

CDC Straw Assembly Procedure:

This is as preliminary procedure based on prototype construction.

Handling: *Straws need to be handled with care so as not to squeeze or pinch them. Care should be taken to avoid touching the aluminized surface inside the straw after cleaning has been completed. All work is to be done wearing latex gloves and following clean-room procedures when in the clean room.*

- Straws are brought into the assembly area outside the clean area.
- Straws are inspected for obvious gross flaws or damage.
- Straws are rolled on optical bench to check for flatness. Straws that bow by more than several mm are not used.
- Straw is clamped into the cutting jig that has been preset to the correct straw length. The plug is inserted into the open end and the end of the straw is cut off using the high-speed saw.
- Cotton balls with alcohol are blown through the straw using compressed air. Two balls should be shot through each tube.
- Cut and cleaned straw tubes are now passed into the clean area through the pass through.
- Straws are laid out on the flat table and aluminum donuts are inserted in the end facing into the lab.
- Conducting epoxy is injected into the glue port on each straw until it is seen in the 2nd port.
- Insert Noryl donuts into the other end of the straws.
- Non-conducting epoxy is injected into the glue ports of the noryl donuts until glue is seen in the 2nd port.
- Straws now need to cure over night.
- For some fraction of the straws, a resistance measurement is made between the aluminum donut and the the foil at the other end of the straw.
- If the measured resistance is above 20 Ohms, the straw is set aside for later rechecking. (Glue curing can take longer than 24 hours and the resistabce continues to decrease as the glue cures.)

CDC Straw Insertion Procedures:

Handling: *Straws need to be handled with care so as not to squeeze or pinch them. It is assumed that the chamber is in its correct orientation for each layer. Orientation is not to be changed except when Gary Wilkin is present.*

- When starting a new layer in the CDC, identify to location of hole number one in each endplate. Mark the hole next to this by putting noryl feedthru through the hole in each end plate.
- Place a straw into the CDC frame insert the top and bottom feedthrus through the endplate.
 - The aluminum donut should be on the aluminum (lower end). Use an aluminum feedthru.
 - The noryl donut should be on the carbon fiber (upper end). Use a noryl feedthru.
- Tape will be needed to hold the bottom feedthru in place.
- Continue inserting straws going around the layer away from the marker near hole one.
- After **VALUE TBA** straws have been inserted, glue the straws in place. Use conducting epoxy on the aluminum (lower) end and non-conducting epoxy of the carbon fiber end (upper).
- Continue until all straws in the layer are completed.
- Spot glue the straws together in a layer. Initially, this phase should only be carried out when Gary Wilkin is present.

- Inject glue into one of the feedthru glue ports.
- Stop when glue is visible in the second port.

Training Procedure for Straw Insertion

CMU has a rather large number of straws left over from the prototype state of the project. These straws will be used for carrying out some teaching procedures. We also note that during the initial phase of any new procedure, all work will be carried out in a fully supervised environment.

- All steps associated with straw selection, cutting and cleaning can be carried out using the surplus straws.
- Use of surplus donuts can be used to practice gluing of donuts into straws.
- We can practice all steps of inserting straws into the CDC frame except gluing.
- At any point, if things seem problematic, a supervisor should be consulted.