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### NCAMP Process Specification

This specification is generated and maintained in accordance with NCAMP  
Standard Operating Procedures, NSP 100

Fabrication of NMS 201 Qualification, Equivalency, and Acceptance Test Panels  
(RM-2014-LDK-Tk)

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REVISIONS

Revision	Date	Description
-	7/5/2023	Initial Release
A	7/12/2024	<p>Section 3.2: Removed breather string, mylar tape and edge dam materials. "preferred" was added for Ultraweave 1332 breather.</p> <p>Section 4.1: Additional clarification was added.</p> <p>Section 4.2.2: Additional clarification was added for debulk, TC placements. Caul plate requirement was revised to match Section 3.2. Breather step was revised. Edge dam was removed. Figure 2 was updated.</p> <p>Revision A was made to record NMS 201/1 Qualification panel fabrication.</p>

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1. SCOPE

This process specification describes the methods oio17 on NP

## 2.3 SAE Publication:

AS 9100	Quality Management Systems - Requirements for Aviation, Space and Defense Organizations
AS13100	AESQ Quality Management System Requirements for Aero Engine Design and Production Organizations

## 2.4 US Government Publication:

DOT/FAA/AR-02/110	Guidelines for the Development of Process Specifications, Instructions, and Controls for the Fabrication of Fiber-Reinforced Polymer Composites
DOT/FAA/AR-03/19	Material Qualification and Equivalency for Polymer Matrix Composite Material Systems: Updated Procedure
DOT/FAA/AC-23-20	Acceptance Guidance on Material Procurement and Process Specifications for Polymer Matrix Composite Systems

## 3. MATERIALS:

- 3.1 Vacuum bag , nylon film, 3 mils maximum, qualified for use at 375°F or above, or equivalent
- Airtech International, Inc., 5700 Skylab Road, Huntington Beach, CA 92647
  - Or equivalent
- 3.2 Breather , N-10 or Ultraweave 1332 (preferred), nonwoven polyester breather, or equivalent
- Airtech International, Inc., 5700 Skylab Road, Huntington Beach, CA 92647
  - Or equivalent
- 3.3 Solid FEP film , separator/release film, 1-2 mils thick, qualified for use at 375°F or above
- Airtech International, Inc., 5700 Skylab Road, Huntington Beach, CA 92647
  - Or equivalent
- 3.4 Solid (Nonporous) PTF - Coated Glass Fabric , 3-5 mil
- Taconic, 3070 Skyway Drive, Bldg 203 Santa Maria, CA 93455
  - Or equivalent
- 3.5 Pressure ( Caul) Plate , 0.06 – 0.30 inch thick, aluminum is preferred, flat and smooth, or equivalent
- Open source
- 3.6 Tacky ( Sealant ) tape , compatible with nylon vacuum bag, qualified for use at 375°F or above
- Airtech International, Inc., 5700 Skylab Road, Huntington Beach, CA 92647

- Or equivalent
- 3.7 Mold (bottom tool), 0.200-0.750 inch thick, aluminum, flat and smooth, or equivalent
- Open source
- 3.8 Release Agents, Chem Trend Zyx Composite Shield or Water Shield
- North American Region Headquarters 1445 W. McPherson Park Drive  
Howell, Michigan 48843
  - Or equivalent

#### 4. TEST LAMINATE FABRICATION

##### 4.1 Prepreg cutting

Wear non-contaminating gloves such as disposable powder-free nitrile gloves when handling the prepreg. The prepreg may be cut using conventional method (i.e. on a glass or non-contaminating polyurethane table top with utility knife) or automated method. The method of cutting must not contaminate the prepreg. The prepreg shall be cut a minimum of ½" larger on each edge than the required panel dimensions. The required panel dimensions are specified in Appendix 2 of applicable test plan or work instruction for qualification panels only (optional for release testing panels). Fiber orientation (e.g. warp versus fill directions) must be maintained during the cutting process. In Appendix 2 of applicable test plan, the warp/longitudinal directions are always larger than the fill/transverse directions whenever possible; this rectangular shape helps maintain direction traceability.

##### 4.2 Prepreg lay-up and bagging

###### 4.2.1 Ply Lay-Up

Wear non-contaminating gloves such as disposable powder-free nitrile gloves when handling the prepreg. The panel layups (stacking sequences) for qualification and equivalency purposes should be in accordance with Appendix 2 of appropriate test plans. For material acceptance purpose, the panel layups should be in accordance with NMS 201.

In the case of materials which are not mid-plane symmetric, such as satin weave fabrics, plies must be orientated such as to give a mid-plane symmetric laminate as best as possible, as shown in Figure 1.

**Note:**

NMS 201/1 - warp face shall not be flipped for qualification, equivalency, or acceptance laminates.

Figure 1

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Figure 2 – Bagging Technique for NMS 201

- g. Place a layer of nylon vacuum bagging film over the entire lay-up. Seal to the tool surface using an appropriate sealant tape.
- h. While applying vacuum to the bag, make sure that there is sufficient FEP film,  
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## 6. SHIPPING

For material qualification and equivalency purposes, it may be necessary to send the panels to a designated test lab as specified in the applicable test plan. The panel shipping instruction should also be included in the applicable test plan.