

AUTO / Prep GE-4

Post Etchback Glass Etch-Activator

Product Description

AUTO/Prep GE-4 is the fourth step in the AUTO/Prep Desmear-Etchback Process designed to remove resin smear and expose interconnects, and at the same time optimize the surface topography of the dielectric for eventual electroless copper deposition. AUTO/Prep GE-4 will remove silica residues adhering to the glass bundles after desmear-etchback AND etchback or “frost” protruding or exposed glass fibers providing a clean hole wall ideal for electroless copper deposition. AUTO/Prep GE-4 features process flexibility, minimal copper attack (non-ammoniated formulation), and long solution life.

Performance Features

- AUTO/Prep GE-4 is a non-ammoniated formulation thus reducing copper attack and complexing for ease of waste treatment.
- AUTO/Prep GE-4 will completely remove silica residue and frost or etchback protruding glass fibers leaving a clean hole wall for optimum electroless deposition and adhesion.
- AUTO/Prep GE-4 offers long solution life and minimal operator maintenance for ease of use.
- AUTO/Prep GE-4 exhibits very low surface tension, ensuring small hole wetting and penetration, thus enhancing product performance.
- AUTO/Prep GE-4 can be combined with AUTO/Prep NU-3 Neutralizer to reduce the number of process steps.

Physical Specifications

Physical State	Crystalline Solid
Appearance	Semi-Transparent
Odor	None
Stability	Stable
Specific Gravity	2.0 – 2.1
pH	3 – 4 (30% Solution)
Flash Point	None
Storage Requirements	Corrosive To Glass

Equipment Requirements

Tanks: Molded Polypropylene, PVC, Or Polyethylene

Heaters: Teflon

Racks: PVC Coated Stainless Steel

Ventilation: Recommended

Technical Data Sheet

Product Make-Up

AUTO/Prep GE-4 is operated at 5 – 60 g/L (5 – 20 g/L for a light etch, 45 – 60 g/L for etch back) and is acidified with sulfuric acid. Use the following procedure when making up a new bath.

1. Thoroughly rinse the tank and inspect for cleanliness paying special attention to the heaters and heater sheathings.
2. Fill the tank half full with deionized water and slowly add sulfuric acid such that it will be 6% by volume of the final bath volume.
3. After the sulfuric acid has been added, add AUTO/Prep GE-4 at a concentration of 5 – 60 g/L. Dilute to final volume and mix until all the GE-4 is in solution.
4. Turn on heaters and verify temperature with a thermometer.

NOTE: For optimum performance when preparing AUTO/Prep GE-4, use only distilled or de-ionized water.

Operating Parameters

A typical etchback-desmear process line employing the AUTO/Prep process is as follows:

Process	Immersion Time (Minutes)	Temperature (°F)	Agitation
HS110-S ¹	5-15	100-140	Solution
Water Rinse	1-2	Ambient	Air
Water Rinse	1-2	Ambient	Air
DS-2 - 55g/L	15-30	150-180	Solution
Water Rinse	1-2	Ambient	Air
Water Rinse	1-2	Ambient	Air
NU-3 50g/L	4-8	70-130	Solution
Water Rinse	3-5	Ambient	Air
GE-4 - 50g/L ²	2-4	70-90	Solution
Water Rinse	1-2	Ambient	Solution
Sulfuric Acid Dip 10%	2-5	Ambient	Solution

Perform a final rinse prior to electroless processing.

NOTE 1. When using HS-110S at full strength, you should not exceed process times of 15 minutes. General rule of thumb is 5 minutes immersion when operating HS-110S at full strength and 10 minutes when at 50%.

NOTE 2. AUTO/Prep GE-4 can be incorporated directly into the NU-3 bath thus reducing the number of steps in the process line.

Due to the many dielectrics employed and variance in processing, parameters must be optimized for each type of resin and the desired rate of etchback and/or desmear. It is not uncommon for resin etch rates to vary from vendor to vendor and even lot to lot. It is advisable to periodically observe the topography of the sidewall via SEM photography and measure the etch rate in the permanganate of random samples to ensure proper processing.

Technical Data Sheet

Control and Replenishment

It is necessary to monitor the concentration of sulfuric acid and GE-4 periodically to ensure the bath is within accepted strength parameters.

Determination Of Sulfuric Acid Concentration

Equipment Required	Reagents Required
Erlenmeyer Flask, 250 ml	Methyl Red Indicator
Buret, 25 ml	Sodium Hydroxide Standardized 1.00 N
Pipet, 20 ml	

Procedure

1. Pipet 20 ml of sample bath into a 250 ml Erlenmeyer flask containing 50 ml of deionized water. Add 10 drops of methyl red indicator and mix.
2. Titrate against standardized sodium hydroxide from a red to a yellow endpoint. Record the number of ml required.

Calculations

$$\frac{A \times B \times 100}{C \times D} = \% \text{ by volume sulfuric acid}$$

Where A = N of sodium hydroxide
B = ml of sodium hydroxide to reach endpoint
C = sample size in ml
D = N of conc. Sulfuric acid (36)

Replenishment

$$(A - B) \times C = \text{volume of sulfuric acid to add}$$

Where A = optimum sulfuric acid concentration (6%)
B = measured concentration of sulfuric acid
C = bath volume in gallons or liters

A typical range for sulfuric acid is 5 – 7% by volume.

Technical Data Sheet

Determination Of AUTO/Prep GE-4 Concentration

Equipment Required	Reagents Required
Buret, 50ml	Aluminum Chloride .10M Standardized
	Sodium Chloride ACS
	Sodium Hydroxide 1.00N

Procedure

1. Use the sample remaining from the sulfuric acid determination from the previous procedure. (This reaction must be performed in a neutral or alkaline solution). To this sample add approximately 25 grams of sodium chloride. Heat to 175°F. Add additional dilute sodium hydroxide to maintain a yellow color in the sample. DO NOT OVER ADD SODIUM HYDROXIDE.
2. Titrate the sample with standardized aluminum chloride from a yellow to peach endpoint. Record the number of ml required.

Calculation

$$\frac{A \times B \times C \times D}{E} = \text{g/L of AUTO/Prep GE-4}$$

Where A = ml of aluminum chloride
B = M of aluminum chloride
C = reaction stoichiometry (3)
D = 61.99
E = sample volume in ml (20)

An appropriate range is 45 – 60 g/L for glass etchback or 5 – 20 g/L for glass frosting (light microetch).

Replenishment

Simply add the appropriate quantity of AUTO/Prep GE-4 in g/l to obtain the desired concentration. Be sure to convert bath volume from gallons to liters when calculating the correct quantity of AUTO/Prep GE-4 to add (1 gallon = 3.785 Liters).

Safety and Handling

Read and understand this products MSDS before handling.

Waste Treatment

Individual users should verify the nature of spent solutions to assure compliance with local, state, and federal regulations. Contact Seacole for specific details and/or further waste treatment recommendations.

Ordering Information

AUTO/Prep GE-4 is available in 25# and 50# pails, and 500# fiber drums.

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