



# PRODUCT INFORMATION

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EMERGENCY: MARTRON 704-289-1934

**CHEMTREC 800-424-9300**

REF. # MFC-004547, 004548 and 004549

## MARTRON 5300 PROCESS

“AN ADVANCED LOW PHOSPHORUS, SEMI-BRIGHT ELECTROLESS NICKEL SYSTEM”

**Martron 5300** is an easy to use Low Phosphorus Electroless Nickel Process specifically formulated to provide a compressively stressed hard EN deposit with excellent corrosion resistance in alkaline environments. With over 20 years of Electroless nickel research and development experience, Martron Inc. offers this newest EN formula to meet and exceed most competitive EN processes available today. Applications requiring high hardness without heat treatment (approaching that of stressed relieved hard chrome) will benefit from this process.

**Martron 5300** is supplied as 3 separate liquid concentrates. **Martron 5300-A** and **Martron 5300-B** are used for make-up; **Martron 5300-A** and **Martron 5300-C** are used for replenishment.

**Martron 5300** meets Mil-26074B, AMS 2404B, AMS 2405 and ASTM-B733 specifications.

### SECTION 1 - FEATURES

- \* High Wear Resistance
- \* High Hardness as Deposited
- \* High Melting point
- \* Excellent Corrosion Resistance to Alkaline Environments
- \* Easily Soldered with RMA Flux
- \* Wide Operating Parameters
- \* Consistent Low Phosphorus Content
- \* RoHS, WEEE and ELV Compliant

### SECTION 2 - DEPOSIT PROPERTIES

Nickel Content	94-97 % w/w
Phosphorus Content	3-6 % w/w
Melting Point	1050-1200°C
Hardness	60-62 R as plated, 68 R (400°C)
Density	8.5-8.6 g/cc
Magnetic Properties	Magnetic
Electrical Resistivity	20-30 micro-ohm/cm
Ductility	Passes (ASTM B-489)

## SECTION 3 - CONCENTRATE PROPERTIES

<b>Martron 5300-A</b>	Green make-up and replenishment component
<b>Martron 5300-B</b>	Clear, slightly yellow make-up component
<b>Martron 5300-C</b>	Colorless replenishment component

## SECTION 4 - SOLUTION MAKE-UP

<b>Martron 5300-A</b>	6 % by volume
<b>Martron 5300-B</b>	15 % by volume
Deionized Water	79 % by volume

## SECTION 5 - OPERATING PARAMETERS

	Range	Optimum
Nickel Metal Content (oz/gal)	0.65 - 0.80	0.80
Sodium Hypophosphite Content (oz/gal)	3.2 - 4.5	4.0
pH	4.8 – 5.2	4.9
Temperature (°F)	170 – 200	190
Bath Loading (sq. ft/gal)	0.1 - 1.5	0.50
Frequency of Additions	Activity should be maintained at 85 - 100 %	

## SECTION 6 - BATH PERFORMANCE

Solution Life	8 - 10 MTO (Steel) minimum 4-5 MTO (Aluminum) minimum
Plating Rate (mils/hr)	0.6 - 0.9 (190°F, pH 4.9)

## SECTION 7 - EQUIPMENT

Tanks should be constructed from anodically passivated stainless steel or high-density polypropylene. Continuous mechanical or air agitation using a low-pressure blower is recommended to reduce localized overheating. Heaters should be 316 stainless steel low density electric or PTFE steam coils. Filtration should be continuous, using 5 micron or smaller media. Exhaust ventilation is recommended to remove steam and solution mist due to elevated temperature and gas evolution of the EN solution while plating.

## SECTION 8 - SOLUTION MAINTENANCE

To insure optimum results of the **Martron 5300** EN process, the solution chemistry should be maintained at optimum concentrations (0.80 oz/gal Nickel concentration, 4.0 oz/gal Sodium Hypophosphite concentration). The procedure to analyze for these two parameters is listed below:

**Nickel Metal Analysis****Reagents**

Concentrate ammonium hydroxide  
1% murexide indicator w/CP grade sodium chloride  
EDTA (disodium dihydrate salt)  
0.1 molar = 37.235g/L

**Procedure**

1. Pipette 10 ml sample of EN solution into a 250 ml. Erlenmeyer flask.
2. Dilute to 100 ml with DI. water.

3. Add 5 - 10 ml of concentrated ammonium hydroxide to form a light blue color.
4. Add sufficient murexide indicator to form a light-yellow color solution.
5. Titrate with 0.1 M EDTA to a violet endpoint.
6. Calculations:
  - (ml) (0.1 M EDTA) x .078 = oz/gal Nickel metal
  - (ml) (.0575 EDTA) x .045 = oz/gal Nickel metal

**Note:** For every 0.1 oz/gal of nickel low, add 1.6 fl. oz/gal of **Martron 5300-A**.

### Hypophosphite Analysis

#### Reagents

6 Normal Hydrochloric Acid  
 0.1N Iodine solution  
 0.1N Sodium Thiosulfate solution

#### Procedure

1. Pipette a 5 ml sample of bath into a 250 ml iodine flask, and add 50 ml of D.I. water.
2. Add 30 ml 6 Normal Hydrochloric Acid and mix.
3. Add 50 ml of 0.1N Iodine solution.
4. Stopper flask and set in dark for 45 minutes.
5. Titrate with 0.1 Sodium Thiosulfate to a colorless endpoint.
6. Calculation:
  - [(ml. of .1N Iodine) - (ml. of Sodium Thiosulfate)] x 0.141 = oz/gal Sodium Hypophosphite

**Note:** For every 0.1 oz/gal of Sodium Hypophosphite low, add 0.20 oz/gal **Martron 5300-C**.

### Replenishment Chart

For optimum results, bath replenishment should be maintained by nickel metal analysis. Recommended nickel concentration is 0.80 oz/gal **Martron 5300-A** and **Martron 5300-C**, added at a 1:1 ratio.

<u>ml EDTA</u> <u>(.0575 M)</u>	<u>ml EDTA</u> <u>(0.1 M)</u>	<u>Activity</u> <u>%</u>	<u>Nickel Conc.</u> <u>Oz/gal</u>	<u>Nickel Conc.</u> <u>g/l</u>	<u>5300-A</u>	<u>5300-C</u>
17.8	10.2	100	0.80	6.0	0	0
16.9	9.7	95	0.76	5.7	1140 ml	1140 ml
16.0	9.2	90	0.72	5.4	2270 ml	2270 ml
15.1	8.7	85	0.68	5.1	3400 ml	3400 ml
14.2	8.2	80	0.64	4.8	4540 ml	4540 ml

(Replenishment Chart for 100-gallon tank.)

## SECTION 9 - pH CONTROL

To raise and maintain pH for normal operation, adjustments should be made with 50 % Ammonium Hydroxide or 2 lbs./gal. Potassium Carbonate. To lower pH, if necessary, add 25 % reagent grade Sulfuric Acid. Make all additions slowly, with agitation, and preferably without work in the tank.

## SECTION 10 - WASTE TREATMENT

**Martron 5300** solutions contain nickel metal and must be treated to meet local, state and federal guidelines. Contact **Martron Inc.** for detailed information for procedures applicable to your plating facility.