



LeKem, Inc.

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Where Innovation and Quality Meet

ENTerminator Plate Out Process

Lekem of Indiana, Inc. ENTerminator is a simple, inexpensive and sludge less method for eliminating nickel from spent electroless nickel solutions. **It can reduce the metals content of most baths to less than 5ppm.**

The ENTerminator process is designed to remove nickel from mostly spent Electroless Nickel baths to less than 5 mg/l. This level meets the current discharge limit in most locations. The remaining liquid is not hazardous and may be discharged to the POTW in many locations.

Equipment

The ENTerminator process is designed to be operated in the Electroless Nickel plating tank. Frequently, however, it may be advantageous to use a separate treatment tank to avoid interrupting production.

Materials

The following is typically all that is needed to treat 150 gallons of spent Electroless Nickel solution:

- 4-5 pounds of **course steel wool** (soft steel wool will not work as well and dissolve in bath)
- 4-5 gallons of 50% ammonium hydroxide
- 10 gallons of ENT (approximate 40-60 mils per liter of operating solution)
- pH paper
- a heated plating tank and a container for the steel wool

Procedure

1. While the solution is at running temperature, do the following:
 - Check the nickel and hypophosphite (if possible) concentrations.
 - If the hypo is low it may take more ENT to get desired results.
2. Set the temperature controller to 195° F if possible this will speed up the process.
3. When the bath temperature reaches 195° F, load the tank with clean activated steel wool. To activate the steel wool, run it through the soak cleaner, rinse, hydrochloric acid, double rinse, and then into the spent Electroless Nickel bath. Make sure that the steel wool is rinsed well between each step. If possible dip the steel wool in 50/50 ammonia hydroxide as a final rinse.
4. Bring up the PH to around 5 or 6 with ammonia (50/50 is preferred).
5. Once the steel wool is placed in the bath, you can add some additional ammonia on top of the steel wool to further accelerate the reaction.
6. Add the ENT to the operating bath. 40-60 mils of ENT per liter of working bath should be enough to get bath to turn clear. Additional ENT may have to be added to keep steel wool plating if bath is very old or heavily contaminated.
7. Make small additions of 50% ammonium hydroxide solution periodically during the plate out to raise the pH to 7.5.
8. When the solution is nearly clear, check its nickel concentration, using atomic absorption or titration. Then follow local and state laws to dispose of the spent bath.

Helpful Hints

The following hints may make the Lekem of Indiana, Inc.'s ENTerminator Plate Out Process easier to operate and more efficient:

1. The steel wool may be plated three or more times before it has to be changed. At this point, the nickel plated steel wool will be quite brittle and can be easily broken for easy packaging.
2. **When handling steel wool, and especially while breaking plated wool, it is advisable to wear safety glasses and gloves.**
3. For packaging, the plate out products should be broken into small pieces and then stored in drums. The plated steel wool must be clean and completely dry before packaging.
4. It is important to check that the hypophosphite content of the spent bath is normal (if possible) before starting the ENTerminator Plate Out Process. If the concentration is low, extra hypophosphite should be added in order to reduce all of the nickel.
5. Baths that have been contaminated or poisoned may not begin plating on their own. If this occurs, the following approach may prove helpful:
 - Apply a DC electric current at 4 to 6 volts for 30 to 60 seconds to electrolytically plate the steel wool for 15 to 30 minutes to dummy out the contaminants in the bath.
 - **CAUTION: ENT ACCELERANT MAY CAUSE EXCESS EFFERVESCENCE AND SPILL OVER. PROTECTIVE GARMENTS ARE SUGGESTED.**