



Product Data Sheet

Date: 01/03/06

Supersedes: 09/02/03

PRODUCT #: N5124 & N5122

MAGNUM N-501 OXIDIZER

Etchback/Desmear Process

DESCRIPTION:

A sodium permanganate based desmear/etchback system designed to efficiently remove sensitized resinous material from the hole wall of printed circuit boards. **MAGNUM N-501 OXIDIZER** produces a microporous surface topography to improve catalyst absorption and hole wall adhesion of electroless copper. Using **MAGNUM N-501 OXIDIZER**, positive etchback can be obtained with three-point connection of the inner layer in most resin systems.

BENEFITS:

- **Simple, easy to control process for desmear/etchback to remove drill smear and debris.**
- **Uniform, microporous surface for maximum copper adhesion**
- **Can be electrolytically regenerated**

EQUIPMENT:

Tanks should be constructed of titanium or 316 stainless steel. Heaters should be constructed of titanium, Teflon, or 316 stainless steel.

MAKE UP/ OPERATING INSTRUCTIONS:

	Desmear	Etchback
MAGNUM N-501 OXIDIZER:	10%	20%
MAGNUM 402:	7% by volume	7% by volume
Deionized Water:	Balance	Balance
Temperature:	155°-180°F	155°-180°F
Time:	5-15 minutes	5-20 minutes
Agitation:	Work bar agitation and solution movement	
Vibration:	Recommended for small hole processing	

Procedure:

1. Fill tank ½ full with deionized water.
2. Add the required amount of **MAGNUM N-501 OXIDIZER** and mix thoroughly.
3. Add the required amount of **MAGNUM 402**, dilute to final volume with deionized water and mix thoroughly.
4. Heat the bath to operating temperature and stir occasionally.

CONTROL

PARAMETERS:

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

	DESMEAR		ETCHBACK	
	Optimum	Range	Optimum	Range
MAGNUM N-501 OXIDIZER	10 %	8-12 %	20 %	18-40 %
MANGANATE	< 45 g/l		< 45 g/l	
MAGNUM 402	7 %	6-8 %	7 %	6-8 %

During use, permanganate ion is reduced to manganate in proportion to the amount of material processed. The use of an electrolytic regeneration unit can regenerate the permanganate, and thus extend the life of the operating solution. Regeneration equipment is available through RBP.

When the electrolytic regeneration process is operating properly, the manganate residue should be maintained below 45 g/l. This may vary somewhat during peak operating periods. Should the residue consistently be above 45 g/l, remove and immerse the electrolytic regenerating unit in a 5% by volume nitric acid solution for 30 minutes.

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 N-501 OXIDIZER

Determination of Percent MAGNUM N-501 OXIDIZER

Equipment: 2 ml pipette 25 ml graduated cylinder
20 ml pipette 250 ml Erlenmeyer flask
50 ml burette 250 ml filter flask
50 ml beaker Glass fiber filter paper, Whatman 934-AH
Buchner funnel Aspirator

Reagents: Saturated barium hydroxide – Add 80 grams of barium hydroxide per liter of DI water. Stir for 15 minutes. Allow undissolved material to settle, then decant the solution and store in a tightly closed plastic bottle.

pH 12.9 barium hydroxide – Using a pH meter standardized to pH 10, add saturated barium hydroxide solution to approximately 800 ml of DI water to a pH of 12.9.

20% v:v nitric acid – Dilute 200 mls of concentrated nitric acid to a volume of 1 liter with DI water.

10% w:v potassium iodide – Dissolve 100 g of potassium iodide into DI water and dilute to a volume of 1 liter.

0.10N sodium thiosulfate (Na₂S₂O₃) – Commercially available from chemical supplier.

0.10N sodium hydroxide (NaOH) – 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. Pipette 20 ml of the bath into a 100 ml volumetric flask. Fill to volume with 0.10N sodium hydroxide solution and mix completely.
2. Pipette 2 ml of the solution prepared in step 1 into a 50 ml beaker containing 10 ml of saturated barium hydroxide solution. Swirl gently to mix.
3. Filter the contents of the beaker through glass fiber filter paper, using a Buchner funnel. Use the pH 12.9 barium hydroxide to rinse the beaker; filtering all washings. Continue to wash the filter paper with pH 12.9 barium hydroxide until the filtrate leaving the bottom of the filter stem is clear. Label this sample B.
4. Pipette another 2 mls of the solution prepared in step 1 into a 250 ml Erlenmeyer flask. Label this sample A.
5. Add 20 ml of 20% v:v nitric acid to both sample B and sample A. Swirl gently to mix.
6. Add 20 ml of 10% w:v potassium iodide to sample A and sample B. Swirl gently to mix.
7. Titrate each sample with 0.10N sodium thiosulfate until the solution fades from dark red to straw yellow. At this point add 5 ml of starch indicator to each sample. Continue titrating to a colorless endpoint.

Calculation: ml $\text{Na}_2\text{S}_2\text{O}_3$ titrated for sample B X N $\text{Na}_2\text{S}_2\text{O}_3$ X 12.9 = % **MAGNUM N-501 OXIDIZER**

[ml $\text{Na}_2\text{S}_2\text{O}_3$ titrated for sample A - ml $\text{Na}_2\text{S}_2\text{O}_3$ titrated for sample B] X N thiosulfate X 103.1 = g/l **MANGANATE**

Maintenance: Maintain the **MAGNUM N-501 OXIDIZER** concentration as outlined in the "Control Parameters" section of the data sheet. Maintain **MANGANATE** at < 45 g/l.

Determination of Percent Concentration MAGNUM 402

Equipment: pH 10 buffer 5 ml pipette
pH meter 150 ml beaker
50 ml burette

Reagents: 0.5N HCl – Commercially available from chemical supplier.

Procedure:

1. Standardize pH meter with pH 10 buffer solution.
2. Pipette 5 ml of working bath into a 150 ml beaker.
3. Add 50 ml DI water.
4. Titrate with 0.5N HCl to pH of 10.5.

Calculation: ml HCl titrated x N of HCl = % **MAGNUM 402**

Maintenance: Maintain the **MAGNUM 402** concentration as outlined in the "Control Parameters" section of the data sheet.

Determination of Percent Solids

Equipment: 25 ml pipette Six inch pyrex evaporating dish
Balance Oven

Reagents: None

Procedure:

1. Weigh a six inch Pyrex evaporating dish and record weight (W_1).
2. Pipette 25 ml of the Permanganate working bath onto the dish.
3. Immediately weigh dish with the solution and record weight (W_2).
4. Heat the solution until all solution has evaporated. Heat slowly to prevent the solution from spattering.
5. Cool and weigh the dish with the dry residue and record weight (W_3).

Calculation: % solids by weight = $\frac{(W_3 - W_1) \times (100)}{(W_2 - W_1)}$

Maintenance: When the **MAGNUM N-501 OXIDIZER** reaches 50% solids by weight as determined by the analysis above, the bath should be replaced.

BATH LIFE:

MAGNUM N-501 OXIDIZER should be replaced when the **Manganate** level exceeds 45 g/l, or after three months if no electrolytic regeneration is used. If electrolytic regeneration is used the bath should be replaced after 12 months of production or when percent solids by weight reaches 50%.

CAUTIONS:

MAGNUM N-501 OXIDIZER is a strong oxidizer and **MAGNUM 402** is strongly alkaline. Store these materials according to their reactivity. A working bath is both alkaline and strongly oxidizing. Safety equipment including protective eye wear, rubber gloves, boots, and aprons should be worn when handling this material. Should exposure occur, flush area with plenty of water and contact a physician if any irritation persists.

WASTE DISPOSAL:

Working bath is alkaline and contains a strong oxidizing agent. Prior to discharge, it is recommended the pH be reduced to 6-7 with dilute sulfuric acid. The oxidizer can be reduced with hydrogen peroxide by adding 35-50% by weight hydrogen peroxide until the characteristic purple color has disappeared. The resulting solution should now be suitable for general waste treatment per the federal, state and local regulations.