



AEROSPACE MATERIAL SPECIFICATION

AMS2950™/1

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Paste Adhesive for Core Restoration Part 1 - General Requirements

RATIONALE

AMS2950/1 has been reaffirmed to comply with the SAE Five-Year Review policy.

A reaffirmed status is given to technical reports that have been reviewed by the technical committee and deemed to be current with no need for immediate revision. No changes have been made to this document as a result of this review.

FOREWORD

This Technical Specification is prepared by the Air Transport Association/International Air Transport Association/Society of Automotive Engineers, Inc. (ATA/IATA/SAE) Commercial Aircraft Composite Repair Committee - Repair Material Task Group (CACRC-RMTG). The purpose of this specification is to obtain a common Technical Specification for the paste adhesives for core restoration in repairs of fiber reinforced composite components conforming to the requirements of the Original Equipment Manufacturers (OEM).

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1. SCOPE

This Technical Specification gives information about technical requirements and qualification procedures of adhesive paste with or without thickening agent for core restoration of aircraft components.

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.

AMS2980/1	Carbon Fiber Fabric and Epoxy Resin Wet Lay-Up Repair Material, Part 1 - General Requirements
AMS2980/5	Carbon Fiber Fabric and Epoxy Resin Wet Lay-Up Repair Material, Part 5 - Material Specification: Carbon Fiber Fabrics, Plain Weave, 193 g/m ² , and Epoxy Resin
AIR4844	Composites and Metal Bonding Glossary.

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/C 297M	Standard test method for flatwise tensile strength of sandwich constructions
ASTM D 1875	Standard test methods for density of adhesives in fluid form
ASTM D 2202	Standard test method for slump of sealants
ASTM D 2471	Standard test methods for gel time and peak exothermic temperature of reacting thermosetting resins.
ASTM D 2896	Standard test methods for base number of petroleum products by potentiometric perchloric acid titration
ASTM D 4440	Standard test methods for plastics: dynamic mechanical properties: melt rheology
ASTM D 5229/D 5229 M	Standard test methods for moisture absorption properties and equilibrium conditioning of polymer matrix composite materials
ASTM E 203	Standard test method for water using Karl Fisher reagent
ASTM E 1252	Standard test method for general techniques for obtaining infrared spectra for qualitative analysis.
ASTM E 1640	Standard test methods for assignment of the glass transition temperatures by dynamic mechanical analysis.

2.3 EN Publications

Available from CEN-comité, Européen de Normalisation, Secretariat Central, Rue de Stassart 36, B-1050 Bruxelles, Belgium.

EN 542	Adhesives-Determination of density
EN 2667-2	Aerospace series - Non-metallic materials. Foaming structural adhesives. Test methods. Part 2: Compressive tube shear
EN 2823	Aerospace series - Test method for the determination of the effect of exposure to humid atmosphere on physical and mechanical characteristics - Fibre reinforced plastics.
EN 6032	Aerospace series - Fibre reinforced plastics. Test method. Determination of the glass transition temperatures.
EN 6040	Analysis of thermoset systems by High Performance Liquid Chromatography
EN 6041	Aerospace series - Analysis of non metallic materials by Differential Scanning Calorimetry
EN 6042	Aerospace series - Determination of organic compounds by infrared spectroscopy
EN 6043	Aerospace series - Determination of gel time and viscosity of matrix resins
EN 6062	Aerospace series - Test method. Flatwise tensile test of composite sandwich panel
EN 6064	Aerospace series - Fibre reinforced plastics. Test method. Determination of the extent of cure by Differential Scanning Calorimetry.

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	Plastic - Vocabulary
ISO 604	Determination of compression characteristics
ISO 760	Determination of water. Karl Fisher method (general method)
ISO 2555	Resins in the liquid state or as emulsions or dispersions. Determination of apparent viscosity by the Brookfield test method
ISO 9000	Quality management systems – Fundamentals and vocabulary (ISO 9000:2005)
ISO 11357-2	Plastics-Differential scanning calorimetry (DSC) – Part 5: Determination of glass transition temperature
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 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-AMS2950	Qualified product list of AMS2950
PRI-QPL-AMS2980	Qualified product list of AMS2980

2.6 SACMA Publications

Available from Suppliers of Advanced Composite Materials Association, 1600 Wilson Boulevard, Suite 1008, Arlington, VA 22209.

SRM 20R-94	High performance liquid chromatography of thermoset resins
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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 Definitions

BATCH: A quantity of adhesive paste produced in a single run or shift in continuous operations using the same batches of raw materials.

LOT: A lot shall consist of all the adhesive paste from one batch received in one shipment. The size of the lot refers to the total number of units in the lot.

UNIT: A unit refers to the smallest single portion of adhesive in any lot, e.g., one container of base and hardener.

STORAGE LIFE: The period of time during which the adhesive paste when stored in accordance with the IPS will meet the requirements of this TS and the IPS.

WORK LIFE: The period time at shop conditions 15 to 30 °C and 25 to 75% relative humidity during which the adhesive paste, when in open containers (one-part-systems) or when mixed (two-part-system), is usable as intended, and once cured will meet the requirements of this TS and the IPS.

FILLER: A material that may be added to the resin or hardener to improve the characteristics of the adhesive.

THICKENING AGENT: A material that may be added to the paste adhesive to increase the viscosity (Aerosil or Cab-O-Sil).

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-AMS2950. The qualified products list shall be in accordance with PD 2000.

4.1.2 Process Control Document

Prior to manufacturing the first Qualification adhesive 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 materials manufacturer shall present evidence of the materials traceability upon request.

4.1.4 Health and Safety Requirements

The delivered adhesive shall fulfill the local requirements of the health and safety laws of the country of the purchaser.

In processing the material in the composite shop, the adhesive shall not cause any health problems or cause an emission that requires special measures to be taken to protect the environment.

The manufacturer shall inform the purchaser regarding safe handling procedures of the material. The adhesive 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 materials 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 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 General

The product shall fulfill the requirements of the relevant MS and IPS.

4.2.2 Specific

4.2.2.1 Nominal Process Parameters for Qualification

Two types:

1 - The adhesive paste shall be resin based and supplied as one part or two parts. The type of resin shall be specified in the relevant IPS.

2 - Resin with thickening agent. The rate of the thickening agent shall be specified in the relevant IPS.

In the case of two-part adhesive paste/resin with thickening agent, the manufacturer shall provide mixing information. Prior to qualification the manufacturer and the CACRC-QPG shall agree upon the nominal blending proportions of the two parts, the blending instructions and the nominal cure cycle, see 4.2.2.3 and 4.2.2.4. The nominal process parameters shall be specified in the IPS. Cure cycles and blending ratios not tested in accordance with this TS are non-qualified process parameters and shall not be mentioned in the IPS.

4.2.2.2 Appearance

For two-part adhesive paste, each component of the resin system shall be homogeneous material and shall meet the requirements of the MS.

4.2.2.3 Blending

The manufacturer shall provide mixing information with two part adhesive pastes. The mixing ratio of the parts shall be expressed as the number of parts, by mass, of the hardener that shall be mixed with 100 parts of the base. During hand or automatic mixing, the two parts shall blend readily in a short time defined in the relevant IPS to produce a uniform paste of a consistency suitable for application.

The work life of the mixed adhesive shall meet the requirements of the relevant IPS.

4.2.2.4 Cure

The adhesive shall cure satisfactorily under the conditions specified in the IPS. Once cured in such conditions, the adhesive shall meet all the applicable requirements of this TS and the relevant MS.

4.2.2.5 Water Content

The resin manufacturer shall recommend a maximum water content for one part adhesive paste and each part of two part adhesive paste based on the material manufacturer and repair shop conditions. This maximum value shall be demonstrated acceptable at time of qualification according to this TS and shall be listed in the IPS. One part adhesive paste or each part of two part adhesive paste delivered according to this specification shall have water content below this amount.

4.2.2.6 Color/Texture

Where applicable, each part of two part adhesive paste may be different in color as a visual aid to mixing. The color of one part adhesive paste and the color of each part and the mixture in the case of two part adhesive paste shall be described in the IPS.

Both one part adhesive paste and each part of two part adhesive paste shall have a uniform color and texture and shall be free from foreign material, lumps and coarse particles.

4.2.2.7 Storage Life

The adhesive paste shall meet the requirements of this TS for the period of time defined in the MS under the conditions also defined in the MS.

Preferable storage temperature is room temperature. The storage life shall be at least of 12 months at room temperature.

The stability or the storage life shall be determined from the date of receipt at the purchaser's facility. When other storing conditions are necessary, these conditions and the storage life shall be as agreed upon between the manufacturer and the purchaser.

4.2.2.8 Work Life

The work life of the adhesive paste shall be such that it meets the requirements of this TS after exposure to shop conditions, unless otherwise agreed at the onset of qualification, for the continuous or accumulative period specified in the MS until the end of the storage life.

During work life the adhesive paste shall be stable with regard to handleability and processing.