|  |
| --- |
| AUP Cavity Components and Parts Degreasing Procedure |
| **Document Number:** | CP-AUP-CAV-CHEM-DEGR | **Approval Date:** | 1-MAY-2020 |
| **Revision Number:** | - | **Periodic Review Date:** | 1-MAY-2022 |
| **Document Owner:** | Ashley Lynn A Mitchell  |  |  |

##

# Purpose and Scope

This procedure covers the cleaning of items associated with the AUP project.

# References

STP [Chemistry Cleaning Procedures](https://jlabdoc.jlab.org/docushare/dsweb/Get/Document-132364/CP-STP-CAV-CHEM-DEGR-R3.pdf)

[**Alconox User’s Manual**](https://jlabdoc.jlab.org/docushare/dsweb/Get/Document-73545/Alconox-UserManual.pdf)- User’s manual for Alconox detergents

OSP for Safe Operations in the Production Chemistry Room

# Terms and Definitions

* **Component**: For the simplicity of this procedure, the terms cavities, components, and/or parts are considered interchangeable and will be generally referred to as “component”.
	+ If a component is a mix of the following metals or an unusual size or shape, the PI/SOTR and/or a supervisor should be consulted on the appropriate method to use.
* **Hardware/fasteners**: nuts, bolts, washers. These should not be degreased in the same container or ultrasonic as components or feedthroughs and other parts that potentially see beam or face the inside of a cavity.
* **DI/UPW**: Deionized (DI) and Ultra-Pure Water (UPW) are used interchangeably in this procedure.
* **Ultrasonic, USC, and sonic:** are used interchangeably in this procedure. The container or tank may also be referred to as a bath.
* **N2 / Nitrogen:** filtered nitrogen is most commonly used.
* **Quick Dump Rinser (QDR):** A sink that fills and empties water to rinse components several times.

# Process Details

**Niobium, Stainless Steel, and Titanium**

The following steps apply to stainless steel, titanium, or niobium components. Only stainless steel, titanium, or niobium is to be cleaned in the bath. Do not share the bath with other items. All components 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 component 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 a small amount of Micro90 into a small container.
	3. Use a TX 1009B Alpha Wipe to apply detergent directly to the component’s exterior and/or interior. Additional wipers, brushes or other means may be necessary to pre-clean heavily soiled components.
	4. Alternatively, the components may be ultrasoniced in a secondary container.
	5. Thoroughly rinse component with DI water.
	6. Repeat until heavy soil, oil, etc. has been removed.
4. Components are usually 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 component.***

* 1. Close drain valve of USC.
	2. Fill USC with DI/UPW at least five inches or more to cover the component being cleaned. Carefully place component(s) into USC using baskets, sheets of plastic, or containers as necessary to protect and contain the component(s). If the components have sealing surfaces, place them face up 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 component(s).
	3. Add 1-2% detergent to the USC tank.
		1. Usually about 300 ml (small USC) or 600 ml (large USC) of Micro90 detergent is added to the USC. If using the 200gal large USC, add roughly 1 L of Liquinox. Citranox may also be used.
	4. Turn on the USC heater (the temperature is typically set to 130°F (54°C)).
	5. Turn on USC andallow the component(s) to clean for 50 minutes. This time may be adjusted if the water is preheated.

***NOTE: The UPW/detergent temperature shall be at least 130°F (54°C) for a minimum of 15 minutes.***

* 1. Turn off the USC and heater. Don a new pair of nitrile gloves and inspect the component(s) for cleanliness. If the components do not appear to be clean, return the component(s) to the ultrasonic bath and re-clean as necessary. If the components appear to be clean, proceed.
1. Rinse components in DI/UPW using one or all of the following methods:
	1. Transfer the parts (in perforated containers if small parts) to the Quick Dump Rinser (QDR). Start the QDR and allow to run for the standard 3 cycles.
	2. Rinse components using DI/UPW until no soap bubbles are visible (approximately 5 minutes).
	3. Dip visibly clean component in the triple rinse sink from left to right.
	4. Ensure the components are thoroughly rinsed and water surface is free of soap bubbles. Repeat if necessary.
	5. Once thoroughly clean, dry parts on clean room wipe in the laminar flow hood or appropriately clean and allow components to dry if there is no immediate need. If parts are needed urgently, they may be dried with a solvent such as acetone, methanol, or isopropyl and blown dry with filtered N2.
		1. Dry all feedthroughs using filtered compressed nitrogen. Place feedthroughs on TX 1009B Alpha Wipes within the laminar flow hood.
	6. If components are bellows, valves or otherwise difficult to dry, they may need to be dried in the oven. This is typically set for ~10+ hours at 100°C in the nitrogen oven.
		1. The nitrogen flow should be set to 50 PSI and 50 CFM.
2. Bag the components:
3. Ensure components have dried completely before bagging.
	1. If necessary, dry component with filtered nitrogen.
4. Bag and seal each component separately.
5. Repeat process until all components are bagged.
6. Transport bagged components to the next work center.

**Ceramics and Feedthroughs**

Ceramic and Feedthroughs follow the stainless steel, titanium, and niobium cleaning procedure above with the exception that the parts must be protected from damage during the ultrasonic step by either using a fixture to hold them in place or placing them in separate containers.

**Copper & Silicon Bronze Components**

The following steps apply to copper (probe tips, washers, etc.) and silicon bronze (nuts, etc.) parts. 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).

***NOTE: Copper wastewater should be saved and disposed of appropriately.***

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 applicable oxide stripping step for the type of metal:

***NOTE: Position copper probe tips in such a way as to prevent their surfaces from touching each other during the oxide stripping process. Failure to do so could result in damage to the component.***

* 1. Copper Probe Tips (or similar components):
		1. It may be necessary to manually clean the copper before placing in the USC. Use a TX 1009B Alpha Wipe or small brush to apply detergent directly to the component until all visible oxides have been removed. Additional wipers, brushes or other means may be necessary to pre-clean heavily soiled components.
		2. Once oxides have been satisfactorily removed, immediately rinse in UPW.

***Note: Oxides form on the surface of copper very quickly. Do not allow probe tips to dry between steps.***

* 1. Silicon bronze nuts and copper washers:

***Note: Silicon bronze nuts and copper washers can be cleaned together.***

* + 1. Add an appropriate amount of Micro90 into an appropriately sized container or basket (container volume in ml x .2 = ml of Micro90 needed). Add components to the container and top off with UPW to achieve a 20% concentration.
	1. Close drain valve of USC.
	2. Fill USC roughly to the bottom of the plugged overflow port with UPW. Place container(s) with Micro90 and components into USC bath.
	3. Turn on the USC heater (temperature set typically to 130°F (54°C)).
	4. Turn on USC andallow the component(s) to clean for 50 minutes. This time may be shortened if water is preheated.

***NOTE: The UPW/detergent temperature shall be at least 130°F (54°C) for a minimum of 15 minutes.***

* 1. Turn off the USC and heater. Don a new pair of nitrile gloves and inspect the component(s) for cleanliness. If the components do not appear to have all the oxide removed, repeat the cleaning process. When the oxide layer is no longer visible, continue.
1. Perform final ultrasonic cleaning (particulate removal):

***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 component.***

* 1. Rinse components with UPW.
	2. Follow metal specific procedure:
		1. Copper probe tips: Place probe tips into a small plastic container with locking lid or other appropriate container. Add appropriate amounts of Micro90 or Citranox and UPW to container to achieve a ~2% concentration (UPW volume in ml x .02 = ml of detergent needed).
		2. Copper washers & silicon bronze nuts: Carefully load them into mesh basket or other container for use in USC.
	3. Add 1-2% detergent to the USC tank.
		1. ~300 ml (small USC) or ~600 ml (large USC) of Citranox or Micro90 detergent to the USC.
	4. Add components to USC.
	5. Turn on the USC heater (the temperature is typically set to 130°F (54°C)).
	6. Turn on USC andallow the component(s) to clean for 50 minutes. This time may be reduced if water has been preheated.

***NOTE: The UPW/detergent temperature shall be at least 130°F (54°C) for a minimum of 15 minutes.***

* 1. Turn off the USC and heater. Don a new pair of nitrile gloves and inspect the component(s) for cleanliness. If the components do not appear to be clean, return the component(s) to the ultrasonic bath and restart the cleaning process. If the components appear to be clean, continue.
1. After ultrasonically cleaning the components, rinse them in UPW as follows:
	1. Copper probe tips: Remove probe tip(s) from container 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.***

* + 1. Thoroughly dry with filtered ionized N2.
		2. Immediately bag probe tip(s) in its own bag filled with N2 and seal.
		3. Transport bagged components to the clean room pass-through or an appropriate location.
	1. Silicon bronze nuts and copper washers:
		1. Transfer container and components to the Quick Dump Rinser (QDR). Start the QDR.

***Note: A minimum of three rinse and dumps shall be performed in the QDR.***

* + 1. The components may also be cleaned by rinsing with UPW and/or dipping in the triple rinse sink.
		2. Ensure the components are thoroughly rinsed.
1. Place nuts and washers on new, dry, clean room wipes within the laminar flow hood and allow components to dry if there is no immediate need.
	1. If parts are needed urgently, they may be dried with a solvent such as acetone, methanol, or isopropyl and blown dry with filtered N2.
2. Bag components:
3. Ensure all components have dried completely before bagging
	1. If necessary, dry component with filtered nitrogen
4. Bag each item type separately and seal.
5. Repeat process until all components are bagged.
6. Transport bagged components to the next work center.

**Copper Gaskets/Seals**

* 1. Put on fresh pair of vinyl gloves and safety glasses.
	2. If copper seals are tarnished, follow instructions for copper components.
	3. If copper seals are clean and tarnish free in a manufacturer’s bag, wipe bag with isopropanol on an Alpha Wipe.

# **Revision History**

|  |  |  |
| --- | --- | --- |
| Rev # | Revision or update: | Effective: |
| Release  | Initial Release  | 5/1/2020 |
|  |  |  |

# **Approvals**

|  |  |  |  |
| --- | --- | --- | --- |
| Approved by: | Name | Signature: | Date: |
| **Document Owner**  | Ashley Lynn A Mitchell  |  |  |
| Project Lead | Naeem Huque |  |  |
|  |  |  |  |
| **SRF Operations Department Head** |  |  |  |