

REVISIONS

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CLEANROOM OPERATIONS

1.0 SCOPE

This procedure provides specific instructions for three areas of cleanroom (cleantent) operations: 1) Proper dressing prior to entrance into the cleantent, 2) Proper behavior while in the cleantent, and 3) Proper material handling prior to and after admittance into the cleantent.

1.1 Introduction

This procedure is to be posted at the entrance to each clean zone. There are 2 clean zones: 1) Building NE80 room 6042, and 2) Building 37 room 521. In NE80-6042 there is one cleantent with one Class 100 horizontal laminar flow bench and in 37-521 there are 5 cleantents, each identified as CT1 through CT5 as referenced in figure 1. Each cleantent is certified to Class 100 per FED-STD-209. The clean zones are to have controlled/limited access to those personnel listed in Attachment A. This procedure helps to ensure that the air particle contamination is controlled so that flight hardware will not be compromised during assembly, test, and inspection.

1.2 Responsibilities

This section lists the responsibilities of individuals as pertaining to operations in the cleantents.

1.2.1 All Personnel

All individuals who intend to enter the cleantents are responsible for following this procedure. Also, the individuals on the access list are responsible for ensuring that guests read and understand this procedure prior to admitting them into the cleantents.

1.2.2 Contamination/Quality Control Engineer

The Contamination/Quality Control Engineer is responsible for monitoring compliance to this procedure. Any findings on noncompliance will result in corrective action and retraining.

1.2.3 Inspectors

Inspectors or Quality Control Engineering is responsible for inspections per section 3.5.

2.0 Applicable Documents

36-01207 ACIS Contamination Control Plan
FED-STD-209 Airborne Particulate Cleanliness Class In Cleanrooms And Clean Zones

3.0 Procedure

3.1 Preparation

PRIOR TO ENTRANCE INTO THE CLEAN TENTS, INCLUDING DRESSING AREA, THE FOLLOWING MUST BE COMPLETED:

Step 1. Any jewelry (watches, necklaces, earrings, ankle and wrist bracelets, rings, etc.) **MUST** be removed, if possible, prior to entrance into the clean tents or dressing area.

All makeup (mascara, powder, lipstick, blush, etc.) MUST be removed prior to entrance into the clean tents or dressing area.

Step 2. All tools, equipment, and material (bagged and not bagged) that is brought into the clean tents must be cleaned per section 3.4 and inspected per 3.5.

Step 3. (Where applicable) Clean shoes using automatic shoe cleaner: push handle forward, slide shoe through the two round brushes and into the front brushes, slide shoe out. Repeat three times.

Step 4. Stand on dycme mats and rock back and forth three times, then enter the clean tent, bringing any tools, equipment, and material per section 3.4 and inspected per 3.5.

3.2 Dressing

Dressing shall be performed in a specified dressing area called the "white area", prior to entrance into the clean tents.

3.2.1 Garments Without Hoods

These are the steps to be followed for dressing, using coveralls **without** hoods or footwear attached :

Step 1. Put on bouffant (hair net), tucking in and covering all hair.

- Step 2. Put on task specific gloves (latex for cleaning and dressing)
- Step 3. Put on face mask with eyesheild covering beards and mustaches
- Step 4. Put on full garment, without letting any part that would be waiste high touch the ground. It is alright if the cuffs of the legs touch the floor as long as the cuffs do not come in contact with material above the waiste.
- Step 5. Put on shoe covers.
- Step 6. Check for proper dressing.
- Step 7. Remove dressing gloves and put on new task specific working gloves(ESD, cleaning, inspection) being careful not to touch extraneous materials. Enter the clean tent without using hands to push through vinyl slats. Also, bring any required cleaned material into the room

- Step 8. When work is complete, disrobe removing the full garment first without letting it hit the floor any higher than the knee area and return garment to hanger. Remove hood, bonnet, facemask then gloves. Leave area botties on while walking in the area. Throw working gloves away. Garments can be worn 2-3 days before disposal. Always discard dirty garments.

3.2.2 Garments With Hoods

These are the steps to be followed for dressing, using coveralls with hoods and footwear already attached :

- Step 1. Put on bouffant, tucking in and covering all hair.
- Step 2. Put on nylon dressing gloves or equivalent.
- Step 3. Put on face mask, covering beards and mustaches.
- Step 4. Put on full garment, without letting any part that would be waiste high touch the ground. It is alright if the cuffs of the legs touch the floor as long as the cuffs do not come in contact with material above the waist.
- Step 5. Check for proper dressing.

- Step 6. Remove dressing gloves (these can be worn 3 times) and put on new specific working gloves, being careful not to touch extraneous materials. Enter the cleantent without using hands to push through vinyl slats. Also, bring any required cleaned material into the room per section 3.4 and inspected per 3.5.
- Step 7. When work is complete, disrobe removing the full garment first without letting it hit the floor any higher than the knee area and return garment to hanger. Throw working gloves away. Garments can be worn 2-3 days before disposal or cleaning. Always discard dirty garments.

3.3 Behavior in the Cleantent.

When working in the cleantent and Class 100 laminar flow bench, there are some basic behavioral procedures to follow:

- 1) Move at a medium to slow pace with no sudden movements or turns.
- 2) Open containers slowly.
- 3) Position containers in a way that allows air to flow easily around them.
- 4) Do not use your hands to move the chairs; sit in them then adjust seating using your body.
- 5) Clean the work surface prior to assembly using approved cleanroom cleaning materials. Allow 3-5 minutes to pass before starting assembly on the new cleaned surface.
- 6) No food, beverages, personal grooming (combing hair, etc.), chewing gum, newspapers, or books are allowed in the cleantents.
- 7) Inspect your gloves before entering the down flow area of the workbench, prior to assembling or touching critical hardware. Change gloves in the dressing area if they have visible particles on them. (Never change gloves in the cleantent. Always remove gloves outside the cleantent or in the dressing area.)

3.4 Handling Material For Admittance Into The Cleantent

There are two groups of materials: 1) material for flight assemblies and 2) materials for dressing, cleaning, testing, and fixtureing.

There are three different packaging categories for material, supplies and equipment to be brought into the cleantent: 1) double -bagged, 2) single- bagged, and 3) material not bagged. Each category requires specific instructions for admittance into the cleantents.

3.4.1 Double -Bagged , Flight Assembly Material

All piece part materials for actual flight assemblies and/or actual completed flight assemblies should be received double-bagged. The following is the method of removing this material from its packaging;

- Step 1. Leave all cardboard boxes and paper material outside the clean zone. **Leave material in the double bagged condition until ready for entrance/admittance into the room.**
- Step 2. Prepare a clean dry tote box with a cover by wiping with semiconductor grade alcohol and a lint free wipe. Use a tote that will hold the material being brought into the cleanroom. Place the clean tote inside the dressing area. While outside the cleanroom cut open (do not tear) the **outer bag only** and discard the outer bag. Enter the cleanroom dressing area and place the material inside the tote. Wear clean gloves while transferring material into the tote to minimize cross contamination. Enter the tent per sections 3.1 and 3.2. and ensure material tote is covered.
- Step 3. Store the bag in a tote, container, bag or other means to protect the bag until use. Be sure that the item is identified if required: part number, serial number, assembly number, and other information as required. (Use only cleanroom approved labels and pens.)
- Step 4. When the item is ready for use (for assembly), clean the bench top, cut open (do not tear) the bag and proceed with assembling. This is to be done inside the Class 100 flow booth.

3.4.2 Double -Bagged, Non-Flight Assembly Material (Cleaning, Dressing, Supplies etc.)

- Step 1. Leave all cardboard boxes and paper material outside the clean zone. **Leave material in the double-bagged condition until ready for entrance/admittance into the room.**
- Step 2. Prepare a clean dry tote box with a cover by wiping with semiconductor grade alcohol and a lint free wipe. Use a tote that will hold the material being brought into the cleanroom. Place the clean tote inside the dressing area. While outside the cleanroom cut open (do not tear) the **outer bag only** and discard the outer bag. Enter the cleanroom dressing area and place the material inside the tote. Wear clean gloves while transferring material into the tote to minimize cross contamination. Enter the tent per sections 3.1 and 3.2. ensure material tote is covered.

All this type of material should stay inside the dressing area. Only bring in enough supplies for dressing and cleaning , to prevent overcrowding the dressing area.

3.4.3 Single -Bagged Material

This pertains to material not supplied with an outer bag. When handling assembly hardware material that is in a single bag prior to admittance in the room, wipe down the bag with alcohol outside and just prior to entrance into the cleantent dressing area. (Through away the dirty TEX-WIPE while outside the tent). Enter the dressing area and wipe with alcohol again. (Through away the dirty TEX-WIPE while inside the dressing area. DO NOT bring a texwipe used to clean material in the dressing area into the cleantent). Inspect per 3.5. while inside dressing area. Place in a cleaned covered tote. Do not open the bag until it is ready for assembly inside the flow booth.

When handling non hardware material that is in a single bag, wipe down the bag with alcohol outside and just prior to entrance into the cleantent. (Through away the dirty TEX-WIPE while outside the tent). Enter the dressing area and wipe with alcohol again. (Through away the dirty TEX-WIPE while inside the dressing area. DO NOT bring a texwipe used to clean material in the dressing area into the cleantent). Inspect per 3.5. while inside dressing area. Inspect per 3.5. Place in a cleaned covered tote. Do not open the bag until it is in the cleantent and ready for use.

3.4.4 Material Not Bagged

Before bringing equipment and tools not bagged into the cleantents, use a squeeze bottle and apply alcohol to a clean-WIPE, then thoroughly(gently) wipe down the equipment, especially wheels on carts. (Through away the dirty TEX-WIPE while outside the tent). Inspect per 3.5. Inspect the equipment and tools for grease and flaking material. Any equipment that is peeling or flaking is not allowed into the cleantent. Enter the dressing area and wipe with alcohol again. (Through away the dirty TEX-WIPE while inside the dressing area. DO NOT bring a texwipe used to clean material in the dressing area into the cleantent). Inspect per 3.5. while inside dressing area. When feasible, place the tools or equipment into a cleaned tote box, covered. Leave them in a tote until ready to use as well as storage after use.

3.5 Inspection

The inspectors or Quality/Contamination Control Engineer is responsible for inspection of material prior to admittance into the cleantents. Inspect all materials, tools, and fixtures using a black light (use protective goggles) for cleanliness, prior to admittance into the cleantents. No particles should be visible. If particles are visible, reclean and reinspect.

3.6 Note

All cleaning materials used in the clean tents must meet Class 100 or better packaging requirements. Alphastat and Alpha 10 tex-wipe with alcohol are some examples of approved cleaning material.

(Attachment A)

ACCESS LIST FOR ENTRANCE INTO CLEAN TENTS

The personnel listed below have access to enter all clean tents. Any personnel not listed herein must read, Clean tent Dressing, Behavior, and Material Handling Procedure posted and have Quality Assurance approval prior to entrance into the clean tents.

NAME

Mark Bautz
Tye Brady
Bob Goeke
Takashi Isobe
Stephen Jones
Fredrick Kasparian
Steve Kissel
Brian Klatt
Herb Manning
Myron MacInnis
Fred Miller
Michael Pivovaoff
Gregory Prigozhin
Ellen Sen
Matt Smith
Peter Tapan
Roland Vanderspek
Jonathan Woo