carbon fiber reinforced epoxy structures. The prepreg system may include a film adhesive to be applied in a co-curing process with the prepreg for joint and sandwich bonding. The need for a film adhesive shall be established during screening tests.

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.

AMS3970	Carbon Fiber Fabric Repair Prepreg, 120 °C (250 °F) Vacuum Curing - Part 0 - Introduction
AMS3970/2	Carbon Fiber Fabric Repair Prepreg, 120 °C (250 °F) Vacuum Curing - Part 2 - Qualification Program for Fiber, Fabric, Carbon Prepreg, Film Adhesive and Non-Structural Glass Prepreg
AMS3970/3	Carbon Fiber Fabric Repair Prepreg, 120 °C (250 °F) Vacuum Curing - Part 3 - Purchasing Specification for Carbon Prepreg
AMS3970/4	Carbon Fiber Fabric Repair Prepreg, 120 °C (250 °F) Vacuum Curing - Part 4 - Purchasing Specification for Film Adhesive
AMS3970/5	Carbon Fiber Fabric Repair Prepreg, 120 °C (250 °F) Vacuum Curing - Part 5 - Purchasing Specification for Companion Non-Structural Glass Fiber Fabric Prepreg
AMS3970/6	Carbon Fiber Fabric Repair Prepreg, 120 °C (250 °F) Vacuum Curing - Part 6 - Carbon Fiber Fabric Reinforced Epoxy Prepreg for Repair, Plain Weave, 193 gm/m ² , Adhesive Film for Repair, Non-Structural Glass Fiber fabric Reinforced Epoxy Prepreg, 105 gm/m ²
AMS-C-9084	Cloth, Glass, Finished, For Resin Laminates
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 C 393	Standard Test Method for Flexural Properties of Sandwich Constructions
ASTM D 740	Standard Specification for Methyl Ethyl Ketone
ASTM D 1002	Standard Test Method for Apparent Strength of Single-Lap-Joint Adhesively Bonded Metal Specimens by Tension Loading (Metal-to-Metal)
ASTM D 1655	Standard Specification for Aviation Turbine Fuels

ASTM D 2344/D 2344M	Standard Test Method for Short-Beam Strength of Polymer Matrix Composite Materials and Their Laminates
ASTM D 3039/D 3039M	Standard Test Method for Tensile Properties of Polymer Matrix Composite Materials
ASTM D 3171	Standard Test Methods for Constituent Content of Composite Materials
ASTM D 3518/D 3518M	Standard Practice for In-Plane Shear Response of Polymer Matrix Composite Materials by Tensile Test of a $\pm 45^\circ$ Laminate
ASTM D 3529/D 3529M	Standard Test Method for Matrix Solids Content and Matrix Content of Composite Prepreg
ASTM D 3530/D 3530M	Standard Test Method for Volatile Content of Composite Material Prepreg
ASTM D 3531/D 3531M	Standard Test Method for Resin Flow of Carbon Fiber-Epoxy Prepreg
ASTM D 3532	Standard Test Method for Gel Time of Carbon Fiber-Epoxy Prepreg
ASTM D 3776	Standard Test Method for Mass per Unit Area (Weight) of Fabric
ASTM D 3990	Standard 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 5528/D 5528M	Standard Test Method for Mode I Interlaminar Fracture Toughness of Unidirectional Fiber-Reinforced Polymer Matrix Composites
ASTM D 5656	Standard Test Method for Thick-Adherend Metal Lap-Shear Joints for Determination of Stress-Strain Behavior of Adhesives in Shear by Tension Loading
ASTM D 5766/D 5766M	Standard Test Method for Open Hole Tensile Strength of Polymer Matrix Composite Laminates
ASTM D 5961/D 5961M	Standard Test Method for Bearing Response 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 7137/D 7137M	Standard Test Method for Compressive Residual Strength Properties of Damaged Polymer Matrix Composite Plates
ASTM E 4	Standard Practices for Force Verification of Testing Machines.
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-comite, European de Normalisation, Secretariat Central, Rue de Stassart 36, B-1050 Bruxelles, Belgium or www.cenorm.be.

EN 2243-7	Aerospace Series: Structural Adhesives Test Methods. Part 7: Determination of the Flow Characteristics of a Film Adhesive
EN 2329	Aerospace Series: Textile Glass Fibre Preimpregnates, Test Method for the Determination of Mass per Unit Area
EN 2330	Aerospace Series: Textile Glass Fibre Preimpregnates, Test Method for the Determination of the Content of Volatile Matter
EN 2331	Aerospace Series: Textile Glass Fibre Preimpregnates, Test Method for the Determination of the Resin and Fibre Content and the Mass of Fibre per Unit Area
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 2557	Aerospace Series: Carbon Fibre Preimpregnates, Test Method for the Determination of Mass per Unit Area
EN 2558	Aerospace Series: Carbon Fibre Preimpregnates, Test Method for the Determination of the Percentage of Volatile Matter
EN 2559	Aerospace Series: Carbon Fibre Preimpregnates, Test Method for the Determination of the Resin and Fibre Content and the Mass of Fibre per Unit Area
EN 2560	Aerospace Series: Carbon Fibre Preimpregnates, Test Method for the Determination of the Resin Flow
EN 2561	Aerospace Series: Unidirectional Laminates - Carbon Thermosetting Resin, Tensile Test Parallel to the Fiber Direction
EN 2563	Aerospace Series: Carbon Fibre Reinforced Plastics - Unidirectional Laminates - Determination of 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 2565	Aerospace Series: Preparation of Carbon Fiber Reinforced Resin Panels for Test Purposes
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 3003	Aerospace Series: Test Method - Determination of Mass per Unit Area of Film Adhesives
EN 3615	Aerospace Series: Fiber Reinforced Plastics, Procedure for the Determination of the Conditions of Exposure to Humid Atmosphere and the Determination of Moisture Absorption
EN 6031	Aerospace Series: Fiber Reinforced Plastic, Determination of In-Plane Shear Properties ($\pm 45^\circ$ Tensile Test)

EN 6032	Aerospace Series: Determination of Glass Transition Temperature (DMA).
EN 6033	Aerospace Series: Carbon Fiber Reinforced Plastics, Determination of the Interlaminar Fracture Toughness Energy - Mode I - G1c Test
EN 6034	Aerospace Series: Carbon Fiber Reinforced Plastics, Determination of the Interlaminar Fracture Toughness Energy - Mode II - G2c Test
EN 6035	Aerospace Series: Fiber Reinforced Plastics, Determination of Notched and Unnotched Tensile Strength
EN 6036	Aerospace Series: Fiber Reinforced Plastics, Test Method, Determination of Notched, Unnotched and Filled Hole Compression 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 6040	Aerospace Series: Analysis of Non-Metallic Materials (Uncured) by High Performance Liquid Chromatography (HPLC)
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 6060	Aerospace Series: Fiber Reinforced Plastics, Tensile Lap Shear Test
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
EN 6066	Aerospace Series: Fiber Reinforced Plastics, Determination of Stepped and Tapered Joint Strength

2.4 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 1183	Density and Relative Density of Non-Cellular Plastics
ISO 1890	Carbon Fiber - Determination of Twist
ISO 9000	Quality Management Systems - Fundamentals and Vocabulary
ISO 10119	Carbon Fiber - Determination of Density
ISO 10120	Carbon Fiber - Determination of Linear Density
ISO 10548	Carbon Fiber - Determination of Size Content

- ISO 10618 Carbon Fiber - Determination of Tensile Properties by Resin Impregnated Yarn Specimens
- ISO 11357-2 Plastics - Differential Scanning Calorimetry (DSC) - Part 2: Determination of Glass Transition Temperature - First Edition
- 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

2.5 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, Issued 1994
- SACMA SRM 3R-94 Open Hole Compression Properties of Oriented Fiber-Resin Composites, Issued 1994
- SACMA SRM 20R-94 High Performance Liquid Chromatography of Thermoset Resins, Issued 1994

2.6 Military Specifications

- MIL-PRF-83282D Performance Specification Hydraulic Fluid, Fire Resistant, Synthetic Hydrocarbon Base, Metric, NATO Code Number H-537 Issued September 30, 1997 and Interim Amendment 1 Issued December 10, 1997
- MIL-DTL-83133G Turbine Fuels, Aviation, Kerosene Types, JP-8 (NATO F-34) and NATO F-35 and JP-8+100 (NATO F-37) Issued April 30, 2010

2.7 PRI Publications

Available from Performance Review Institute, 161 Thorn Hill 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 AMS3970 Qualified Product List of AMS3970

3. DEFINITIONS

3.1 General

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

3.2 Specific for Carbon Fiber Prepreg and Film Adhesive

FILM ADHESIVE: Semi finished product of specified areal weight produced from thermosetting resin in an uncured state of certain advancement, ready to be applied in bondlines for co-curing with a prepreg. A suitable carrier material (fabric or scrim) shall be incorporated into the film adhesive to improve handleability and to define minimum bondline thickness.

FILM ADHESIVE BATCH: A film adhesive batch is produced in one continuous manufacturing operation that conforms to a fixed manufacturing process in accordance with the Process Control Document (PCD) using one batch of resin and suitable carrier with traceability to the individual batches of resin and carrier used. A continuous manufacturing operation is defined as one in which the process is not interrupted for more than 72 continuous hours, during which time the materials shall be stored according to the certified production procedure. Any interruption shall not contain a different

product run. The total production time, interruptions included, shall not exceed five days unless otherwise stated in the relevant Appendix of PRI QPL AMS3970 or Individual Product Sheet (IPS).

ADHESIVE ROLL: Adhesive material including suitable protection foil(s) according to the PCD contained on one support tube.

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 from 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 a 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.

PREPREG: Semi finished product of woven fabric material impregnated with a specified amount of thermosetting resin in an uncured state of certain advancement ready for lamination and to be cured by heat and vacuum pressure only.

PREPREG SYSTEM: Prepreg material produced under a specific trade name by a prepreg manufacturer. In most cases a film adhesive is required for use with the prepreg for co-cure joint and sandwich bonding. The prepreg material and associated co-curing film adhesive are defined as the Prepreg System. It shall be responsibility of the prepreg manufacturer to select the appropriate film adhesive for the system.

PREPREG BATCH: A batch of preimpregnated fabric is produced in one continuous manufacturing operation using one batch of resin and one or several batches of dry fabric, with traceability to the individual batches of fabric used. These batches shall be constituted from the same type of fabric, supplied by the same weaver. A continuous manufacturing operation is defined as one in which the process is not interrupted for more than 72 continuous hours, during which time the materials shall be stored according to the certified production procedure. Any interruption shall not contain a different product run. The total production time, interruptions included, shall not exceed five days unless otherwise stated in the relevant Appendix of PRI QPL AMS3970 or IPS.

PREPREG ROLL: Prepreg material including suitable protection foil(s) according to the PCD contained on one support tube.

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.

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

RESIN BATCH: A quantity of homogeneous resin prepared in one operation with traceability to individual component batches as described in the PCD of the prepreg and adhesive manufacturer used to manufacture prepreg or film adhesive in accordance with the defined process. A resin batch may contain up to 15% of another approved and within shelf-life resin batch of the same resin type, blended uniformly with the major resin batch. Full traceability shall be maintained for all raw material constituents. The blended resin batch shall have a single new batch number.

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 AMS3970. 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, resin, prepreg or film adhesive batch, the manufacturer shall have established the PCD. The PCD shall be presented to the CACRC-QPG upon request. The 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 a side qualification program. 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 prepreg and adhesive 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 prepreg and film adhesive 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 about the safe handling procedures of the material. The resin system formulation of the prepreg and film adhesive 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 himself to supply the 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 requalification 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 AMS3970/1 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 the Appendix of PRI QPL AMS3970.

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 4.2.1. Looms used to weave fabrics for the repair prepreg 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 (case 3:1). Alternatively, if one batch is used in the warp direction, no more than three batches shall be used in weft direction (case 1:3). The fiber orientation for the warp and the weft shall be 0 degree 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 the fabric batch shall meet the length requirements of the PS for carbon fabric. The fabric manufacturer shall assign consecutive fabric roll numbers. Roll number assignment may be done:

1. at the time of weaving or
2. at the time these rolls are wound from master rolls.

The woven fabric shall meet the requirements of the MS.

4.2.2.2 Carbon 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 includes selvage, shall be specified in the Appendix of PRI QPL AMS3970. The width tolerance shall be ± 12.5 mm for each meter of fabric width.

The material shall be wound on a 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.

Material shall be packaged and shipped in accordance with requirements defined in AMS3970, Part 3.

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 each end of the roll. Material splicing deviations shall be allowed when agreed between purchaser and prepreg 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.

Further requirements with respect to fabric quality, defects, storage, etc. shall be agreed in a bilateral specification between the prepreg manufacturer and the fabric manufacturer to fulfill the relevant requirements of AMS3970/1 as defined for the prepreg. The woven fabric shall meet the requirements of the MS when tested in accordance with AMS3970/2.

4.2.2.3 Carbon Woven Fabric Defects

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

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

Single yarn defects, such as broken fibers, distortions and wrinkles, shall not be more than three over 2.0 m 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.

Continuous 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 missing pick, missing end, whipped in weft, loose pick, slab, kink, or fuzz ball shall be considered a continuous defect, if they involve more than one yarn.

A continuous single yarn or weaving defect shall not exceed 170 mm in any linear meter where no defect is 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, see 4.2.2.2.

Warp yarn deviation from a straight line shall be 5 mm maximum over 1.0 m of fabric length.

Weft yarn deviation from a straight line shall be 50 mm maximum over 1.0 m of fabric width.

4.2.2.4 Glass Fabric Requirements

The incorporation of tracer yarns may be agreed upon between the purchaser and the fabric manufacturer. Aramid fibers tracers shall not be used.

Selvage width on each side of fabric shall not exceed 38 mm as to cause no distortion of the fabric when the material is unrolled.

Width of the material, which includes selvage shall be specified in the Appendix of PRI QPL AMS3970. The width tolerance shall be ± 12.5 mm for each meter of fabric width.

Material shall be packaged and shipped in accordance with requirements defined in AMS3970, Part 5.

Further requirements with respect to fabric quality, defects, storage, etc. shall be agreed in a bilateral specification between the prepreg manufacturer and the fabric manufacturer to fulfill the relevant requirements of AMS3970/1 as defined for the prepreg. The woven fabric shall meet the requirements of the MS when tested in accordance with AMS3970/2.

Fabric requirements shall also adhere to requirements defined in AMS-C-9084.

4.2.2.5 Glass Woven Fabric Defects

Definition of defect description terms are in accordance with AMS-C-9084.

The material shall be uniform in quality and condition and shall not exhibit characteristics detrimental to handling, lay-up, or mechanical properties.

Fabric shall be free from curled or folded selvages that overlap non-selvage areas, wrinkles, smashes or fabric splices.

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.

4.2.3 Technical Requirements for Resin

4.2.3.1 Resin Requirements

The resin used to manufacture the prepreg and film adhesive shall be an epoxy or modified epoxy type produced in accordance with AMS3970/1 and meeting the requirements of the MS. The prepreg and film adhesive do not need to use the same epoxy system but must be compatible.

4.2.4 Technical Requirements for Carbon and Glass Prepreg

4.2.4.1 Prepreg Requirements

Fabric prepreg shall be produced from woven fabric and resin meeting the requirements of 4.2.2 and 4.2.3. The prepreg shall meet the requirements of the MS when tested in accordance with AMS3970/2.

Defect descriptions and requirements as described in 4.2.2 apply to the prepreg materials.

4.2.5 Technical Requirements for Film Adhesive

4.2.5.1 Film Adhesive Requirements

The film adhesive shall be produced from an epoxy or modified epoxy resin produced in accordance with the TS and meeting the requirements of the MS when tested in accordance with AMS3970/2.

The film adhesive shall have cut edges ensuring presence of the carrier over the full width. Cutting tolerance of the width defined in the Appendix of PRI QPL AMS3970 or purchase order shall be ± 1 mm.

Materials shall be packaged and shipped in accordance with requirements defined in AMS3970, Part 4.

4.2.6 Common Technical Requirements for Prepreg and Film Adhesive

4.2.6.1 Release Film Material

The prepreg and the film adhesive shall be protected from contamination and, if necessary, from self adhesion by release film on one side or both sides. Films shall be easily removable from the prepreg or film adhesive without transfer of release materials or otherwise affecting the quality under shop conditions of 15 to 30 °C and 25 to 75% relative humidity. Different shop condition limits may be established in the Appendix of PRI QPL AMS3970.

The release film shall be of a contrasting color and maintain its release and noncontaminative properties over a temperature range of -20 to +30 °C and a range of 25 to 75% relative humidity, if not otherwise agreed in the Appendix of PRI QPL AMS3970. Release film material shall not protrude over the edges of the prepreg or adhesive material.

4.2.6.2 Material Requirements

Resin distribution and areal weight of the prepreg or the film adhesive shall comply in each area with the requirements of the MS. Visual resin starved or resin rich areas shall be considered as defects.

The prepreg and the film adhesive shall be of homogenous color and shall be free from foreign substances and undissolved (except by design) or cured resin system particles.

Creases, cuts and cracks are not permitted.

The formation of folds after unrolling the prepreg or the film adhesive shall not result in separation of the material from the release film.

4.2.6.3 Defects

Any defects in excess of that defined shall be cause for rejection of the specific material delivery or roll, according to the following requirements:

A defective area is the length of the defect, if that defect exceeds specified limits, multiplied by the roll width.

Defective areas are not part of the delivered quantity and shall not be included in the cost of the material.

The cumulative defective area in a roll shall not exceed 10% of the roll area.

All defects within a length of one linear meter are counted as one defective area.

A continuous defect single yarn or weaving defect shall not exceed 170 mm in any linear meter where no defect is closer than 150 mm to another.

Each defect shall be identified and flagged with a colored mark positioned on the roll.

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 type, location and length of each defect (if any) in that roll. As far as applicable definition of defect description terms shall be in accordance with ASTM D 3990. Defects not recorded by the manufacturer and detected by the user during application of the material shall be handled similar to recorded defects.