



PSAS Composite Fuel Tank: Shrink-Fit Assembly

Purpose and Scope:

The intent of this procedure is to provide direction for the assembly of a proof-of-concept shrink-fit fuel tank prototype module. The tank fabrication process can be found in a separate document.

Tools and Equipment:

The following materials and equipment should be collected and on hand at the beginning of the lay up procedure:

- Complete fabricated shrink-fit tank module
- Shrink-fit end caps (qty 2)
- Liquid nitrogen (LN₂)
- Mallet
- Insulated gloves (for handling cryogenic material and heated module)
- Foam cooler (for holding LN₂ during procedure)
- Tongs

Facility Equipment:

- Exhaust fans or hoods
- Autoclave (for heating module)

Safety:

- Insulated gloves should be worn whenever handling materials in or around LN₂ or while moving module into or out of the autoclave.
- Safety glasses should be worn at all times.

Initial Tips/Suggestions:

- The materials only remain at working temperatures for about a minute, so work quickly.
- Have at least two people to perform the procedure (one pulling the hot module and the other pulling the chilled end caps).

General Requirements:

This assembly procedure only reflects the steps taken in the assembly of modules for testing. It does not address steps that should be taken to minimize stresses the finished tank is exposed to in the assembly process.

Materials:

1. Turn the autoclave on and set the temperature to 250F
2. Place the module in the autoclave
3. Fill the foam cooler with enough LN₂ to fully submerge end caps
4. Place end caps in cooler and replace lid

Assembly Process:

1. Wait for the materials to come to temperature (initially this will occur when the autoclave reaches operating temperatures)
2. Remove module from autoclave and place on workbench
3. Use tongs to remove one end cap from LN₂
4. Place end cap on module, aligning keyways with the guides
5. Use mallet to insert end cap completely (check closely to be sure that the end cap is completely seated against the mating rings)
6. Replace module in the autoclave
7. Allow enough time to bring the module back up to temperature (~15 minutes should be plenty of time for the smaller test modules)
8. Repeat steps 2 through 5 for the other end cap
9. Insert and tighten fasteners to hold end cap in place



Figure 1: Placing end cap in position



Figure 2: Securing end cap in position



Figure 3: Finished end cap installation