

Nadcap
Requirements for Prepreg/Adhesive Bonding

RATIONALE

AS7118/1A is being cancelled and superseded by PRI AC7118/1. The requirements in the document have not changed.

CANCELLATION NOTICE

This document has been declared "CANCELLED" as of July 2008 and has been superseded by AC7118/1. By this action, this document will remain listed in the Numerical Section of the Aerospace Standards Index noting that it is superseded by AC7118/1.

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1. SCOPE:

This Aerospace Standard (AS) establishes the requirements for suppliers of Composites to be accredited by Nadcap. Nadcap accreditation is granted in accordance with SAE AS7003 after demonstration of compliance with the requirements herein. The requirements may be supplemented by additional requirements specified by the Nadcap Composites Task Group. Using the corresponding Audit Criteria (PRI AC7118) will ensure that accredited Composites suppliers meet all of the requirements in this standard and all applicable supplementary standards.

The purpose of this audit program is to assess a supplier's ability to consistently provide a product or service that conforms to the technical specifications and customer requirements. The corresponding audit criteria is also structured to obtain information relevant to management practices and processes that directly or indirectly affect the product or service. This information will be used in the determination of accreditation status and may be used by the supplier to guide improvements in the product or service and the associated processes.

2. REFERENCES:

2.1 SAE Publications:

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

AS7118 Nadcap Program – Requirements for Composites

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2.2 PRI Documents:

Available from Performance Review Institute, 161 Thorn Hill Road, Warrendale, PA 15086-7527.

AC7004 Nadcap Program – Audit Criteria for Standard Quality Program Requirements

AC7118 Nadcap Program – Audit Criteria for Composites

3. MATERIAL CONTROL:

3.1 Shelf Life and Out Time:

- 3.1.1 There shall be a controlled procedure describing shelf life and out time controls for all perishable materials.
- 3.1.2 There shall be a documented procedure describing the re-certification requirements of shelf life controlled materials.
- 3.1.3 Perishable materials, i.e. out time and temperature history, shall be controlled and traceable through supplier, distributor, and user.
- 3.1.4 Materials shall be shipped in accordance with customer requirements.
- 3.1.5 Certifications of conformance by the manufacturer shall be available and meet the customer requirements.
- 3.1.6 All perishable materials shall be labeled with identification (i.e. specification, supplier code, date of manufacture and storage temperature), storage life and/or expiration date.
- 3.1.7 There shall be controls to ensure identified materials are held and segregated pending tests/certification.
- 3.1.8 There shall be a documented procedure for internal pre-release of materials requiring tests/certification that allows a positive recall, if permitted per the customer requirements.
- 3.1.9 Each received lot/batch of material shall be inspected and tested per customer requirements.
- 3.1.10 Expired/rejected material shall be identified and segregated per nonconformance system.
- 3.1.11 Materials shall be stored per customer requirements.

- 3.1.12 Accumulated out time shall be tracked by attached card or other method to maintain specification limits.
- 3.1.13 The adhesive, prepreg, or potting shall be sealed in an approved material prior to returning to cold storage.
- 3.1.14 The prepreg/adhesive shall be allowed to warm/thaw to prohibit condensation prior to removing from bag.
- 3.2 Expendable:
- 3.2.1 The processor shall use the required expendable materials as defined in the customer specification.
4. FACILITIES AND EQUIPMENT:
- 4.1 Cold Storage Units:
- 4.1.1 The cold storage units shall be equipped with at least a calibrated temperature indicator with log or a calibrated temperature recorder.
- 4.1.2 The cold storage units shall be alarmed to indicate temperature excursions, if required per customer requirements.
- 4.1.3 There shall be a documented procedure that describes actions to be taken after temperature failures and action taken shall be recorded
- 4.1.4 There shall be a log that lists all the materials stored in the cold storage unit(s) including their product designation and expiration date.
- 4.2 Controlled Contamination Area (CCA):
- 4.2.1 The application of polymeric action materials, such as, prepreg, adhesive and adhesive primer shall be conducted in a CCA per customer requirements.
- 4.2.2 There shall be a procedure which defines the environmental conditions for performing the following, in accordance with customer requirements:
- Structural adhesive bonding, splicing, potting and stabilization.
 - Composite lay-up.
 - Material cutting and kitting.
 - Storage of surface treated metallic and pre-cured nonmetallic parts.

- 4.2.3 If applicable, the compressed air supply in the CCA shall be filtered to remove oil, water and particles.
- 4.2.4 The incoming air filters shall be capable of removing particles according to customer requirements.
- 4.2.5 Incoming air filters shall be monitored for periodic replacement.
- 4.2.6 Particle count shall be measured and recorded per customer requirements.
- 4.2.7 The CCA shall be maintained under positive pressure and verified on a daily basis.
- 4.2.8 Temperature and humidity shall be continuously recorded, or there shall be a log of periodic monitoring checks maintained per customer requirements.
- 4.2.9 There shall be a documented procedure describing the actions to take when specified temperature/humidity requirements are exceeded.
- 4.2.10 The instruments used to monitor CCA, such as temperature, humidity and particle count shall be calibrated.
- 4.2.11 Processes or operations which produce contaminants shall be prohibited in the CCA. (i.e. aerosols, dust, oil fumes, polluting type vehicles, hand creams, release agents, silicones, eating or drinking, and smoking)
- 4.2.12 Signs shall be posted outside the CCA which indicate the appropriate prohibition of eating, smoking and drinking.
- NOTE: If the supplier has a policy on no smoking within the facility, then the sign does not need to state "No Smoking".
- 4.2.13 There shall be a cleaning procedure established for the following (within the CCA): floors, walls, ceilings, transport equipment, light fixtures, tools, storage areas and tables/work stations using approved materials.
- 4.2.14 The floors shall be appropriately covered per customer requirements.
- 4.2.15 The CCA shall be enclosed (walls and ceiling) and doors shall be kept closed at all times, except for entry and exit.
- 4.2.16 Sweeping or other dust dispersing methods shall be prohibited when lay-up is in progress or uncovered adhesives, sealant primers, composites, tooling, etc. are in the CCA.
- 4.2.17 The CCA shall be separated from the trim routing/stripping/sanding area to avoid contaminants per customer requirements.

- 4.2.18 All personnel and visitors in the CCA shall wear appropriate personal protective equipment (PPE) in accordance with the supplier and customer requirements.
- 4.3 Environmentally Monitored Area:
- 4.3.1 The application of polymeric reaction materials, such as adhesive and adhesive primer shall be conducted in the monitored area per customer requirements.
- 4.3.2 There shall be a procedure which defines the environmental conditions for performing the following, in accordance with customer requirements:
- a. Cold bonding.
 - b. Wet lay-up.
 - c. Splicing, stabilizing, potting and kitting.
 - d. Storage of surface treated metallic and pre-cured nonmetallic parts.
- 4.3.3 There shall be a documented procedure describing the actions to take when specified temperature/humidity requirements are exceeded.
- 4.3.4 The instruments used to monitor the area, such as temperature, humidity and particle count, shall be calibrated per customer requirements.
- 4.3.5 Processes or operations which produce contaminants shall be prohibited in the environmentally monitored area per customer requirements (i.e. aerosols, dust, oil fumes, polluting type vehicles, hand creams, release agents, silicones, eating, drinking and smoking).
- 4.3.6 There shall be a procedure that prohibits eating, drinking and smoking in the environmentally monitored area.
- 4.3.7 There shall be a cleaning procedure established for the environmentally monitored area.
- 4.3.8 Process operations shall be separated from the trim, routing, stripping, and sanding areas to avoid contaminants per customer requirements.
- 4.4 Temperature Uniformity Surveys:
- 4.4.1 Instrument System Check (ISC) and Temperature Uniformity Survey (TUS) shall comply with customer requirements, or, if no customer requirement exists, the instrumentation system accuracy shall be chosen to provide temperature controls that meet the customer's processing requirements.

NOTE: AMS 2750 may be used as a guide for development of ISC and TUS practices.

4.5 Preventative Maintenance:

- 4.5.1 There shall be a preventative maintenance plan that includes all major equipment (i.e. ovens, autoclaves, presses, tape placement machines, etc.), as applicable.
- 4.5.2 The preventative maintenance records shall be current to the frequency defined in the procedure.

5. TOOLING:

- 5.1 Tools shall be identified and traceable to ownership.
- 5.2 Tools shall be inspected to a documented procedure which meets customer requirements.
- 5.3 Tools, including substructures, shall be stored and maintained in accordance with customer or supplier requirements.
- 5.4 Mold Releases:
 - 5.4.1 Mold releases shall be applied according to customer or supplier requirements.
 - 5.4.2 Tools/containers shall be protected from mold release contamination.
 - 5.4.3 Mold release shall be fully cured prior to lay-up or adhesive bonding.
- 5.5 Tooling Thermal Profiles:
 - 5.5.1 Documented thermal profiles shall be on file, per customer requirements.

6. GENERAL FABRICATION PROCEDURES:

- 6.1 General:
 - 6.1.1 Placement of thermocouples shall be controlled and documented per customer requirements or per an established default company requirement in the absence of a customer mandated requirement.
 - 6.1.2 Handling procedure shall protect parts and materials from damage and contamination during manufacturing, handling, and storage.
 - 6.1.3 Heating tools shall be controlled to a maximum temperature per customer or supplier requirements.
 - 6.1.4 There shall be procedures for debulking per customer requirements.

- 6.1.5 If trimming is performed with a utility knife or equivalent, a shim shall be used to protect other plies or tools from being cut.
- 6.1.6 Hand sweeps and shop aids shall be fabricated from material that would not contaminate the part.
- 6.1.7 Approved marking pens/pencils shall be used per customer requirements.
- 6.1.8 Procedures shall include instructions for cleaning tools prior to lay-up, adhesive bonding, or molding use.
- 6.1.9 Required splices and darts shall be documented or referenced by the work instructions and meet customer requirements.
- 6.1.10 If rework is performed, it shall comply with the customer requirements.
- 6.2 Lay-up Composite Fabrication:
 - 6.2.1 Kits shall be prepared in CCA and stored per applicable customer specifications.
 - 6.2.2 Kits shall be properly labeled for traceability.
 - 6.2.3 Intermixing of lay-up materials shall be performed per customer requirements.
 - 6.2.4 As required, process control panels or tag end specimens shall be processed and cured concurrently with the part they represent.
- 6.3 Bagging:
 - 6.3.1 Procedures shall exist for bagging (breathers, bleeders, release films, bags, tacky tape, tapes and pressure pads) per customer requirements.
 - 6.3.2 If silicone pressure pads are used, they shall be post cured per customer specifications prior to bagging the part.
 - 6.3.3 Prior to bagging, tool fittings and orifices shall be checked for cleanliness and obstructions.
 - 6.3.4 The bagged parts shall be checked for leaks prior to cure by applying vacuum.