Luster-On Products

Technical Data Sheet

LUSTER-NI 389
Bright Nickel Plating System

I. GENERAL DESCRIPTION

The Luster-Ni 389 Nickel Plating Process is a high performance system of addition agents for bright nickel plating that offers consistent and uniform appearance over a wide range of current densities and plating conditions.

The Luster-Ni 389 process features outstanding brightness and leveling at all current densities, even in low current density areas. Deposits are white, bright and level even when minimum thicknesses of plate are applied. Luster-Ni 389 is tolerant to metallic impurities such as copper and iron and produces ductile deposits which readily accept subsequent chrome plating.

The Luster-Ni 389 Process offers the ease and economy of a single component addition system. Routine replenishment of all components is usually accomplished with a single maintenance addition of Luster-Ni 389.

PLEASE READ MATERIAL SAFETY DATA SHEETS BEFORE USING THIS PRODUCT

II. CHEMICAL COMPOSITION

The following is the recommended make-up for a new bath.

	Range	Recommended
Nickel Metal	7.0-10.7 oz/gal	10.0 oz/gal
Nickel Sulfate	15.0-50.0 oz/gal	33.0 oz/gal
Nickel Chloride	8.0-15.0 oz/gal	10.0 oz/gal
Boric Acid	6.0- 7.5 oz/gal	7.0 oz/gal

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II. CHEMICAL COMPOSITION (Continued)

	Range	Recommended
Luster-Ni 441	2.5 - 3.5%	3.0%
Luster-Ni 442	0.1 - 0.5%	0.15%
Luster-Ni 389	0.05 -0.10%	0.25%
Luster-Ni LFW	0.1 - 0.25%	0.15%

NOTE: Luster-Ni 441 and 442 are normally used only for making up a new bath, during conversions, or to adjust the bath when the brightener system becomes unbalanced. Luster-Ni 373 is a brightener adjuster normally used only for conversions or to adjust the bath when the brightener system becomes unbalanced. Luster-Ni 441, 442 and 373 are components of Luster-Ni 389 and under usual plating conditions normal replenishment is accomplished with Luster-Ni 389 only. Occasional supplementary additions of Luster-Ni 441 (carrier) may be necessary in some installations. The cathode current density, type of base metal, required thickness, part configuration and plating equipment can affect optimum concentrations. Lower operating concentrations and temperatures generally consume less brightener and require lower energy costs. They should be used when possible.

III. SOLUTION MAKE-UP

1. The nickel-plating solution should be prepared in a storage tank and not in the plating tank itself. The storage tank should be thoroughly cleaned, filled with water to 2/3 of the final volume and heated to 150°F. Add required amounts of nickel sulfate, nickel chloride and boric acid and mix thoroughly until completely dissolved. Bring solution to working volume.

2. While maintaining temperature at 150°F adjust the solution pH to 5.0 by the addition of a nickel carbonate slurry. Add 2 lbs of activated carbon per 100 gal of solution and stir for one to two hours. Allow the carbon to settle for at least eight hours and filter the solution into the clean plating tank.

3. Reduce the pH to 3.3 by the addition of dilute sulfuric acid. Dummy the solution at 3-5 amps/ft^2 for the removal of any zinc, copper and lead impurities in the make-up chemicals. Dummy for 6-8 hours or until a Hull cell with normal brightener additions shows a satisfactory bright deposit in the low current density range.

4. Adjust the pH to the recommended range (3.7-4.0 for rack and 3.5-3.7 for barrel) and add brighteners as recommended in Section II.

IV. SOLUTION COMPONENTS

A. Nickel Sulfate

Nickel sulfate is the principal source of nickel metal in the solution. Nickel sulfate should be maintained in the recommended range to give the brightest, burn-free high quality deposits. A low level of nickel sulfate usually results in a low level of nickel metal, reduced cathode efficiencies and a longer plating time to deposit the required thickness. High levels of nickel sulfate result in increased consumption of brighteners.

B. Nickel Chloride

Nickel chloride provides the remainder of the nickel metal and improves conductivity and anode corrosion. Low chloride levels can result in anode polarization accompanied by excessive brightener consumption. High chloride levels will increase deposit stress and decrease ductility.

C. Boric Acid

Boric acid assists in maintaining the proper solution pH during plating. Low concentrations of boric acid can result in burning, pitting and/or a decrease in ductility. High concentrations of boric acid can result in shelf roughness if the solubility of the boric acid is exceeded.

D. Luster-Ni 441

This is the carrier portion of the Luster-Ni system. It provides basic brightness and ductility to the nickel plate. Excessively low concentrations of Luster-Ni 441 can cause poor response to additions of Luster-Ni 389, loss of ductility, and chrome coverage problems. A slightly high level of Luster-Ni 441 has no noticeable effect. Extremely high levels can increase the amount of Luster-Ni 389 and Luster-Ni 442 necessary for full, bright deposits.

E. Luster-Ni 442

Luster-Ni 442 is the supplementary brightener or leveler portion of the Luster-Ni system. It is normally added only on make-up and occasionally when recommended by the Luster-On Customer Service Laboratory to restore an unbalanced brightener system. A low concentration reduces leveling and brightness. A significantly high concentration can reduce the ductility of deposits and dull the low current density areas.

IV. SOLUTION COMPONENTS (continued)

F. Luster-Ni 389

This is the replenishment agent which is routinely added to maintain brilliance and leveling. A low level of Luster-Ni 389 will reduce deposit quality particularly leveling and low current density brightness. Slight to moderately high levels of Luster-Ni 389 will have little effect other than to increase operating costs. High levels may darken deposits in low current density areas.

G. Luster-Ni LFW

This is a low foaming wetting agent used to reduce surface tension and control pitting from hydrogen gas evolution. A low concentration can result in pitting. An excessively high concentration can produce cloudy deposits.

H. Luster-Ni 445

This is a liquid addition agent to control the build-up of dissolved iron in the solution. Small regular additions to the bath will insure that the iron that is present in the solution will remain in a soluble state so that it can be co-deposited without adversely affecting plating quality.

V. PLATING CONDITIONS

A. Temperature

Luster-Ni 389 Process operates satisfactorily in the range of 120°-150°F with the range of 130°-140°F preferred for most applications. Lower operating temperatures result in lower energy costs and reduced brightener consumption. They should be employed so far as possible without affecting plating quality. Too low an operating temperature will result in high current density burning. Too high a temperature will result in excessive brightener consumption.

B. pH

The pH of the Luster-Ni 389 Process should be maintained in the range of 3.8 to 4.0 for rack plating installations. For barrel plating installations, a pH of 3.7 to 3.9 should be employed. Too high a pH can result in deposit roughness, brittle deposits and poor chrome receptivity. In barrel plating, excessively high pH can result in laminated deposits. Too low a pH will produce reduced brightness and leveling.

V. PLATING CONDITIONS (Continued)

B. pH

The pH may be reduced by the addition of either sulfuric or hydrochloric acid. Sulfuric is normally recommended since it reduces the chance of excessively high chloride concentrations and the possibility of brittle deposits. Only reagent grade hydrochloric acid should be used to reduce the chance of introducing dissolved iron into the solution. The pH of the solution may be raised by withholding acid additions and plating until the pH rises or by the addition of nickel carbonate. Nickel carbonate additions should never be made directly into the plating tank as extreme roughness will result.

C. Cathode Current Density

The Luster-Ni 389 Process produces bright level deposits in a current density range of 20 to 100 amps/ft^2. Usual operating current for most operations is approximately 40 amps/ft^2. Too low an operating current results in excessively long plating times. Too high a current will produce burned deposits.

D. Anode Current Density

Anode current density should be maintained at less than 35 amps/ft^2. Too high an anode current density can result in polarization of anodes.

VI. EQUIPMENT

A. Anodes

Electrolytic nickel chips and titanium anode baskets are the preferred anode material. Other types of anodes, such as bar and oval, may be used if desired.

B. Anode Bags

Dynel or polypropylene anode bags should be used. New anode bags should be thoroughly leached to remove sizing materials which can introduce organic contaminants into the plating bath. If SD anodes are used, double bagging of anodes is recommended.

C. Agitation

The Luster-Ni 389 Process can be used with either air or mechanical agitation. Low-pressure air agitation is preferred. Compressed air should not be used due to the risk of contamination with oil. Cathode rod agitation may also be used. Cathode movement should be between 3 and 10 ft/minute.

VI. EQUIPMENT (Continued)

D. Tanks and Heaters

Steel lined with Koroseal is the preferred tank material. Polypropylene may also be used. Heaters or steam coils should be of titanium.

E. Filtration

Nickel solutions should be continuously filtered through a filter packed with a mixture of filter-aid and activated carbon for best results. Approximately 2 lbs. of carbon per 1000 gallons of plating solution should be used. Filters should be repacked weekly. If filter cartridges are used they should be leached to remove sizing in the same manner as employed for new anode bags.

VII. REPLENISHMENT

Replenishment of the Luster-Ni 389 Bright Nickel Process is accomplished by additions of Luster-Ni 389. As a guide for additions, Luster-Ni 389 should be added at the rate of 1 quart every 2000-2500 ampere hours. Actual operating experience will determine the optimum addition rate for a particular operation. The Luster-On Equipment Department can supply ampere-hour feeders for optimum control of brightener additions.

VIII. CONTROL

Control of brightener levels in Luster-Ni solutions may be accomplished with the Hull cell. It is suggested that a sample be submitted to the Luster-On Customer Service Laboratory every 4 - 6 weeks for routine brightener check.

Major solution components should be analyzed weekly by standard analysis methods. A copy of standard analysis methods is available upon request from the Luster-On Customer Service Laboratory or may be found in the METAL FINISHING GUIDEBOOK AND DIRECTORY.

The pH should be checked daily using a pH meter and adjusted as necessary.

IX. PACKAGE

All Luster-Ni products are packaged in 5 and 55 gallon plastic non-returnable containers.

X. STORAGE

Keep container closed when not in use. Keep from freezing. If product freezes, it should be completely thawed and thoroughly re-mixed prior to use.

XI. WASTE TREATMENT

The Luster-Ni addition agents do not require waste treatment. It is, however, necessary that the solutions in which they are used be treated for the removal of nickel metal prior to disposal.

XII. SAFETY AND HANDLING PRECAUTIONS

MILDLY ACIDIC INDUSTRIAL PRODUCT.

Nickel plating solutions prepared per this data sheet are mildly acidic industrial products.

DO NOT GET IN EYES; AVOID SKIN CONTACT; DO NOT TAKE INTERNALLY; EXERCISE NORMAL SAFETY PRECAUTIONS TO AVOID EYE AND SKIN CONTACT.

FIRST AID IN CASE OF CONTACT

FOR EYES: Immediately flush eyes with plenty of water for at least 15 minutes. Get immediate medical attention.

FOR SKIN: Wash the affected area thoroughly with soap and water. Wash contaminated clothing before re-use.

KEEP OUT OF REACH OF CHILDREN

FOR INDUSTRIAL USE ONLY

This product is sold for industrial use only. Our suggestions for its use are based upon tests and procedures which from experience we believe to be reliable. Since the use is beyond our control, neither our distributors nor we can assume responsibility, either expressed or implied for the results and/or for violation of any patents or any claims resulting from such use.

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