

# LLE Precision Cleaning Procedure

## M-CC-P-006 Rev A

### General Description

The purpose of this procedure is to specify the process required to perform precision cleaning of unclean structures and vessels. This cleaning procedure will take place within a Class 100 cleanroom tent, and utilize high pressure spray of DI water and surfactant. This procedure will also outline how to pre-clean the components and set up the equipment for cleaning. Levels of cleanliness will be defined by IEST-STD-CC-1246 - Product Cleanliness Levels and Contamination Control Program to a cleanliness level of 100 A/10.

### Safety Considerations

Non-slip footwear must be worn at all times to minimize the hazard of slipping.

Personal protective equipment (gloves, goggles, face shields, water resistant garments, and non-slip footwear) shall be worn at all times during this process.

Personal injury is possible from the high-pressure (2500-3000 psi) water guns and lance. Do not point the wand directly at any person at any time. Verify that all parts are securely attached prior to high pressure spraying.

Individuals working within the confined cleaning area shall be subjected to water at elevated temperatures. Employees must take every precaution to assure that they are not sprayed with the hot effluent.

Read all MSDS's prior to performing this procedure.

### Applicable Documents

IEST-STD-CC-1246 - Product Cleanliness Levels and Contamination Control Program  
MEL99-009-OC – Gross Cleaning of NIF components and Structures  
MEL00-016-OC – Precision Cleaning of NIF Components and Structures  
M-CC-P-001 – Bright Light Inspection

### Materials

- Latex Gloves

- Cleanroom wipes
- Isopropyl Alcohol: 99.99% pure
- Acetone: 99.5% pure
- Safety Goggles
- Face shield
- Pressure washer
- Brulin 1990 GD
- CitriSurf 77 Plus solution
- Cleanroom Tenting and apparatus
- Air Respirator
- Tyvek® coveralls
- Non-slip footwear

### **Pre-cleaning Operations**

Remove any tape, ink and other residue using the appropriate solvent (IPA or Acetone) with approved cleanroom wipe. Continue cleaning until no residue is visible on wipes. Continue with the following process:

1	Wipe all surfaces (internal and external) with an IPA saturated wipe.
2	Liberally apply CitriSurf 77 Plus solution, per manufacturer's suggestions, onto the any steel surfaces that have visual oxidation. If there is no visual oxidation, skip to step 6.
3	Let the applied CitriSurf Plus solution stand for 5-10 minutes depending on the severity of the oxidation.  <i>NOTE: Do not allow the CitriSurf solution to dry on the surface. If necessary, reapply the solution or mist lightly with deionized water using a hand held sprayer.</i>  After standing in step 3, remove the CitriSurf solution from the treated surface, 6" of adjacent surface and any additional run-off and dripping. Continue with the procedure to remove rust:
4	Apply deionized water to the treated surface.
5	Wipe with a clean room wipe.
6	Repeat until there is no visual rust or CitriSurf Plus on the surface and wipe. Wipe the surface with an IPA saturated wipe and let dry.
	(End Of Procedure)

### **Precision Cleaning Equipment Set Up Procedures**

1	Move the item being cleaned into the precision cleaning station and set on the appropriate holder.
2	Move the cleanroom tent into place, one person per tent post is required to move the tent in and out of place
3	Turn on the HEPA filters
4	Turn on the exhaust blowers
5	Verify DI water (is > 18MΩ) supply line is “open”
6	Turn “on” the heating element
7	Set up wand/hoses
8	Verify the soap concentration is between 2-3%
9	Verify the water temperature is ~ 115° F
10	Set Flow = 5 GPM
11	Set Pressure = 3000 PSI
	(End of procedure)

### **Gowning Requirements**

All employees performing the high-pressure wash operations shall have, at a minimum, the following protective equipment as supplied:

- Safety glasses
- Tyvek® coveralls
- Gloves
- Air hood
- Non-slip footwear
- Respirator

The air respirators shall be worn by both individuals within the module enclosure. A fresh air pumping system has been made available to provide breathable air while high-pressure wash operations occur.

**Gross Cleaning Procedure**

1	Clean all holes using a cleanroom swab soaked in Isopropyl Alcohol.
2	Using an approved cleanroom wipe saturated with 100% <u>acetone</u> , wipe all stainless steel surfaces from top to bottom then from one side to the other as follows: Use each surface of the wipe for a maximum of 3 ft <sup>2</sup> ; edges and corners shall be wiped after wiping the main part. Repeat two additional times (for a total of three wipes)
3	Using an approved cleanroom wipe saturated with 100% <u>Isopropyl Alcohol</u> , wipe all stainless steel surfaces from top to bottom then from one side to the other as follows: Use each surface of the wipe for a maximum of 3 ft <sup>2</sup> ; edges and corners shall be wiped after wiping the main part. Repeat two additional times (for a total of three wipes)
4	Prepare module for high pressure wash a. Water Temperature 115 ±5° F b. Brulin 1990 GD cleaner ready at 2-3 % solution
5	Rinse all stainless steel surfaces with high-pressure water spray
6	High-pressure spray a 2-3% Brulin solution with a spray nozzle two to four inches from the surface being cleaned.  <i>Note: Do not allow the interior surface to dry between Brulin and rinse steps</i>
7	Rinse components with high-pressure process water spray
8	Rinse components a second time with high-pressure process water spray
9	Once module has been dried completely, request a NVR sample. Two to three random locations (depending on the vessels being cleaned) shall be taken to define the cleanliness status of module prior to precision cleaning process.
10	Record the results of all assays and report the results to the Integration Manager, and Contamination Control Engineer..
	(End of procedure)

## Precision Cleaning Procedure

Once all pre-cleaning conditions have been satisfied, preparations have already been established to perform the precision cleaning process. The precision cleaning process shall consist of high-pressure rinse and wash cycles.

- Note: 1) Make certain personnel protection is worn at all times*  
2) *Verify apparatus is secure prior to high-pressure wash*  
3) *Verify that the water temperature is within specification prior to use. Do not exceed established temperature*

The following process shall be performed upon given authorization/validation of pre-cleaning process has been successfully performed.

1	Verify high-pressure washer pressure = 3000 $\pm$ 100 psi and surfactant (Brulin) concentration is at 2-3%
2	Turn on air handling system
3	Rinse components with high-pressure process water spray
4	High-pressure spray a 2-3% Brulin solution with a spray nozzle two to four inches from the surface being cleaned. If the component to be cleaned is a vacuum vessel, clean the internal far end of the tube, rotating the nozzle within the tube to insure all surfaces are cleaned. Move the nozzle down the tube with continued rotation  <i>Note: Do not allow the interior surface to dry between Brulin and rinse steps</i>
5	Rinse components with high-pressure process water spray. If the component is a vacuum vessel, rinse in the same flow as cleaning was performed (see step 4)
6	Rinse components a second time with high-pressure process water spray. If the component is a vacuum vessel, rinse in the same flow as cleaning was performed (see step 4)
7	Allow the component to completely dry within the cleanroom tent
8	Once module has been dried completely, request a NVR sample. Two to three random locations shall be taken to define the cleanliness status of

	module prior to precision cleaning process
9	<p>If NVR tests are greater than the “100-A/10” (<math>&gt;.10\text{mg}/\text{ft}^2</math>) specification, additional cleaning steps must be taken.</p> <ul style="list-style-type: none"><li>• If NVR is greater than <math>.15\text{mg}/\text{ft}^2</math>, repeat steps 4 thru 10</li><li>• If NVR is less than <math>0.14\text{mg}/\text{ft}^2</math>, repeat steps 6 thru 10</li></ul> <p>Once NVR testing is less than <math>0.14\text{ mg}/\text{ft}^2</math> continue to the next step</p>
10	Inspect the surface of the components using a bright light inspection to identify particle contamination. Use procedure M-CC-P-001 for this process.
11	Proceed with module assembly process.
	(End of procedure)

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### **Document Release:**

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