



HN-505 ACCELERATOR

INTRODUCTION

HN-505 accelerator lowers the resistance of nonconductive surfaces rendered conductive by treating in HN-504 activator. HN-505A is a free flowing powder that is dissolved in water with a small amount of HN-505B Kick Start to form the HN-505 accelerator bath.

OPERATING CONDITIONS

Concentration	3.0 to 3.3 pounds per gallon HN-505A 0.3% to 0.5% by volume HN-505B Kick Start
Temperature	140 to 148 F
Time	<u>Dip Processing</u> 7 to 10 minutes <u>ERC® Processing</u> 30 seconds to 2 minutes

MAKE UP & OPERATING PROCEDURES

Dip Tank Processing

Fill a freshly cleaned tank about 80% full with deionized or distilled water. Heat water to 100 to 120 F. With constant stirring, slowly add 3 pounds of HN-505A Accelerator for each gallon of bath. Continue stirring until HN-505A is completely dissolved. Add remaining deionized or distilled water to bring bath to operating level. With vigorous stirring, very slowly add 0.4% by volume HN-505B Kick Start. HN-505B reacts violently with HN-505A solutions when added too rapidly. Add HN-505B very slowly with vigorous stirring to prevent excessive spattering of HN-505A solution. Maintain temperature of the HN-505 bath at 140 to 148 F.

Immerse parts that have been freshly processed through HN-504 Activator and rinsed into the HN-505 bath for 10 minutes. Agitate parts horizontally so that HN-505 is forced through the holes and into blind vias. A rack agitator with 1 to 2 inch stroke operated at 12 to 15 strokes per minute is satisfactory. After soaking for 10 minutes, remove parts from HN-505 bath. Transfer parts immediately to a dual cascade counterflow rinse. Do **NOT** allow HN-505 solution to dry on parts before immersing in water rinse. Soak parts in each station





of the counterflow rinse for about 30 seconds. Tap water at ambient temperature (65 to 110 F) is suitable for rinsing HN-505 from the parts. Deionized or distilled water is not necessary.

After rinsing, immerse parts in a solution of 10% by volume sulfuric acid (reagent, electronic, or SEMI grade) in deionized water at ambient temperature for 3 minutes. Transfer parts to dual cascade counterflow rinses. Tap water at ambient temperature (65 to 110 F) is satisfactory. Soak parts for about 30 seconds in each station of the rinse. Remove parts from rinse and dry thoroughly using a warm air blower or other suitable dryer. **After drying completely**, parts are ready to be prepared for imaging. Plating resist can be applied directly to the activated surface of the copper. If desired, the copper surface may be microetched or scrubbed to remove activator. Either pumice slurry scrubbing or abrasive brush scrubbing is acceptable. If abrasive brush scrubbing is used, adjust brush properly to avoid excessive pressure that forces abrasive fibers deep into large diameter holes. If microetching is desired, use HN-507 in spray application. Adjust exposure time, concentration of HN-507, and operating temperature to remove approximately 5 microinches of copper. Spray rinse with fresh water and air blow dry.

ERC® Processing

Fill freshly cleaned sump of conveyORIZED equipment about 80% full with deionized or distilled water. Heat water to 100 to 120 F. With constant stirring, slowly add 3 pounds of HN-505A Accelerator for each gallon of bath. Continue stirring until HN-505A is completely dissolved. Add remaining deionized or distilled water to bring bath to operating level. With vigorous stirring, very slowly add 0.4% by volume HN-505B Kick Start. HN-505B reacts violently with HN-505A solutions when added too rapidly. Add HN-505B very slowly with vigorous stirring to prevent excessive spattering of HN-505A solution. Maintain temperature of HN-505 bath between 140 and 148 F.

Using parts that have been freshly treated with HN-504 activator, process with HN-505 for 30 seconds to 2 minutes. Be sure the HN-505 solution is forced through the holes and into blind vias. Immediately rinse with tap water at ambient temperature (65 to 110 F.) Deionized or distilled water rinsing is not necessary or desirable.

After rinsing, process parts in a solution of 10% by volume sulfuric acid (reagent or SEMI grade is preferred) in deionized water at room temperature for 30 seconds to 1 minute. Immediately, flash plate with acid copper plating bath using the OS Tech ERC® Plating cell. Rinse with tap water at ambient temperature.

If desired, an antioxidation film may be applied to the freshly plated copper surface to prevent tarnishing by using Tarn Guard Antioxidant. Rinse with ambient temperature tap water. Dry parts thoroughly using a warm air blower or other suitable dryer. After drying, parts are ready for imaging. If desired, parts may be microetched or scrubbed with pumice slurry or abrasive brush to improve adhesion of the plating resist. If abrasive brush scrubbing is used, adjust brush to avoid excessive pressure that forces abrasive fibers deep into large holes.





CONTROL DATA

Shop Level Control

Keep tank covered when not in use to minimize evaporation. Replace evaporation losses with deionized or distilled water. **DO NOT** replace evaporation losses with tap water.

At least once each shift, check the Baume reading of the HN-505 bath. Maintain the Baume reading of the bath (when tested at 140 F) between 30 and 33 degrees. If Baume reading drops below 30, add HN-505A and stir well to dissolve. Additions may be calculated from laboratory analysis of bath using the procedure below.

As parts are processed through the HN-505 solution, the blue color of the HN-505B Kick Start will slowly fade. The HN-505 bath will cease functioning when all of the Kick Start has been depleted. Using color comparison standards, estimate the concentration of HN-505B in the bath every shift.

Filter the HN-505 bath continuously using approximately 10 micron filter cartridges. Inspect the filters at least weekly. Clean or replace filter cartridges as needed.

Copper parts are often oxidized after processing through HN-505 baths. This is normal and in no way interferes with subsequent processing.

Laboratory Control

ANALYSIS

Concentration of HN-505A

1. Place a 5 ml sample of HN-505 bath into a 250 ml Erlenmeyer flask.
2. Add approximately 50 ml deionized or distilled water.
3. Add 3 to 6 drops methyl orange indicator solution.
4. Titrate with 1N sulfuric or hydrochloric acid until the color changes from yellow to orange.
5. Calculations: $\text{ml in acid} \times 0.102 = \text{pounds per gallon HN-505A}$.

Concentration of HN-505B

1. Determine copper concentration, expressed as parts per million (PPM) copper, in HN-505 bath using an atomic absorption spectrophotometer (A.A.).
2. Calculations: $\text{PPM Copper} \times 0.0046 = \% \text{ HN-505B in the bath}$.

Estimation of HN-505B

If an atomic absorption spectrophotometer is not available, the concentration of HN-505B in the HN-505 bath may be estimated using the following procedure.





1. Prepare a stock solution of 3600 grams HN-505A in 10 liters of distilled or deionized water.
2. Prepare fresh color standards by placing 1 ml, 2 ml, 3 ml, 4 ml, and 5 ml HN-505B Kick Start in 5 separate 1000 ml volumetric flasks and diluting to the mark with stock solution of HN-505A. Label standards 0.1%, 0.2%, 0.3%, 0.4% and 0.5% respectively.
3. Use Nessler color comparison tubes (Scientific Products catalog number C6701-2 or equivalent). Place the bath sample and each of the color standards into separate Nessler tubes.

NOTE: For Shop Level Control, uniform clear, colorless glass jars with lids may be used instead of Nessler Tubes.

4. Using a light source below the tubes, compare the color of the bath sample with the color of the standard solutions.
5. Estimate the concentration of HN-505B in the bath.

NOTE: Color standards of HN-505 change with time. The color standards should be prepared the same day the color comparison is performed.

Replenishment

Dip Processing

Add fresh 3.0 pound per gallon HN-505A solution at a rate of 10 gallons per 10,000 square feet of surface processed through the bath, or once weekly, whichever comes first. The preferred method of additions is constant feed and bleed, however, periodic manual additions are usually satisfactory.

ERC® Processing

Add HN-505A and/or HN-505B as required to maintain proper concentrations. Add deionized or distilled water as needed to replace evaporation and dragout losses. Do NOT add tap water to HN-505 baths.

Recharging Cycle

Discard the entire bath and recharge with fresh HN-505 solution when 1,000 surface square feet per gallon have been processed through the bath, or monthly, whichever occurs first.

EQUIPMENT

Tanks of polypropylene, CPVC, Teflon, glass or stainless steel are acceptable for containing HN-505 solutions. Heaters of stainless steel or Teflon are satisfactory.

HANDLING & SAFETY

HN-505A contains alkaline ingredients that are irritating to skin and eyes. HN-505B contains acidic ingredients that are corrosive to skin and eyes. Protective clothing such as impervious gloves, apron, boots





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and chemical goggles should be worn when handling these materials. In case of accidental skin contact, flush immediately with fresh water. Remove contaminated clothing and wash before wearing again. In case of eye contact, flush with fresh water for 15 minutes and seek medical attention at once. HN-505A and HN-505B are harmful if swallowed or inhaled. Avoid breathing vapors or mist.

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