



### Check List for an Ultrasonic Aqueous Cleaning Process

When shopping for an ultrasonic cleaning process or equipment it is important to know what you are looking for and exactly what you are trying to accomplish. The following questions will help you determine what equipment and process you require. These questions are for high end cleaning and some will not apply to general visual cleaning. If you have the information at hand the specification will be much easier.

#### Part Volume and Cleaning Method:

1. What part [or parts] will you be cleaning, give size L, W, H of part and the material and weight of the part.  
\_\_\_\_\_
2. How many parts will be cleaned in one load?  
\_\_\_\_\_
3. How many parts do you need to clean in one shift, how many shifts per day?  
\_\_\_\_\_
4. Are there any chemical or heat restrictions?  
\_\_\_\_\_
5. Do you have a source of DI water, if so what is its Meg Ohm rating?  
\_\_\_\_\_
6. What contaminants are you cleaning from the part?  
\_\_\_\_\_
7. What are your criteria for "clean" and how do you define it?  
\_\_\_\_\_
8. How do you check the part for cleanliness, i.e. visual, or some other method?  
\_\_\_\_\_
9. Will you need to dry the part after cleaning?  
\_\_\_\_\_
10. Can you send samples for cleaning by the Manufacturer? [most companies will clean small sample lots at no charge]  
\_\_\_\_\_

#### Process:

1. Determine what steps you need in your cleaning process.
2. The typical ultrasonic cleaning process consist of;
  - A. Ultrasonic Detergent Clean
  - B. Spray Rinse with Hot DI water
  - C. Ultrasonic overflow Rinse with DI Water

There are modifications to the above process, such as adding detergent tanks, additional rinses and dump rinses. The equipment manufacturer can be of great help in setting up the process. Samples sent in for cleaning will help define this process. Once you have decided on the process a written process sheet should be developed for that process. A typical process sheet is shown below.

Cleaning Process	Part # 943	Eng. OK			
Stage	Chemistry	Temp	Power	Frequency	Time
Ultrasonic Detergent	DI @ 18 Meg Ohm / 10% V 200 Detergent	130 deg F	500 W	170 kHz	7 min.
Spray Rinse	DI Water 15 Meg Ohm	110 F	N/A	N/A	5 min
Ultrasonic Overflow Rinse	DI Water @ 15 Meg Ohm	110 F	500 W	170 kHz	10 min
Special Instructions: Load parts in Work Holder # 342 insert into tank slowly and turn on ultrasonics, at end of cycle remove work holder slowly and place in next station. Visually inspect parts when removed from last rinse tank and place in drying system					

**Equipment:**

1. What type of equipment are you looking for, automatic or manual?  
\_\_\_\_\_
2. Will you require automatic indexing of the work load from tank to tank?  
\_\_\_\_\_
3. What Services do You Have: electrical, water, exhaust, drains, etc.?  
\_\_\_\_\_
4. What are your space requirements, how much room do you have for the system?  
\_\_\_\_\_
5. Will the cleaning take place in a dedicated room, Clean Room or factory floor?  
\_\_\_\_\_
6. Are there any local restrictions or regulations that may involve the cleaning system?  
\_\_\_\_\_
7. Do you have a budget for the system?  
\_\_\_\_\_
8. What is your time line for installing equipment?  
\_\_\_\_\_
9. Do you want the manufacturer to install and start the equipment?  
\_\_\_\_\_
10. Use the expertise of the equipment manufacturer to fill in the gaps in your process requirement.  
\_\_\_\_\_

**Facilities:**

1. Location and lay out of available space for Cleaning Line [ attach layout drawing]
2. Electrical available: \_\_\_\_\_
3. Drain Location and size: \_\_\_\_\_
4. Water Available at \_\_\_\_\_ PSI DI or House \_\_\_\_\_
5. Exhaust Requirements: \_\_\_\_\_

## Cleaning Tables

<b>Cleaning Efficiency in % For ultrasonic tanks with and with out filtration</b>						
<b>Sets of Substrates</b>	<b>Tank 1 No Filtration</b>	<b>Tank 1 Filtration</b>	<b>Tank 2 No Filtration</b>	<b>Tank 2 Filtration</b>	<b>Tank 3 No Filtration</b>	<b>Tank 3 Filtration</b>
<b>1</b>	78.46	89.30	92.26.	97.69	96.09	99.00
<b>2</b>	68.30	87.63	87.25	97.16	93.50	98.97
<b>3</b>	60.66	87.19	82.68	97.01	90.91	98.95
<b>4</b>	54.46	87.05	78.41	96.96	88.32	98.95
<b>5</b>	49.22	87.02	74.40	96.95	88.75	98.95
<b>6</b>	44.71	87.01	70.63	96.94	83.19	98.95
<b>7</b>	40.77	87.00	67.06	96.94	80.66	98.95
<b>8</b>	37.20	87.00	63.60	96.94	78.16	98.90

<b>Distilled / De Ionized Water Resistance in Megohm</b>	<b>Equivalent UPW readout in us/cm</b>
<b>1</b>	<b>1.00</b>
<b>2</b>	<b>0.500</b>
<b>5</b>	<b>0.200</b>
<b>10</b>	<b>0.100</b>
<b>15</b>	<b>0.067</b>
<b>20</b>	<b>0.050</b>
<b>50</b>	<b>0.02</b>

<b>Cubic in. of useful water In Tank</b>	<b>Lx W x[ H -2"]</b>	<b>Allows for free board of 2"</b>
<b>Gallons</b>	<b>Lx W x [H-2"] / 231</b>	
<b>Weight of Water in tank</b>	<b>1 cu ft =62.5 lb</b>	<b>Divide Cu in./1728 x 62.5= Weight</b>
<b>Weight of Water in pipe</b>	<b>Pipe length in Ft x dia. In "squared" x 0.34</b>	
<b>Weight of 1 gallon of Water</b>	<b>8.33 lb</b>	<b>231 cubic in.</b>
<b>Specific Gravity</b>	<b>1</b>	

Temp F	Temp C
75	24
80	27
86	30
91.4	33
95	35
100	38
105	41
111	44
116	47
120	49
125	52
131	55
135	57
140	60
145	63
150	66

**Ultrasonic Energy for Cleaning:**

Industrial: 50-70 watts per gallon  
 Lab: 80-100 watts per gallon  
 Critical; 70 to 150 watts per gallon [dependent on temperature and solvent]

Note above wattage is for liquid with a specific gravity of 1.

**Rules for sizing an Ultrasonic Tank**

1. Allow 2" of fluid from bottom of work basket to bottom of tank.
2. Allow 2" of fluid over top of parts.
3. Allow 2" of freeboard
4. Allow 1/2" around sides of tank to work basket edges.

Frequency	Length of Wave
20 kHz	1.5"
30 kHz	1"
40 kHz	.75"
50 kHz	.6"
68 kHz	.4"
80 kHz	.37"
120 kHz	.25"
170 kHz	.17"
220 kHz	.13"