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NTP 4708Q2	Material Property Data Acquisition and Qualification Test Plan for Newport NCT 4708 MR40 G150 Unitape.

2.2 ISO Publications:

ISO 9000	Quality Management Systems

2.3 US Government P

3.7 Tape: Pressure Sensitive Mylar or polyester tape, 375ºF minimum use temperature
Sources:

- Keystone Tape, 3911 E. La Palma Ave., Suite V Anaheim, CA 92807
- Airtech International, Inc., 5700 Skylab Road, Huntington Beach, CA 92647
- National Aerospace Supply Co.
-

3.8 Sealant tape: Compatible with nylon d

4.2 Prepreg layup and bagging

Wear non-contaminating gloves such as disposable powder-free nitrile or latex gloves when handling the prepreg. The panel layups (stacking sequences) for qualification and equivalency purposes should be in accordance with appropriate test plans. For material acceptance purpose, the panel layups should be in accordance with NMS 4708.

Removal of volatiles and entrapped air to minimize void content is essential in the manufacture of high quality laminates. This is especially critical for a vacuum bag-only cure process. As part of the panel layup process, a vacuum debulking technique should be used for 3-5 minutes after every 2 plies, preferably on a tool plate (with vacuum connection) to avoid constant transfer of the laminate stack to other debulking equipment. It is recommended to use porous Teflon coated glass and porous peel ply on both sides of the laminate during this process. Following completion of the bagging process, the laminate(s) should be kept under full vacuum for 1-4 hours (preferably overnight) prior to initiating the cure cycle.

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.

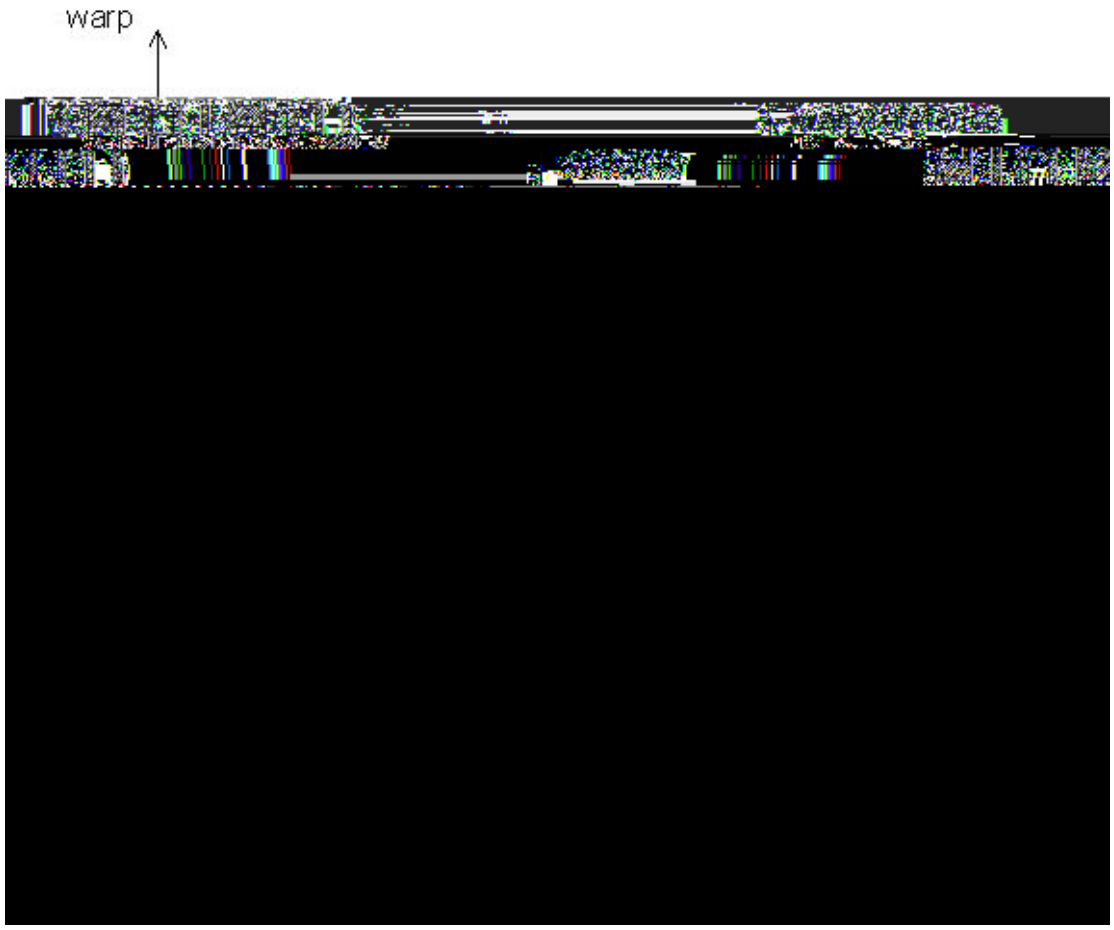


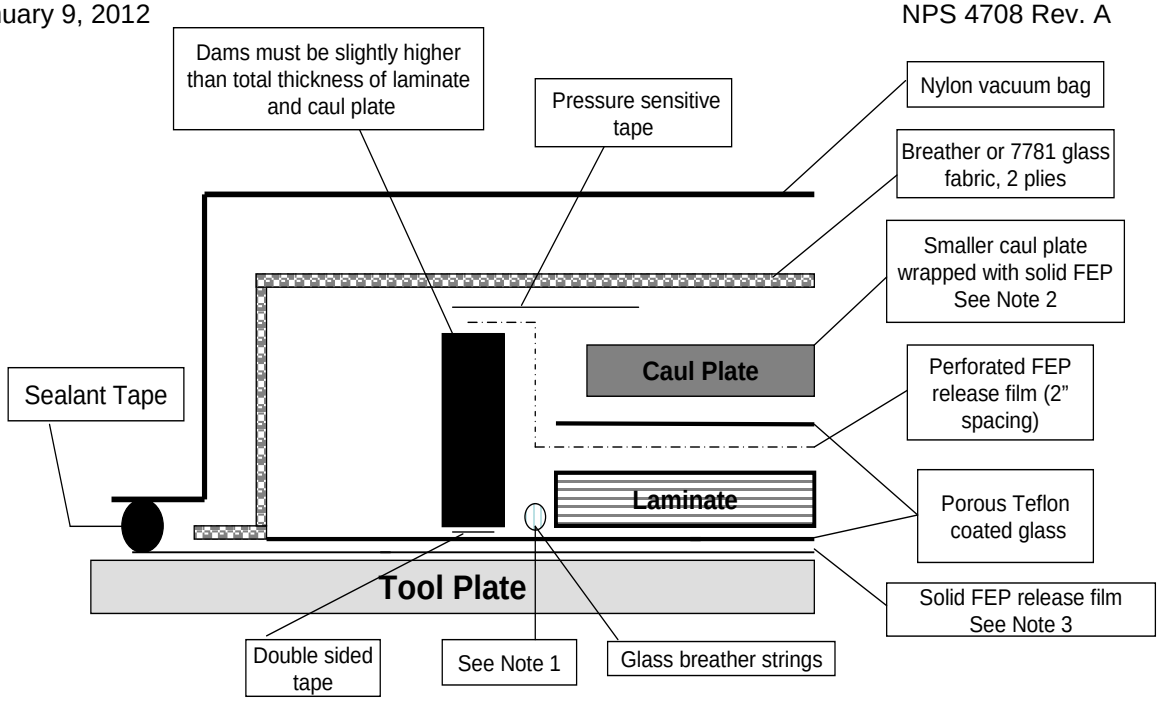
Figure 1. Example of Satin Weave Showing Warp and Fill Faces Used for Ply Collation

In order to maintain the fiber orientation, a reference edge should be created on each panel. During the layup process, each ply must be laid up within ± 1° of the reference edge. The edge dams around the layup/prepreg will form a straight edge on the cured panel (see Figure 2). In the layup of unidirectional prepreg, plies may be butt spliced in the 90º direction; ply splicing is not allowed in the 0º direction. Ply splicing is not allowed in the layup of woven fabric prepreg in any direction.

In material qualification and equivalency programs, for panel identification purpose, place a label within 0.5" from the prepreg edge with the following information: "0º direction : Test Plan Document Number -Prepregger ID - Material Code - Fabricator ID - Test Type - Batch ID - Cure Cycle ID -Test Panel ID." Make sure that the "0º direction : ´ D F W X D O O \ points in the 0º direction or warp direction. Appendix 2 of the test plan contains the panel identification information. Use a laser printer to print the labels on standard printer paper.

Figure 2 shows the bagging arrangement which will be used for the manufacture of mechanical test panels from unitape and fabric prepregs. Thermocouple wires should be used to monitor and record the temperature of representative test panels. One method is to place the thermocouple junctions at the laminate mid-plane and near the edge of the laminate where they will be trimmed off after the panels have been cured. An alternative method is to place the thermocouple junctions in between the part and the caul plate (on the part but about 0.5" away from the edge). The latter method allows the thermocouples wires to be reused if the thermocouple junctions are wrapped with Teflon or flash-breaker tape so that they can be removed from the part after cure. Thermocouples may be placed outside the bag only if it has been previously demonstrated that there is negligible temperature difference between the inside and outside of the bag.

Release agents may be used on the tool surface instead of non-porous FEP. Cork, silicone rubber (preferred) or any other type of stiff material may be used as dams. To facilitate removal of entrapped volatiles, they may be wrapped with 7781 glass/boat cloth or, preferably 3 – 4 glass breather strings may be placed against all edges of the laminate between the dam and the laminate. All breather strings must connect to the vacuum path. **The edge of the dams must be slightly higher than the total height of the laminate and the caul (pressure) plate.**



Notes:

1. Dams can consist of various materials (sealant tape, cork, other stiff materials, but silicone rubber is preferred). For volatile removal they can be wrapped with 7781 glass cloth, or alternatively, 3-4 glass breather strings can be placed against all edges between the dam and the laminate as shown in Fig.2. All materials must connect to the vacuum path. The edge of the dams must be slightly higher than the total thickness of the laminate and the caul (pressure) plate.
2. For optimum laminate quality, the caul (pressure) plate should be smaller than the actual laminate size by 0.25"-0.5" on each side. Recommended plates are made of stainless steel, 0.04" (1 mm) thick.
3. The tool does not require a release film if it has been treated with a release agent.

Figure 2 Bagging Assembly for NB/NCT 4708 Prepregs

4.3 Baseline Cure Cycle (C)

The baseline cure cycle shall be in accordance with the following process. For the purpose of specimen naming, this cure cycle is designated as "C." The material qualification panels are processed in accordance with the baseline cure cycle. Check vacuum bag integrity prior to starting cure cycle; leak rate shall not exceed 1" Hg in 2 minutes. All temperatures are part temperatures. Steps 1 through 5 are based on the lagging thermocouple.

1. Prior to curing the laminate, leak check the bag to ensure a good seal. No more than 1" Hg of vacuum over a 2 minute period allowed. Leak check by taking an initial reading after 2 minute isolation and then take a final reading after an additional 2 minutes. The difference between the two readings is the leak rate.
2. Apply full vacuum, within 1.5" Hg of the local atmospheric pressure. Hold at room temperature (RT) under vacuum for a minimum of 4 hours (preferably overnight).
3. Heat from RT to 265±10°F at 0.5 to 5°F/minute (depending on laminate thickness) based on the part temperature.
4. Hold at temperature for 120±10 minutes. Start the hold time when the lagging thermocouple reaches 255°F.
5. Cool under vacuum to below 140°F at 3°F/minute maximum.

4.4 Alternative Cure Cycles

Based on limited historical data, a resin cure kinetics model, and a viscosity model, the

5.3 Visual Inspection

Verify that there are no obvious defects such as warpage and dry spots. Panels for material qualification and equivalency purposes should be labeled in accordance with the applicable test plan for identification purposes.

6. SHIPPING

For material qualification and equivalency purposes, it may be necessary to send the panels to a designated test lab.