



# LEN-193 System

## Electroless Nickel

EN 193 deposits have a nickel-phosphorous alloy that is deposited by means of an autocatalytic reduction of metal from solution without the use of electricity. EN 193 coatings are noted for the following properties: Coating is uniform at a consistent, rapid rate, bright Electroless Nickel process with low (4%) phosphorous content.

## Advantages

- Stable, uniform rate, with 8 metal turnovers.
- Very high as-plated hardness up to 770 HK 100
- Excellent wear resistance, freedom from porosity.
- High tank stability.
- Natural lubricity, providing excellent release properties.
- Self-polishing effect in molding operations.
- A sound base coating for subsequent finishing operations.
- Easily waste treatable.

## Deposit Properties:

Phosphorous Content	4 wt. %
Hardness	52-60 Rc
Internal Stress	Compressive
Ductility	Pass (ASTM B-489)
Electrical Resistivity	70-100 microhm-cm
Melting Point	880° C
Density	7.75 g/cc

### Operating Data:

LEN 193 A	Bath make-up solution
LEN 193 B	Bath make-up solution
LEN 193 C	Hypophosphite replenisher

### Operating Instructions

1. A new bath should be made with 6% LEN 193 A and 15% LEN 193 B and 79% DI water. Tanks should be previously calibrated to assure proper concentration. Tanks may now be half filled with DI water. LEN 193 A and LEN 193 B are added with agitation on. DI water is then added to bring the solution to the proper level.
2. pH should now be checked and adjusted to 4.9 with Aqua Ammonia, if necessary. Always dilute ammonia 1:1 with DI water before adding. The same dilution applies to sulfuric acid if the pH ever needs to be brought below 5.0. The proper operating range is 4.8 to 5.0.
3. Air must be turned on before turning on heat.
4. Filter should be turned on and remain on throughout the operation period.
5. The bath is heated to 185-190° F for normal operation. Making sure the heater thermostat is in the bath. Do not exceed 195° F.
6. Titration of bath should be used on the amount of work being processed.
7. Operation range of nickel content should be maintained between 80-95%.
8. Replenishment adds may be made during plating. LEN 193 A is always added before LEN 193 C. Replenishment should be made in 10% increments to eliminate possible over-concentration of the bath. Adds should be made in a ratio of 2 parts LEN 193 C to LEN 193 A.
9. Bath pH is self-maintained by proper replenishment. If, however, the pH varies from the operation range due to excessive drag-in, it may be adjusted by following

instructions in step #2. Dilution of this type of add with DI water is a must at operating temperature.