

ACID WASH GUIDE

"CT" 450+ LBS/DAY SERIES MODELS

WITH TOUCH-SCREEN CONTROL PANEL

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Manual: ClorTec Operation and Maintenance
Section: Acid Wash Guide - CT-450+ Series - TS
Author: LP Date: February 2005 Version: 1.1

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WARNING!

Sample contains sodium hypochlorite.

Sodium hypochlorite is known to cause permanent damage to eyes and clothing upon contact.

Procedure requires handling of acid.

Acid is known to cause permanent damage to eyes, skin and clothing upon contact.

Please take the proper precautions and utilize the appropriate protective gear and clothing as listed below:

FACE SHIELD with GOGGLES
GLOVES
APRON
CLOSED SHOES

Failure to follow the above-mentioned instructions may result in significant property damage and/or severe personal injury.

PURPOSE AND GOAL

The purpose of this document is to demonstrate the proper way to clean the "CT" series models of the ClorTec line of sodium hypochlorite systems by using the method of acid wash.

Acid washing the system is required to remove the calcium and magnesium deposits that result from water hardness. This build-up is exacerbated by faulty or poor-functioning water softening equipment.

Electrolytic cells that have excessive build-up of calcium and magnesium have reduced levels of efficiency and shorter electrode life.

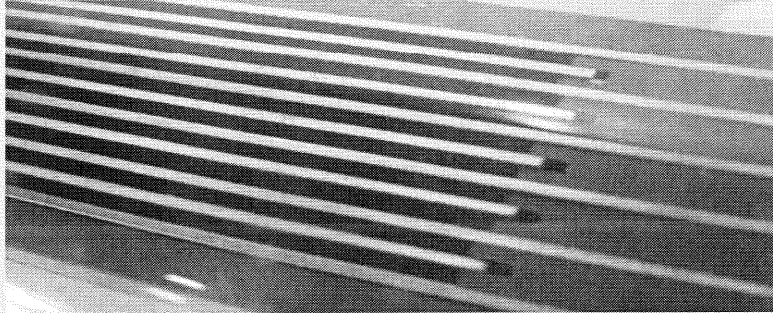
CT SERIES MODELS

DETERMINING CLEANSING NEED

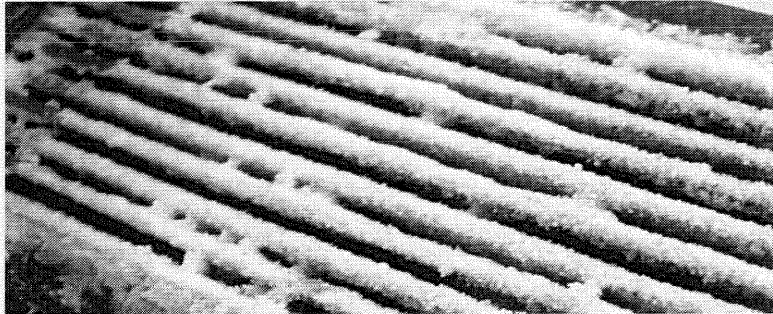
The electrolytic cell(s) need cleaning when any visible bridging of the cell(s) electrode(s) by an off-white colored calcified substance occurs and/or when water hardness build-up precipitates onto the bottom of the cell. This calcification is accompanied by a steady increase in the DC rectifier voltage.

ELECTROLYTIC CELLS (FIGURE 1)

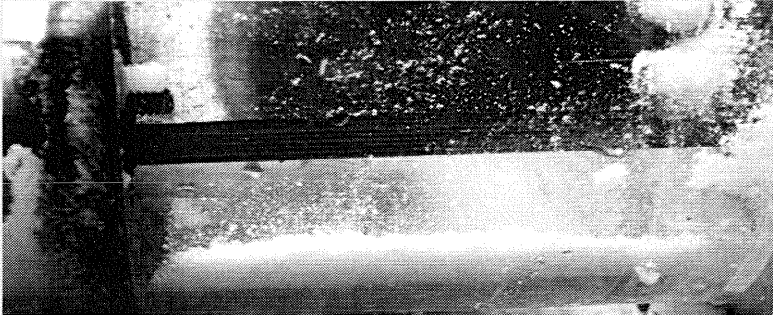
(Figure 1a)



(Figure 1b)



(Figure 1c)



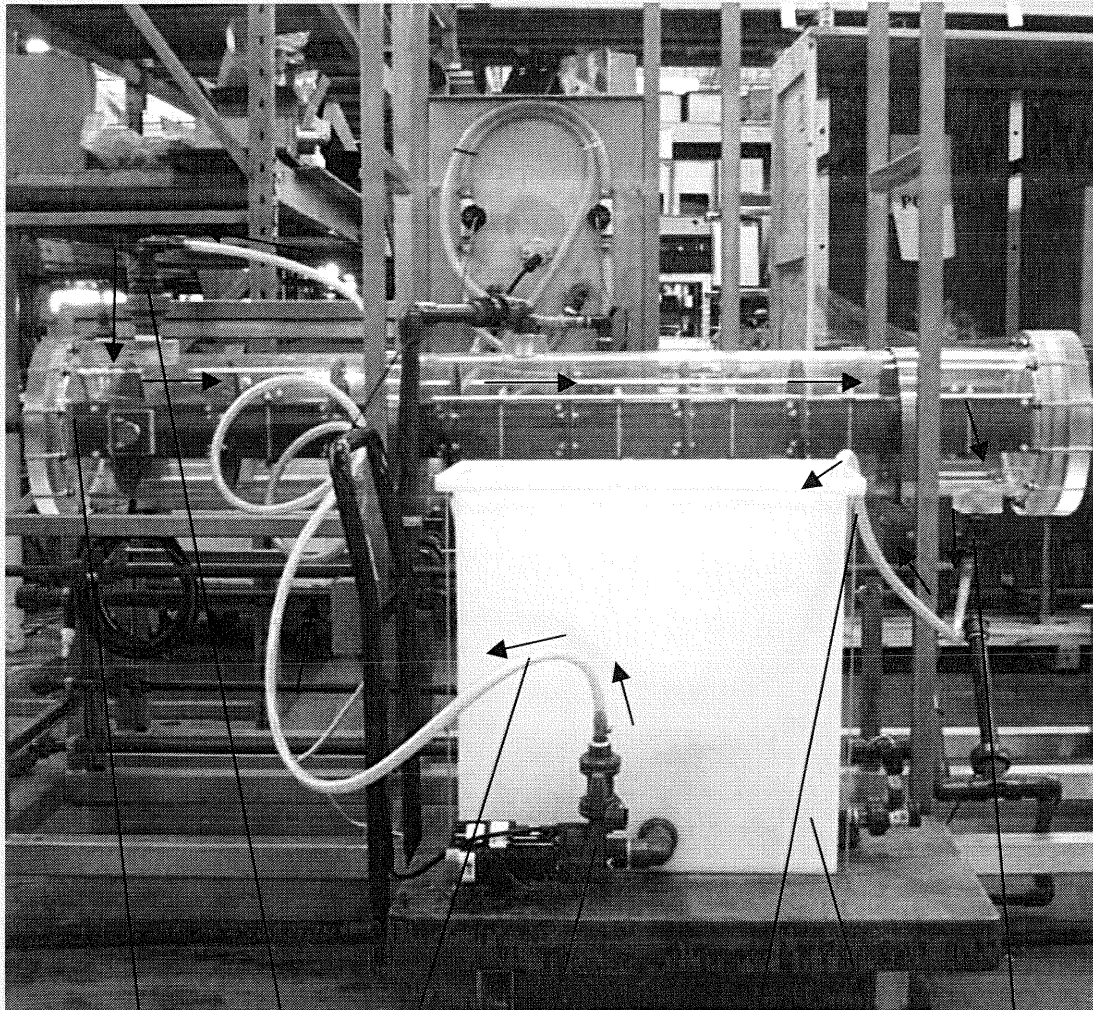
CLEAN ELECTROLYTIC CELL (Figure 1a)

A perfectly clean electrolytic cell is clear, as if looking into a glass of water, with no traces of any calcified substance on the electrode or the cell.

ELECTROLYTIC CELL REQUIRING ACID WASH (Figure 1b), (Figure 1c)

A dirty electrolytic cell will have a bridging deposit of a calcified substance visible on the electrode fins and/or water hardness build-up will precipitate off the electrode and onto the bottom of the cell.

CT MODEL SYSTEM (Figure 2)



ELECTROLYTIC CELL

CELL OUTLET

ACID WASH PUMP

ACID WASH PUMP OUTLET

CELL INLET

ACID WASH PUMP TANK

ACID WASH PUMP RETURN LINE

ACID CLEANING PROCEDURE

NOTE: Each cell must be isolated and cleaned individually when acid washing a CT-450 or larger system.

Rinsing Procedure



MIXING OF MURIATIC ACID AND SODIUM HYPOCHLORITE CAN RESULT IN THE RELEASE OF POISONOUS CHLORINE GAS!

Prior to acid cleaning, the system must be flushed clean of all brine and hypochlorite within by taking the following steps:

- Stop the system by pressing the "Disable/Enable" key on the touch-screen control panel (*Figure 3a*) and disconnect rectifier power.
- Open the drain valve.
- Drain the electrolytic cell of all liquid. Once entirely empty, close the drain valve.
- Shut the brine valve.
- With the brine valve shut, press the "Acid Wash" key (*Figure 3b*) on the touch-screen. The cell will fill-up entirely with water and then the system will shut itself off.
- Once full, open the drain valve and empty the water from the cell.
- Shut the drain valve after the cell has emptied.
- Repeat the flushing procedure two more times so that the system has been fully flushed with water a total of three times.

At this point, all of the cells in the system have been rinsed and are ready to be acid washed individually.

Cleaning Procedure

- With the system in "Disable" mode, shut the water valve. The brine valve should remain shut from the prior "Rinsing Procedure".
- Isolate the cell to be cleaned by detaching the split flow water inlet, the hydrogen vent stack and the inlet and outlet piping.
- Attach the acid wash pump and tank to the cell inlet and outlet with hoses:
 - Connect the cell outlet to the acid wash pump outlet.
 - Connect the cell inlet to the acid wash pump tank.



WHEN MIXING ACID WITH WATER, ALWAYS ADD ACID TO WATER ONLY! NEVER ADD WATER TO CONCENTRATED ACID!

- Fill the acid wash pump tank with 18 gallons of water.
- Turn the pump on, allowing water to circulate in the cell.
- While water is flowing into the cell, slowly add 2 gallons of muriatic acid (commercial grade 31% hydrochloric acid) to the 18 gallons of water in the acid wash pump tank.

The acid solution will begin bubbling as it removes deposits from the cell. Once it is confirmed that the acid solution is reacting with the deposits, the pump may be turned off. If the reaction weakens, the pump should be restarted in order to circulate fresh acid solution into the system.

- Allow the acid/water solution to continually run through the system until all deposits appear to be cleaned out of the cell.

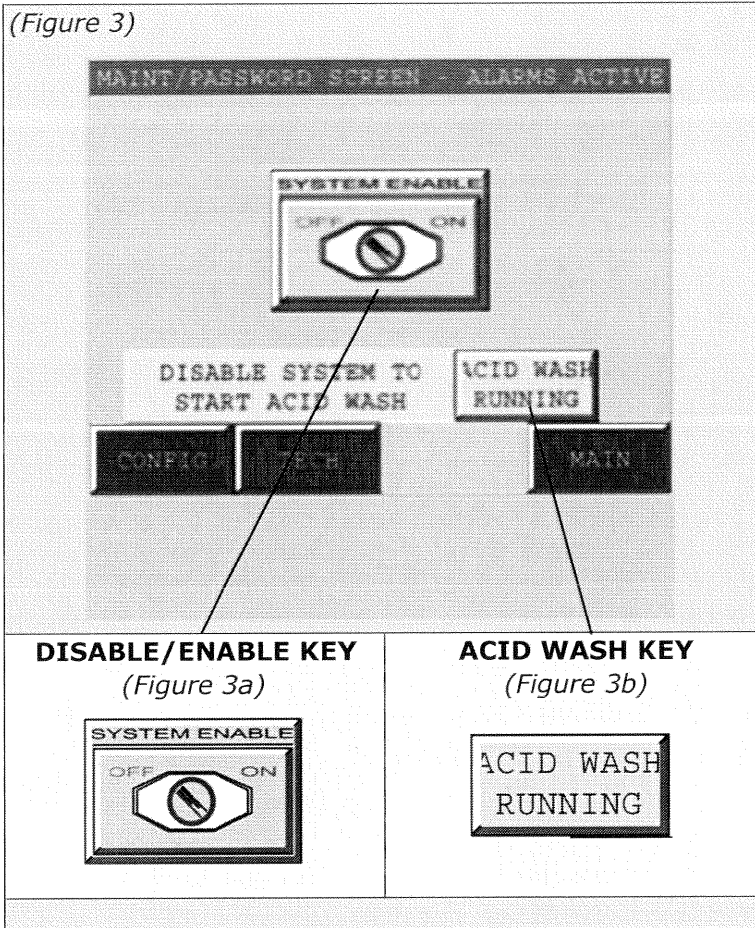
NOTE: Under conditions of extreme calcification, the cleaning process may take as long as a few hours to complete.

- Once the system is clean and free of all deposits, turn the acid wash pump off.
- Disconnect the pump outlet tubing from the cell outlet (*keep the cell acid wash pump tank connected to the cell inlet*). This will allow the acid solution to properly drain from the cell into the acid wash pump tank.
- Once the cell is empty, disconnect the pump tank from the cell inlet.

Neutralize and dispose of the solution that is in the pump tank and thoroughly clean the tank and hoses with fresh water as they will be used to flush the cell clean of all acid residue as instructed in the following section.

The cell is now ready to be flushed clean of all acid.

(Figure 3)



FLUSHING ACID FROM THE SYSTEM

IMPORTANT!

IN ORDER TO ENSURE THAT THE SYSTEM IS FREE OF ACID, IT MUST BE FLUSHED WITH WATER A TOTAL OF THREE TIMES AFTER THE ACID WASH IS COMPLETE AND BEFORE THE SYSTEM IS PUT TO USE AGAIN!

- Fill the acid wash pump tank with as much fresh water as is practicable.
- Attach the acid wash pump and tank to the cell inlet and outlet with hoses:
 - Connect the cell outlet to the acid wash pump tank.
 - Connect the cell inlet to the acid wash pump outlet.

NOTE THAT THE PUMP AND TANK ARE REATTACHED TO THE CELL IN CONTRARY ORDER TO THE WAY IN WHICH THEY WERE PREVIOUSLY

- Turn the pump on, allowing water to circulate in the cell.
- Turn the pump off once water circulation is established and the cell is completely full of fresh water.
- Disconnect the pump outlet tubing from the cell inlet (*keep the cell acid wash pump tank connected to the cell outlet*). This will allow the rinse water to properly drain from the cell into the acid wash pump tank.
- Neutralize and dispose of the rinse water that is in the pump tank and thoroughly clean the tank and hoses with fresh water as they will be used to further flush the cell clean of remaining residue.
- Repeat the flushing procedure entirely two more times so that the system has been fully flushed with water a total of three times.

MULTIPLE CELLED SYSTEMS

As noted at the beginning of the "Acid Cleaning Procedure" instructions, each cell within a system must be isolated and cleaned individually when acid washing a CT-450 or larger system.

Once one cell has been fully acid washed and properly and thoroughly rinsed free of all acid, cleaning on the next cell may begin.

Remember, all of the cells have been rinsed in preparation for acid washing at the same time. Once one cell has been acid washed, acid washing of the additional cells may begin at the "Cleaning Procedure" section of this manual.

The system should not be put to use again until all cells have been properly acid washed.

RESTARTING THE SYSTEM

IMPORTANT!

MAKE CERTAIN THAT THE SYSTEM HAS BEEN PROPERLY FLUSHED (AS MENTIONED ABOVE) AFTER ACID WASHING IN ORDER TO ENSURE THAT ACID DOES NOT MIX WITH BLEACH THAT THE SYSTEM IS PRODUCING.

NOTE: Typically the system will need to operate for 24 - 48 hours in order to season the electrode prior to producing the desired 0.8% bleach.

To begin operating the system again:

- Reconnect any piping that has been removed.
- Open the outlet valve.
- Open the brine valve.
- Refill the system with brine/water solution.
- Reconnect power supply to the rectifier.
- Enable the system to operate.

PROCEDURAL GUIDE FOR NEUTRALIZATION OF DILUTE (1:10) SPENT MURIATIC ACID

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Author: LP Date: March, 2005 Version:1.1

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APRON
CLOSED-TOE SHOES

Failure to follow the above-mentioned instructions may result in significant property damage and/or severe personal injury.

Do NOT apply the neutralization methods of this document to any chemicals other than dilute, spent muriatic acid.

Always work in a well-ventilated area and avoid contact with all fumes as large amounts of gas will be liberated from the solution during neutralization.

ALWAYS REMEMBER THAT THE NEUTRALIZATION PROCESS MAY GENERATE HIGH LEVELS OF HEAT UNLESS CARRIED OUT VERY SLOWLY WITH HIGH DILUTION LEVELS. CLOSELY MONITOR HEAT LEVELS BY CAREFULLY TOUCHING THE OUTSIDE OF THE NEUTRALIZATION CONTAINER.

Thoroughly wash hands after working with chemicals.

An eye-wash station and quick-drench facility must be in the area, in a location that is known by all employees before commencing work.

PURPOSE AND GOAL

The purpose of this document is to provide procedural instructions for the neutralization of dilute (1 acid : 10 water) spent muriatic acid that is the result of acid washing the Severn Trent line of ClorTec sodium hypochlorite systems.

NEEDED ITEMS

- Sodium carbonate (soda ash), baking soda or diluted inorganic base (hydroxide).
- Polyethylene bucket - 1 gallon (3.8L) size.
- 500mL beakers.
- pH indicator strips or other pH testing device(s).
- Protective gear:
 - Face shield with goggles
 - Chemical-resistant gloves
 - Apron
 - Closed-toe shoes

PROCEDURE

Neutralization must be performed very slowly. If you have any questions or if you are hesitant toward attempting this procedure for any reason, please speak with your local Safety/Environmental Health department.

- Make a saturated solution of sodium carbonate (soda ash) in a bucket or use an inorganic base (hydroxide) diluted in water at a 1:10 ratio (1 part hydroxide to 10 parts water) then set the bucket aside.
- Slowly add soda ash or other basic solution into diluted acid no faster than 1/2 gallon (1.9L) at a time while taking caution to avoid the escaping fumes.
 - Wait 5 minutes before adding additional base solution to the acid so that the full reaction of the acid/base solution may occur.
- Measure the pH level with a pH meter, pH indicator strip or other pH measuring device(s).
- Once the pH level is between 6 and 9, dispose of the solution into a drain followed by excess water.

NOTE: A pH level near 7 is preferred in order to reduce the likelihood of plumbing damage.

General Tip: When neutralizing an acid, the pH level can be tested quickly by making a saturated solution of sodium bicarbonate in water. A small amount of sodium bicarbonate solution poured into the acid will create a "fizz" reaction which is a release of carbon dioxide. Since carbon dioxide evolves from these procedures, always make certain that adequate ventilation is in place. This "fizz" reaction indicates that the solution is still acidic and needs more base to be added. Always perform a final check of the pH level before pouring the neutralized acid into the drain.

BID OPPORTUNITY 792-2006

**CLEANING INSTRUCTIONS FOR
CITY SUPPLIED EQUIPMENT – FRP
TANKS**

CLEANING INSTRUCTIONS

The first step in cleaning a vessel should be to wash all dust or dirt from the surface. If there is sludge in the bottom of the vessel, remove it with a plastic shovel. Never use anything to clean a vessel that could scratch the liner or cut into the resin rich surface.

After all of the dirt has been removed wash the inner and outer surfaces with a mild soap and water using a soft bristled brush to apply it.

Never use solvents to clean a Fiberglass Vessel

After the vessel has been cleaned allow it to air dry prior to placing it back in service.