## Uncoated / Stainless Steel Bellows

The following steps apply to stainless steel or uncoated bellows as appropriate. Only like material is to be cleaned in the bath. Do not share the bath with other items. 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. Remove any covers and inspect the bellows for excessive damage (chips/scratches/dents/bent parts). If a bellows has a pre-existing impairment, notify PI/PM. Do not proceed until PI/PM verifies through written acknowledgement of previous damage presence.
3. If the component(s) appears excessively soiled or greasy, or has tape/stickers/labels present, 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. Pre-clean the bellows with a soft-bristled brush and Micro90 (alternatively Citranox may be used).
	1. Clean internally and externally focusing on the convolutions, bolt holes, and areas around the flange where particles may be trapped.
5. Bellows are usually cleaned in the Ultrasonic Cleaner (USC):

***NOTE: Position bellows in such a way as to prevent touching each other during the ultrasonic cleaning process; failure to do so could result in damage to the component. If the bellows contains a rotatable flange, it should be placed at the bottom of the tank or in such a way as to avoid damage to the bellows if movement occurs while in the USC.***

* 1. Close drain valve of USC.
	2. Fill USC with DI/UPW at least five inches or more to cover the bellows being cleaned. Carefully place the bellows into USC using baskets, sheets of plastic, or containers as necessary to protect and contain the bellows.
		1. Ensure there are no trapped air pockets under or within the bellows.
	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.
	4. Turn on the USC heater (the temperature is typically set to 130°F (54°C)).
	5. Turn on the USC andallow the component(s) to ultrasonically 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 bellows for cleanliness. If the bellows do not appear to be clean, return the bellows to the ultrasonic bath and re-clean as necessary. If the bellows appear to be clean, proceed.
1. Rinse bellows in DI/UPW using one or all of the following methods:
2. Transfer the bellows to the Quick Dump Rinser (QDR). Start the QDR and allow to run for its standard 3 cycles.
3. Rinse bellows using DI/UPW until no soap bubbles are visible (approximately 5 minutes)
4. Dip visibly clean bellows in the triple rinse sink from left to right.
5. Ensure the components are thoroughly rinsed and water surface is free of soap bubbles. Repeat if necessary.
6. Once thoroughly clean, dry the bellows depending on the urgency:
	1. If time allows, dry in the nitrogen drying oven set to 100°C for ~ 10+ hours.
		1. The nitrogen flow should be set to 50 PSI and 50 CFM.
	2. If bellows are needed urgently, dip into clean isopropyl
7. Bag the components:
	1. Ensure components have dried completely before bagging.
	2. If the valve(s) are still hot from the oven, allow them to cool before handling.
	3. Bag and seal each component separately.
	4. Repeat process until all components are bagged.
8. Transport bagged components to the next work center.