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## Product Data Sheet

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**PRODUCT #:** N7111

# MAGNUM GE-600

Glass Etch

**DESCRIPTION:** A non-ammoniated fluoride glass etch. *MAGNUM GE-600* is used to etch away the glass fiber bundles left exposed after the permanganate etchback process. It can be mixed with *MAGNUM N-599 NEUTRALIZER* or used as a separate step for maximum process control.

**BENEFITS:**

- Reduces the wicking associated with other glass etch solutions.
- Flexible process – the neutralizer and glass etch can be separated for greater control, or combined for reduced process steps
- Non-ammoniated for easier waste treatment

**EQUIPMENT:**

Tanks should be constructed of polypropylene, polyethylene or PVC. Heaters should be constructed of Teflon. Ventilation is recommended.

Filtration of the *MAGNUM GE-600* is recommended at a rate of 3-4 turnovers an hour. Use a 20 micron polypropylene filter.

**MAKE-UP/  
OPERATING  
INSTRUCTIONS:**

<b>MAGNUM GE-600:</b>	Glass Etch - 60 g per liter Glass Frost – 3 g per liter
<b>Sulfuric Acid:</b>	7% by volume
<b>Deionized Water:</b>	84% by volume
<b>Temperature:</b>	100 - 120°F
<b>Time:</b>	1 - 5 minutes
<b>Agitation:</b>	Work bar agitation
<b>Vibration:</b>	Recommended for small hole processing
<b>Post Dip:</b>	5 minute dip in 10% sulfuric acid is required

**Procedure:**

1. Fill tank  $\frac{3}{4}$  full with deionized water.
2. Add the required amount of Sulfuric Acid and mix well.
3. Add the required amount of *MAGNUM GE-600* and mix well.
4. Adjust to final volume with deionized water and mix well.

**CONTROL  
PARAMETERS:**

To achieve optimum results the bath should be maintained at these concentrations:

<u>MAGNUM GE-600: Glass Etch</u>	<u>OPTIMUM</u>	<u>RANGE</u>
<i>MAGNUM GE-600:</i>	60 g/l	50-65 g/l
<b>Sulfuric Concentration:</b>	7%	6-8%

<u>MAGNUM GE-600: Glass Frost</u>	<u>OPTIMUM</u>	<u>RANGE</u>
<b>MAGNUM GE-600:</b>	3 g/l	1-3 g/l
<b>Sulfuric Concentration:</b>	7%	6-8%

**NOTE :** The desmear and electroless copper deposition process is laminate specific. Parameters specified in RBP supplied operating guides for particular installations always supersede the parameters listed above.

**ANALYSIS & REPLENISHMENT:**

**Analysis procedures for MAGNUM GE-600**

Any reaction of the sample with glassware will give low results, therefore a plastic pipette should be used to deliver sample. Reaction with glass beaker can be minimized by a pre-addition of sodium hydroxide to the beaker (see step #1).

**Determination of concentration of Sulfuric Acid**

- Equipment:** 20 ml plastic pipette      400 ml beaker with magnetic stir bar  
50 ml burette                              Stir plate
- Reagents:** 1.0N Sodium Hydroxide (NaOH) – Commercially available from chemical supplier.  
Methyl Red Indicator – Commercially available from chemical supplier.

**Procedure:**

- Using burette, add 40.0 ml of 1.0N NaOH into a 400 ml glass beaker(containing a stir bar) and add 50 ml of DI water.
- Pipet(using plastic pipette) 20 ml of working bath into beaker.
- Add 10 drops methyl red indicator.
- Titrate with 1.0N NaOH from red through orange to a yellow endpoint. Save the solution.
- Record the total mls (including step #1& #4) of 1.0 N NaOH used.

**Calculation:** (mls 1.0N NaOH used x 0.139) – (0.0348) x (g/l **MAGNUM GE-600**)=  
% sulfuric acid by volume

**Maintenance:** 
$$\left[ \begin{array}{l} 7 \% - \% \text{ sulfuric acid} \\ \text{from analysis} \end{array} \right] \times 37.85 \times \begin{array}{l} \text{Tank volume} \\ \text{in gallons} \end{array} = \begin{array}{l} \text{mls of sulfuric} \\ \text{acid to add} \end{array}$$

**Determination of concentration of MAGNUM GE-600**

- Equipment:** 50 ml burette                              Hot/Stir plate
- Reagents:** 0.20 M Aluminum Chloride (AlCl<sub>3</sub>) – Dissolve 48.286g of Aluminum Chloride Hexahydrate to a volume of 1 liter with DI water or dilute 100 ml of 6N Aluminum Chloride to a volume of 1 liter with DI water.  
Sodium Chloride (crystal) – Commercially available from chemical supplier.

This product should be used only for its intended purpose. The information stated above is based on our laboratory tests and experience, and is accurate to the best of our knowledge. Since actual use is beyond our control, the recommendations or suggestions are made without warranty, expressed or implied.

**Procedure:**

1. To the solution from step 4 above, add 25 g of sodium chloride.
2. Heat the solution to 160-175°F. Add diluted NaOH as needed to maintain yellow color.
3. Titrate with 0.20 M AlCl<sub>3</sub> until the color changes from yellow to definite pinkish/orange. The end point must be approached gradually to allow the color change to fully develop.

**NOTE:** Set stirring rate to provide a good vortex. Add titrant into the vortex and observe color changes in the vortex.

**Calculation:** mls of 0.20 M AlCl<sub>3</sub> x 1.86 = g/l *MAGNUM GE-600*

**Maintenance:** To raise the *MAGNUM GE-600* concentration by 1g/l, add 3.785 g/gal.

**BATH LIFE:** *MAGNUM GE-600* Glass Etch should be replaced when copper concentration exceeds 1500 ppm of copper or when 100 SSF/ Gal. of boards have been processed.

**CAUTIONS:** *MAGNUM GE-600* Glass Etch is a corrosive material. Avoid contact with the skin or eyes and/or inhalation of the dust when working with this product. The operator should read the MSDS before use.

If contact with skin or eyes is made flush affected area with water for at least 15 minutes. Contaminated shoes and clothing should be removed immediately. Wash clothing before reuse. Consult a physician in case of injury.

Keep *MAGNUM GE-600* Glass Etch in a cool, dry, well-ventillated area out of direct sunlight.

**WASTE DISPOSAL:** Waste treatment and/or disposal of the used *MAGNUM GE-600* Glass Etch working bath will be subject to the federal, state and local regulations that apply and to the permits under which the facility operates. The environmental hazards to be addressed are acidity and metals content

If the facility has a waste treatment permit, the acidity is neutralized using soda ash or lime. Increasing the pH to 9-10 using lime will also precipitate any metals present.