Introduction

Use the porous pot to perform the following tasks:

Remove metallic impurities (such as iron, copper, nickel, and aluminum) and re-oxidize trivalent chrome from most types of chromic acid solution including hard chrome, decorative chromic acid baths, chromic acid anodizing, chromic acid and sulfuric acid plastic etch, and chromate. Porous pots can also be used to reclaim scrubber wastewater for reuse in the plating tank.

- Remove chromic acid from rinse water for reuse.
- Remove chrome from caustic electric strips.
- Purify your chromic acid solution at the same time that you chrome plate parts.
- Remove chromic acid from rinse water. **Note:** The porous pot will not reduce the amount of chromic acid in the rinse water enough to discharge the rinse water into a sewer. However, the rinse water will be clean enough to reuse repeatedly as rinse water in most applications. You can only put the chromic acid collected inside the ceramic pot from rinse water tank back into the plating tank.

Capacity

PPS1 is recommended for up to 2,000 gallons of solution or more. PPS2 and PPS3 are recommended for up to 700 gallons of solution. The actual size porous pot you use depends on the type and degree of contamination and the rate at which contaminants are introduced to the bath. If you contaminate your plating bath in a short time (such as three months or less) you may need more than one porous pot. The porous pot reoxidizes trivalent chrome rapidly and removes metal contaminants from the solution at a slower rate. Iron is the slowest contaminate to remove and copper is the fastest. Nickel, aluminum, and zinc are somewhere in between. You will see improvement in the plating rate after a week of 24-hour continuous use. An unworkable plating bath usually shows signs of life after a few days of use. It will take two-to-four weeks to bring the solution to the wine-red color of a new solution.

Mounting the Racks in the Chrome Tank

The porous pot racks are built into a hard chrome plating rack that fits a reversible-rack, two-busbar hard chrome tank. These busbars are 23-inches apart on center and 12-inches from top of busbar to top of high-solution level. If you have tanks setup for anodizing, bright chrome (three-bar tank), chromate, plastic etch, or bright dip, etc.,, you will have to set up some tank bus bar supports to suspend the rack in the tank 12-inches above the solution.

Busbars are too Wide and on Tank Lip

If your busbars are more than 23-inches apart and are sitting on the lip of the tank, proceed as follows to adapt the rack to your busbars.

- Remove the lead mat anode, cathode, framework, and ceramic pot from the copper rack top.
- Bend the pre-bent, 45-degree hooks on the copper rack top into a 90-degree angle. This action will raise the pot.
- Pre-tin the ends of the copper bar of the appropriate width to fit your busbar.
- Drill holes into the copper bar and bolt it to the hooks. Solder the bar after bolting.
- On very wide busbars, you will also need to add a plastic insulator between the hooks for added support.
- Reassemble the components removed in Step 1.

Busbars are too Wide and at Correct Height

If your busbars are at least 12-inches above the high-solution level, proceed as follows to adapt the rack to your

busbars.

- Remove the lead mat anode, cathode, framework, and ceramic pot from the copper rack top.
- Unbend the pre-bent, 90-degree hooks into a 45-degree angle
- Pre-tin the ends of copper bars of the appropriate width to fit your busbar.
- Drill holes into the copper bar and bolt it to the hooks. Solder the bar after bolting.
- On very wide busbars, you will need to add a plastic insulator between the hooks for added support.
- After you re-bend the hooks, make sure that the top of the pot is at least 2-inches above the high-solution level.

Lack of Tank Space

If you do not have enough tank space, you can use a 55-gallon plastic drum outside of the tank to hold the porous pot rack. Mount two bus bars on this drum and properly ventilate the drum. You will need a small pump to pump the chromic-acid solution from the tank into the drum and plastic pipe mounted on the side of the drum to counter overflow the solution back into the tank for re-circulation. You can use cables of the proper size to connect the rack to the tank's busbars or you can use a separate power supply for the rack. The PPS1 requires a 0000-gage copper cable. The PPS2 or PPS3 requires a 2-gage copper cable.

Using the Porous Pot to Purify Chromic Acid Baths

The power for the porous pot rack must be on all the time. If you cycle the power on and off to the chrome tank, use a different power supply for the porous pot rack and leave it on. If you are using a reversing switch on the plating tank, insulate the hooks before reversing the tank and then make sure you remove the insulators when you put the tank back into plating position.

If you are using a porous pot to remove impurities from scrubber water, use a separate tank to batch treat the contaminated scrubber water before putting the reclaimed scrubber water back into the main process tank.

The lead-mat anodes are on the outside of the porous pot and are hooked to the positive anode busbar. If you trace the electrical path through the rack, it leads to the positive anode hook (stamped with a +). The cathode is hooked up to a negative (stamped with a -). The lead mat cathode inside the pot is hooked up to the negative busbar. If the pot seems clogged and does not draw much current, reversing it and running it at 10 to 24 volts for 10 minutes will clean out the pores. If you make a mistake and connect the rack in reverse, you will collect clean water in the pot.

After you have installed the porous pot rack into the plating tank, the plating solution in the tank should not overflow into the porous pot. To start using the porous pot, fill it with chromic acid from the plating tank (don’t fill the porous pot all the way to the top, make sure the acid level is at least two inches below the top). It is necessary to put chromic acid in the pot to make the porous pot conductive. The porous pot may not draw much current the first time you use it until the ceramic in the porous pot becomes conductive.

General Usage Instructions

The pot lip must be positioned at least two inches above the high-solution level. This positioning is necessary because the solution inside the pot will be hotter than the solution outside the pot and will rise above the level of the solution in the tank.

The contaminated solution that is collected inside the porous pot must not flow over the top of the pot and back into the plating tank. If this occurs, reduce the fluid level inside the pot or reduce the voltage you are using.

Using the Porous Pot the First Time

Do not run any porous pot more than 8 hours the first time. This is particularly important if you are using PPS2 and PPS3, since they may collect so much contaminated material inside the round porous pot that it may be impossible to remove the cathode without breaking the ceramic pot. As the contaminant level in the bath falls, the running time will increase.

If the bath is highly contaminated and not plating at all, we recommend you clean the porous pot at least twice a day during the first week of use. If the porous pot does not draw much current in a highly-contaminated bath or it does not plate at all, you may want to mix a new 32-ounce per gallon solution of chromic acid to put inside the porous pot.

As the contaminants collect inside the porous pot, the current drawn will fall off. Monitor the current draw the first couple of times you use the porous pot once an hour. The amperage can reach zero amps. We suggest that you clean the porous pot after the current drawn is 75% of the initial starting value. The porous pot performs better when you clean it frequently. As most of the contaminates are removed from the bath, clean the porous pot at least once every two or three days.

When you first use the porous pot rack, the solution inside the porous pot may turn a very green color. This color is trivalent chrome. As the porous pot re-oxidizes the trivalent chrome, the solution in the porous pot will turn dark brown or black. The dark color is metallic impurities.

Using Foaming Fume Suppressants

If you use excessive fume suppressant that causes the foam to flow over the top of the porous pot, do not use the chromic acid from the plating tank to fill the porous pot. Instead, mix up a new batch of solution using 32-ounces per gallon of chromic acid with the correct amount of fume suppressant. Use this new solution to fill the inside of the porous pot.

Using High-fluoride, Heef 25[illegible] , or High-speed Baths

You need to use a 6%, tin-lead, mat-anode because these baths will have a very short anode life with 1-percentage antimony, lead-mat anodes. Do not use 1% antimony lead mat anodes if you are using a fluoride catalyst, Heef 25[illegible] , or high-speed, mixed-catalyst baths. These baths must be hot during porous pot operation. If the baths are purified at room temperature, catalyst crystals will form on the anode and the bottom of the tank. If this happens, heating the tank will cause the catalyst crystals to re-dissolve. The porous pot will not remove the catalyst and unbalance your bath. The standard, 100-to-1, chrome-sulfate baths can be purified hot or cold.

Cleaning and Checking the Porous Pot and the Rack

CAUTION

Always wear safety glasses, a respriator, protective clothing and gloves before installing and cleaning the porous pot.

Warning

Clean the rack connections by hand-sanding only. Never clean the rack connections by mechanical means such as a lathe.

NOTE

It is not necessary to remove the rack or porous pot from plating tank in order to clean it.

Checking the Condition of the Porous Pot Rack Weekly

Remove the rack from the plating tank weekly to check the following conditions:

- Check the condition of the Plastisol™ framework
- Check for cracks in the ceramic pot
- Check the condition of the PVC tray
- Check the lead mat anodes and lead mat cathodes for wear
- Check to make sure all rack connections are clean

Replace any damaged or worn parts.

General Cleaning Procedure

- Remove the two nuts on the sidebars that hold the cathode crossbar.
- Carefully slide the lead mat cathode out from the inside the porous pot. Do not bump or scratch the ceramic.
- Pump the contaminated solution and sludge out of the inside of the pot into a plastic steel-lined drum suitable for proper waste treatment and disposal. Note: a 55-gallon of sludge can weigh 2000 pounds or more.
- Spray rinse the inside of the porous pot. In cold climates, rinse the ceramic with water that is the same temperature as the tank. This is necessary because 35-degree F water can crack the ceramic pot due to thermal shock.

CAUTION

Wear a respirator while performing Step 5.

- Brush off any contaminates on the cathode while it is still damp to cut down on air born contamination and then rinse the cathode.

Weekly Cleaning Procedures

Weekly, clean all rack connections. Especially the aluminum cathode cross bar to lead cathode. Or you will burn off the lead leed.

Reinstalling the Porous Pot and Returning It To Service After Cleaning

- Carefully replace the cathode and reinstall the two nuts on the sidebars that hold the cathode crossbar.
- Fill the pot to the proper level (two inches below the top of the porous pot) with the solution from the plating tank.
- Turn on the power supply. Monitor the current draw after five minutes of operation. The current draw should be about the same as it was when you first started the porous pot.

Power Requirements

D.C. Voltage

Use 4 to 9 volts to remove impurities and re-oxidize trivalent chrome (whatever voltage you plate at should work). 4 to 9 volts can also be used to remove chrome from the electric caustic strip and stainless steel acid pickles. If you use a voltage that is too high, the contaminated solution inside the porous pot will overflow back into the chrome tank. If you start plating chrome onto the cathode, reverse the chrome off the cathode before the next run and reduce the amount of chromic acid inside the pot and fill the balance with water or reduce the voltage. Use 24 to 27 volts to remove chromic acid from rinse water because rinse water is not very conductive. At startup, to make the porous pot more conductive during rinse water reuse operations, you might need to add a little chromic acid to the porous pot to get it to draw current.

Current

There is a wide variation in the amperage drawn. The variations depend on the type and contaminate concentration in the solution. The average current draw in a 32-ounce standard bath is as follows:

- PPS1 draws about 210 amps at 4.5 volts and as much as 300 amps at 6 volts

- PPS2 and PPS3 draw 70 amps at 4.5 volts and as much as 100 amps at 6 volts

Don’t worry if your current draw is a little more or less than the amperage listed above.

If there is no current draw after an hour of operation, the pores in the porous pot are probably clogged or you may have a bad rack connection. Clogged pores are usually caused by not cleaning the pot after removing it from service and letting the contaminated sludge dry out inside the porous pot. To clean pores that are clogged, rinse out the inside of the pot install the porous pot in the tank in reverse the polarity. Fill the porous pot with chromic acid from the plating tank. If possible, increase the voltage up to 24 volts in reverse polarity for 10 minutes. This procedure might chrome plate the lead mat anodes. However when you return the polarity to normal the chrome will re-dissolve into the plating tank. If the pot still does not draw any current, you will have to replace the ceramic pot because the pores are permanently clogged.

Using a Constant Current Power Supply

If you have a constant current power supply, set current limit a little below the initial current draw and turn the voltage control up to a maximum of 24 volts DC. This will automatically raise the voltage as the current draw begins to decrease. This will make the porous pot work more efficiently and you will collect more sludge between cleanings. It is not necessary to have a constant current power supply unless you are introducing contaminates into your solution at a fast rate and need the extra capacity. Another way to increase amperage is to make a u-shaped anode for PPS1.

Replacement Parts

You may want to purchase an extra lead mat cathode (PPAIC for PPS1, PPA2C for PPS2) and aluminum cathode crossbar. Specify 1% OR 6% tin.

You should also purchase an extra ceramic porous pot (PPR-1 for PPS1, PPR-2 for PPS2). They are fragile and when they wear out they become brittle and break easily.

Some caustic electric strip solutions will cause the ceramic pot to have a short life. The additives in the proprietary caustic strips will attack the pot. In a high-fluoride, mixed-catalyst bath and a Heef 25™ bath, the ceramic pot PVC tray and Plastisol coating on the aluminum frame will have a shorter life than with a standard 100 to 1 chrome sulfate bath. You must use a Plastisol titanium framework in a plastic-etch bath that contains 60-ounces per gallon of chromic and 20% sulfuric acid. This bath is highly corrosive to the Plastisol. The sulfuric and chromic acid will attach the Plastisol and destroy the aluminum framework and the ceramic pot will fall to the bottom of the tank. The titanium framework must be re coated with Plastisol every 3 to 6 months. Do not use titanium framework in a chromic acid fluoride bath. Check the condition of the Plastisol under the PVC tray and re-coat before coating is deteriorated.

Keeping the Porous Pot Rack in Good Operating Condition

Observe the following to guidelines keep the Porous Pot in optimal operating condition.

- Do not lift the rack out of the porous pot and leave it above the tank for more than a few minutes because the contaminated solution will seep back into the process tank and clog the pores.
- You must remove and clean the cathode and remove contaminated solution from the pot and rinse before storage. Do not let the sludge dry out inside the pot because it will clog the pores
- Do not switch between caustic electric strip and chromic acid or other types of plating processes using the same porous pot. Buy a separate ceramic pot for each plating process.
- Do not transfer ceramic porous pot between fluoride baths and standard chrome sulfate baths because you will introduce fluoride to the standard bath.
- Do not lean the porous pot rack against the wall while cleaning it or storing it. If you do, you will damage the Plastisol coating and the fluoride will destroy the aluminum framework. Store the porous pot on a rack stand.