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| **LCLS-II Cavity Parts Cleaning Procedure** |
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# Purpose

The purpose of this document is to describe the cleaning procedure for parts and components that are to be used as part of a clean room assembly for 9-cell Tesla-style cavities in support of the LCLS-II program

# Scope

The intent of this procedure is to provide instruction on how to remove organic surface contaminants and particulates from components that are to be used as part of a clean room assembly for 9-cell Tesla-style cavities

# Terms and Definitions

The following terms have specific meanings within this procedure.

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| --- | --- |
| **Term** | **Definition** |
| **<Term 1>** | **<Definition>** |
| **<Term 2>** | **<Definition>** |
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# Roles and Responsibilities

**The following roles have responsibilities described in this document.**

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| **Role** | **Responsibility** |
| **<Job Title>** | **<Very short summary of activities this job title performs in this procedure.>** |
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# Safety

Individual must keep safety as the first priority in the process; before beginning any job, the user must assure they have the correct PPE for the individual job. Maintaining the level of safety and secure nature of the work area is vital. Refer to the [work-center OSP](https://misportal.jlab.org/mis/apps/mis_forms/operational_safety_procedure_form.cfm?entry_id=102890) for specifics.

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| Chemical | Hand PPE | Eye PPE | Body PPE |
| Surfactant (fordegreasing) | Nitrile Gloves | Safety Glasses | None |
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# Procedure

## STAINLESS STEEL FLANGES AND FEEDTHROUGHS

The following steps apply to stainless steel flanges that will be later used as part of a clean room assembly. Only stainless steel flanges are to be cleaned in the bath. Do not share the bath with other items. All flanges shall be completely disassembled and all gaskets removed prior to executing this procedure. To prevent excessive exposure to particulate in air, the user is to perform all actions within the laminar flow hood (when possible).

1. Don a new pair of nitrile gloves and appropriate safety glasses;
2. Inspect component(s) for excessive damage (chips/scratches); if part has pre- existing impairment notify owner. Do not proceed until owner verifies through written acknowledgement of previous damage presence.
3. If the component(s) appears excessively soiled or greasy, perform the following:
	1. Wipe all oil and marker off with acetone.
	2. Measure 4 oz. of Micro90 into a small container.
	3. Use TX 1009B AlphaWipe to apply detergent directly to the part’s exterior. Additional wipers, brushes or other means may be necessary to pre-clean heavily soiled components.
	4. Thoroughly rinse component with UPW.
	5. Repeat steps b – d until heavy soil, oil, etc. has been removed.
4. Components need to be cleaned in the Ultrasonic Cleaner (USC):

***NOTE: Position components in such a way as to prevent their surfaces from touching each other during the ultrasonic cleaning process; failure to do so could result in damage to the part.***

* 1. Close drain valve of USC.
	2. Fill USC to the bottom of the plugged overflow port with UPW. Carefully load flanges into wire mesh basket with sealing surfaces face up, away from the basket whenever possible. The component(s) must be completely submerged for proper ultrasonic cleaning action. Ensure there are no trapped air pockets under or within the flange(s).
	3. Add 300 ml (small USC) or 600 ml (large USC) of Micro90 detergent to the USC (2% concentration).
	4. Turn on the USC heater and set the temperature to 130°F.
	5. Turn on ultrasonics and allow the component(s) to ultrasonically clean for
	6. 50 minutes. NOTE: The UPW/detergent temperature shall be at least
	7. 130°F for a minimum of 15 minutes.
	8. Turn off the USC heater and ultrasonics. Don a new pair of nitrile gloves and inspect the component(s) for cleanliness. If the parts do not appear to be clean, return the component(s) to the ultrasonic bath and go back to step 4d above. If the parts appear to be clean continue to step 5.
1. After ultrasonically cleaning the flanges rinse them in UPW as follows:
	1. Transfer the wire mesh basket with flanges to the Quick Dump Rinser
	2. (QDR). Start the QDR.
	3. Ensure the flanges are thoroughly rinsed.
	4. Dry all feedthroughs using filtered compressed nitrogen. Place feedthroughs and remaining flanges on TX 1009B Alphawipes within the laminar flow hood.
2. Bag the flanges:
	1. Ensure components have dried completely before bagging
	2. Bag each component separately, in its own bag.
	3. Seal opposite end of bag with bag sealing machine.
	4. Repeat process until all components are bagged.
	5. Transport bagged components to the clean room pass-through.

## Uncoated Stainless Steel Fasteners (nuts, bolts & washers)

The following steps apply to uncoated stainless steel fasteners (nuts, bolts, washers) that will be later used as part of a clean room assembly. Only uncoated stainless steel fasteners are to be cleaned in the bath. Do not share the bath with other items. All fasteners shall be completely disassembled prior to executing this procedure. To prevent excessive exposure to particulate in air, the user is to perform all actions within the laminar flow hood (when possible).

1. Don a new pair of nitrile gloves and appropriate safety glasses;
2. Inspect fasteners for irregularities or damage (stripped heads or threads). Report questionable items to your supervisor.
3. If the fasteners appear excessively soiled or greasy, perform the following:
	1. Measure 4 oz. of Micro90 into a small container.
	2. Use TX 1009B Alphawipe or small brush to apply detergent directly to the part’s exterior. Additional wipers, brushes or other means may be necessary to pre-clean heavily soiled components.
	3. Thoroughly rinse component with UPW.
	4. Repeat steps b – d until heavy soil, oil, etc. has been removed.
4. All fasteners need to be cleaned in the Ultrasonic Cleaner (USC):
	1. Close drain valve of USC.
	2. Fill USC to the bottom of the plugged overflow port with UPW. Carefully load fasteners into wire mesh basket. The fasteners must be completely submerged for proper ultrasonic cleaning action. Ensure there are no trapped air pockets under or within the fasteners.
	3. Add 300 ml (small USC) or 600 ml (large USC) of Micro90 detergent to the USC (2% concentration).
	4. Turn on the USC heater and set the temperature to 130°F.
	5. Turn on ultrasonics and allow the component(s) to ultrasonically clean for
	6. 50 minutes. ***NOTE: The UPW/detergent temperature shall be at least***
	7. ***130°F for a minimum of 15 minutes.***
	8. Turn off the USC heater and ultrasonics. Don a new pair of nitrile gloves
	9. and inspect the component(s) for cleanliness. If the parts do not appear to be clean, return the component(s) to the ultrasonic bath and go back to step 4d above. If the parts appear to be clean continue to step 5.
5. After ultrasonically cleaning the fasteners, rinse them in UPW as follows:
	1. Transfer wire mesh basket with fasteners to the Quick Dump Rinser
	2. (QDR). Start the QDR.
	3. Ensure the fasteners are thoroughly rinsed.
	4. Place fasteners on TX 1009B Alphawipes within the laminar flow hood to dry.
6. Bag fasteners:
	1. Ensure all fasteners have dried completely before bagging
	2. Bag each type/size separately, in its own bag.
	3. Seal opposite end of bag with bag sealing machine.
	4. Repeat process until all components are bagged.
	5. Transport bagged components to the clean room pass-through.

## Silver Plated Stainless Steel Fasteners

The following steps apply to silver plated stainless steel fasteners (nuts, bolts, washers) that will be later used as part of a clean room assembly. Only silver plated stainless steel fasteners are to be cleaned in the bath. Do not share the bath with other items. All fasteners shall be completely disassembled prior to executing this procedure. To prevent excessive exposure to particulate in air, the user is to perform all actions within the laminar flow hood (when possible).

1. Don a new pair of nitrile gloves and appropriate safety glasses;
2. Inspect fasteners for irregularities or damage (stripped heads, threads, flaking of silver plating, etc.). Report questionable items to your supervisor.
3. If the fasteners appear excessively soiled or greasy, perform the following:
	1. Measure 4 oz. of Micro90 into a small container.
	2. Use TX 1009B Alphawipe or small brush to apply detergent directly to the part’s exterior. Additional wipers, brushes or other means may be necessary to pre-clean heavily soiled components.
	3. Thoroughly rinse component with UPW.
	4. Repeat steps b – d until heavy soil, oil, etc. has been removed.
4. All fasteners need to be cleaned in the Ultrasonic Cleaner (USC):
	1. Close drain valve of USC.
	2. Fill USC to the bottom of the plugged overflow port with UPW. Carefully load fasteners into wire mesh basket. The fasteners must be completely submerged for proper ultrasonic cleaning action. Ensure there are no trapped air pockets.
	3. Add 300 ml (small USC) or 600 ml (large USC) of Micro90 detergent to the USC (2% concentration).
	4. Turn on the USC heater and set the temperature to 130°F.
	5. Turn on ultrasonics and allow the component(s) to ultrasonically clean for 50 minutes. NOTE: The UPW/detergent temperature shall be at least 130°F for a minimum of 15 minutes.
	6. Turn off the USC heater and ultrasonics. Don a new pair of nitrile gloves and inspect the fasteners for cleanliness. If the parts do not appear to be clean, return the component(s) to the ultrasonic bath and go back to step 4d above. If the parts appear to be clean continue to step 5.
5. After ultrasonically cleaning the fasteners, rinse them in UPW as follows:
	1. Transfer wire mesh basket with fasteners to the Quick Dump Rinser
	2. (QDR). Start the QDR.
	3. Ensure the fasteners are thoroughly rinsed.
	4. Place fasteners on TX 1009B Alphawipes within the laminar flow hood to dry.
6. Bag fasteners:
	1. Ensure all fasteners have dried completely before bagging
	2. Bag each type/size separately, in its own bag.
	3. Seal opposite end of bag with bag sealing machine.
	4. Repeat process until all components are bagged.
	5. Transport bagged components to the clean room pass-through.

## Copper & Silicon Bronze Components

The following steps apply to copper (probe tips, washers, etc.) and silicon bronze nuts that will be later used as part of a clean room assembly. Only copper or silicon bronze items are to be cleaned in the bath. Do not share the bath with other items. All components shall be completely disassembled prior to executing this procedure. To prevent excessive exposure to particulate in air, the user is to perform all actions within the laminar flow hood (when possible).

1. Don a new pair of nitrile gloves and appropriate safety glasses;
2. Inspect components for irregularities or damage (dings, nicks, scratches, etc.). Report questionable items to your supervisor.
3. Perform oxide stripping step in the Ultrasonic Cleaner (USC):

***NOTE: Position components in such a way as to prevent their surfaces from touching each other during the ultrasonic cleaning process; failure to do so could result in damage to the part.***

* 1. Perform the following depending on material:
		1. Copper parts: Copper probe tips must be cleaned separately in an appropriately sized beaker. Do not mix probe tips with any other parts. Add appropriate amounts of Micro90 and UPW to beaker to achieve a 20% concentration (UPW volume in ml x .2 = ml of Micro90 needed).
		2. Add probe tip(s) to container and heat beaker with stirrer on a hot/stir plate to 160°F until all visible oxides have been removed.
		3. Remove probe tips from beaker and immediately rinse in UPW for at least five minutes. Note: Oxides form on the surface of copper very quickly. Do not allow probe tips to dry between steps. Continue to step 4 below.
		4. Silicon bronze parts: Add appropriate amount of Micro90 into a small container with locking lid (container volume in ml x .2=ml of Micro90 needed). Add components to the container and top off
		5. with UPW to achieve a 20% concentration. Securely attach lid and continue to step 3b.
	2. Close drain valve of USC.
	3. Fill USC to the bottom of the plugged overflow port with UPW. Place previously filled container(s) with Citranox or Micro90 components into USC bath.
	4. Turn on the USC heater and set the temperature to 130°F.
	5. Turn on ultrasonics and allow the component(s) to ultrasonically clean for 50 minutes. NOTE: The UPW/detergent temperature shall be at least 130°F for a minimum of 15 minutes.
	6. Turn off the USC heater and ultrasonics. Don a new pair of nitrile gloves and inspect the component(s) for cleanliness. If the parts do not appear to be have all the oxide remove, return the component(s) to the plastic container and then back to the ultrasonic bath and go back to step 3d above. If the parts appear to be clean continue to step 4.
1. Perform final ultrasonic cleaning:

***NOTE: Position components in such a way as to prevent copper probe tips from touching each other during the ultrasonic cleaning process; failure to do so could result in damage to the part.***

* 1. Rinse components with UPW.
	2. Copper probe tips: Place probe tips into a small plastic container with locking lid.
	3. Copper washers & silicon bronze nuts: Carefully load them into wire mesh basket for use in USC.
	4. Add 300 ml (small USC) or 600 ml (large USC) of Citranox detergent to the USC (2% concentration). Add components to USC.
	5. Turn on the USC heater and set the temperature to 130°F.
	6. Turn on ultrasonics and allow the component(s) to ultrasonically clean for 50 minutes. NOTE: The UPW/detergent temperature shall be at least 130°F for a minimum of 15 minutes.
	7. Turn off the USC heater and ultrasonics. Don a new pair of nitrile gloves and inspect the component(s) for cleanliness. If the parts do not appear to be clean, return the component(s) to the ultrasonic bath and repeat step 4d above. If the parts appear to be clean continue to step 5.
1. After ultrasonically cleaning the components, rinse them in UPW as follows:
	1. Transfer wire mesh basket and components to the Quick Dump Rinser
	2. (QDR). Start the QDR.
	3. Ensure the components are thoroughly rinsed.
	4. Dry all copper & silicon bronze parts using filtered compressed nitrogen.
2. Place components on TX 1009B Alphawipes within the laminar flow hood. Bag components:
	1. Ensure all components have dried completely before bagging
	2. Bag each item separately in its own bag.
	3. Seal opposite end of bag with bag sealing machine.
	4. Repeat process until all components are bagged.
	5. Transport bagged components to the clean room pass-through.

## Aluminum-magnesium gasket cleaning

The following steps apply to aluminum-magnesium gaskets that will be later used as part of a clean room assembly. Aluminum-magnesium gaskets do not need ultra-sonic cleaning. To prevent excessive exposure to particulate in air, the user is to perform all actions within the laminar flow hood (when possible).

1. Don a new pair of nitrile gloves and appropriate safety glasses;
2. Inspect gaskets for irregularities or damage (dings, nicks, scratches, etc.). Report questionable gaskets to your supervisor.
3. Wipe down gasket with acetone soaked TX 1009B Alphawipe
4. Wipe down gasket with isopropyl alcohol soaked TX 1009B Alphawipe.
5. Wipe down gasket with UPW soaked TX 1009B Alphawipe.
6. Place gasket(s) on new, dry TX 1009B Alphawipes within the laminar flow hood.
7. Bag components:
	1. Ensure all gaskets have dried completely before bagging
	2. Bag each item separately in its own bag.
	3. Seal opposite end of bag with bag sealing machine.
	4. Repeat process until all gaskets are bagged.
	5. Transport bagged components to the clean room pass-through.

# References

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| **Document No.** | **Title** |
| [SRF-13-18853-OSP](https://mis.jlab.org/mis/apps/mis_forms/operational_safety_procedure_form.cfm?entry_id=18853) | OSP for Safe Operations in the Production Chemistry Room |
| [Alconox User’s Manual](https://jlabdoc.jlab.org/docushare/dsweb/Get/Document-73545/Alconox-UserManual.pdf) | User’s manual for Alconox detergents |
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# Release and Revision History

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| **Rev #** | **Major Changes** | **Effective Date:** |
| 1 | Initial version | DD Mmm YYY |
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# Approvals

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