



Product Data Sheet

Date: 06/03/08

Supersedes: 07/26/07

PRODUCT #: N3100, N3101 & N3102

MAGNABOND CO-300

Copper Oxide Process

DESCRIPTION:

A copper oxide process uniquely formulated to produce a variety of oxide coatings ranging from a very fine-grained bronzed oxide to a larger grained black oxide. **MAGNABOND CO-300** provides the flexibility to manipulate the grain size allowing for processing a wide variety of dielectric materials while maintaining optimum inner-layer bonding.

BENEFITS:

- Bath make-up flexibility to produce full spectrum of oxide grain structure
- Quick initiation with uniform coverage
- Lower operating temperature
- Self limiting oxide growth to completion 3 - 5 minutes
- Excellent peel strengths

EQUIPMENT:

316 stainless steel is not recommended. Tanks, plumbing and filter pumps should be constructed of titanium, molded polyethylene, or CPVC. Heaters should be constructed of titanium or quartz.

MAKE-UP/ OPERATING INSTRUCTIONS:

Make-up of MAGNABOND CO-300 Pre-dip:

<u>Oxide Grain Structure/Color</u>	<u>Fine Red</u>	<u>Medium Brown</u>	<u>Large Black</u>
Deionized Water v/v%	83.5	82	81.5
MAGNABOND CO-300B v/v%	4.0	5.5	9.0
MAGNABOND CO-300C v/v%	12.5	12.5	9.5
Temperature:	Ambient		
Time:	1-3 minutes		
Agitation:	Rack agitation and eductors recommended		
Filtration:	Recommended (20-25 micron wound polypro) 2-3 turnovers per hour		

The bath ingredients should be added in the above order with thorough mixing to avoid localized precipitation.

MAGNABOND CO-300 Pre-dip is used to prevent drag in of hard water chelators, prevent bath contamination and ensure a smooth uniform oxide.

Make-up of MAGNABOND CO-300 Oxide:

<u>Oxide Grain Structure/Color</u>	<u>Fine Red</u>	<u>Medium Brown</u>	<u>Large Black</u>
Deionized Water v/v%	32.5	31	30.5
MAGNABOND CO-300A v/v%	53	53	53
MAGNABOND CO-300B v/v%	2.0	3.5	7.0
MAGNABOND CO-300C v/v%	12.5	12.5	9.5

Temperature:	140 - 160°F
Time:	3 - 5 minutes
Agitation:	Rack agitation and eductors recommended
Filtration:	Recommended (20-25 micron wound polypro) 2-3 turnovers per hour)

The bath ingredients should be added in the above order with through mixing to avoid localized precipitation. The **MAGNABOND CO-300A** contains some of the hydroxide in **MAGNABOND CO-300B**.

Using **MAGNABOND CO-300** oxide process, it is easy to adjust the concentrations of **MAGNABOND CO-300A**, **CO-300B** and **CO-300C** to obtain the desired oxide grain structure. See chart for concentrations for oxide colors.

NOTE: Parameters specified in RBP supplied operating guides for particular installations always supersede the parameters listed above.

***RECOMMENDED
PROCESS CYCLE:***

- 1. ULTRACLEAN NF - Alkaline Clean** 10 % by volume
Temperature 130°F
Time 3 - 5 minutes immersion
- 2. Water Rinse 2x** 2 - 5 minutes
- 3. Copper Microetch**
CIRCUTEK ME-515 120 g/l, 1 lb/gal
Sulfuric Acid 4 - 5 % by volume
Temperature 70 - 90°F
Time 1 - 3 minutes immersion
- 4. Water Rinse 2x** 2 - 5 minutes
- 5. Sulfuric Acid Neutralizer**
Sulfuric Acid 5 - 10% by volume
- 6. Water Rinse** 1 - 2 minutes
- 7. Pre-Dip**
MAGABOND CO-300B 3 - 10 v/v %
MAGABOND CO-300C 8 - 14 v/v %
Temperature Ambient
Time 2 minutes
- 8. MAGNABOND CO-300 Copper Oxide Process**
See make-up chart above for desired operating conditions.

MAGNABOND CO-300 copper oxide can produce a variety of oxide grain structures because of the flexibility in bath make-up.

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.

CONTROL

PARAMETERS:

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

Pre-dip

<u>Oxide Grain Structure/Color</u>	<u>Fine/Red</u>	<u>Medium/Brown</u>	<u>Large/Black</u>
<i>MAGNABOND CO-300B</i> v/v %	3.0 – 5.0	4.5 – 6.5	8 - 10
<i>MAGNABOND CO-300C</i> v/v %	11 - 14	11 - 14	8 - 11
Temperature, °F	Ambient	Ambient	Ambient

Oxide

<u>Oxide Grain Structure/Color</u>	<u>Fine/Red</u>	<u>Medium/Brown</u>	<u>Large/Black</u>
<i>MAGNABOND CO-300A</i> v/v %	50 - 56	50 - 56	50 - 56
<i>MAGNABOND CO-300B</i> v/v %	1.0 – 3.0	2.5 – 4.5	6 - 8
<i>MAGNABOND CO-300C</i> v/v %	11 - 14	11 – 14	8 - 11
Temperature °F	140 - 150°F	145 - 155°F	150 - 160°F

ANALYSIS &

REPLENISHMENT:

Analysis procedures for *MAGNABOND CO-300*

Note: Analyze all 3 components of the bath prior to making any additions.

MAGNABOND CO-300A Concentration

- Equipment:** 1 ml pipette 250 ml Erlenmeyer flask
5 ml pipette 50 ml graduated cylinder
50 ml burette
- Reagents:** 0.1 N sodium thiosulfate (Na₂S₂O₃) - Commercially available from chemical supplier.
10% w:v potassium iodide – Dissolve 100 g of potassium iodide into DI water and dilute to 1 liter.
20% v:v sulfuric acid – Dilute 200 mls of concentrated sulfuric acid to 1 liter DI water.
Starch indicator – Commercially available from chemical supplier.

Procedure:

1. Pipette a 1 ml sample into a 250 ml Erlenmeyer flask containing 50ml of deionized water and mix.
2. Add 20 ml of 10% w/v potassium iodide and mix thoroughly, followed by 20 ml of 20% v/v sulfuric acid. CAUTION! It is important to add the potassium iodide before adding the sulfuric acid to prevent the generation of poisonous chlorine gases.
3. Titrate the sample with 0.1 N sodium thiosulfate until the solution is a straw yellow color. Add 5 ml of starch indicator. (The solution should have turned purple-black at this point.) Continue titrating to a clear endpoint and record the number of mls.

Calculation:

$$(\text{ml of thiosulfate}) * (\text{N of thiosulfate}) * (12.5) = \text{Analyzed \% by volume}$$

MAGNABOND CO-300A

Note: Take sample for hydroxide analysis prior to making any maintenance additions.

Reagents 1N NaOH solution – Commercially available from chemical supplier.
Phenolphthalein indicator – Commercially available from chemical supplier.

Concentrated Nitric Acid – 68 - 70% reagent grade commercially available from chemical supplier.

Ammonium molybdate reagent – Prepare by the following procedure:
Weigh 45g ammonium heptamolybdate tetrahydrate into a 1L flask.
Add 20 ml concentrated ammonium hydroxide and 100 ml DI water. Swirl to dissolve salt.
Weigh and add 120 g ammonium nitrate. Swirl to mix.
Dilute to 1L with DI water.

Procedure:

1. Pipette a 10 ml sample of the oxide bath into a 250 ml Erlenmeyer flask.
2. Place the flask on a hot plate **in a fume hood**. Carefully add 30 ml concentrated nitric acid. **Toxic chlorine fumes will be evolved**. Let the flask stir on a hot plate while gently warming until the solution is no longer yellow and all the yellow colored fumes have dissipated.
3. Add 160 ml ammonium molybdate reagent solution, and stir for 15 minutes.
4. Filter the solution and wash the yellow precipitate thoroughly with at least 200 ml DI water.
5. Transfer all the precipitate to a 250 ml Erlenmeyer flask, and rinsing the filter paper with DI water to complete the transfer. Add DI water to make a final volume of about 150 ml.
6. Add 5 drops phenolphthalein indicator and titrate with 1N sodium hydroxide to a pink endpoint. **Note:** The precipitate will dissolve as the titration proceeds.

Calculation:

$1.4 * (\text{mls of 1N NaOH used to titrate the sample prepared in the above procedure}) = \text{Volume \% MAGNABOND CO-300C}$

Maintenance:

$[\{ \text{Required conc.}(\%) - \text{Analyzed}(\%) \} / 100] \times \text{Tank volume}$
= Add **MAGNABOND CO-300 C**

Determination of carbonate level for MAGNABOND CO-300

Equipment: 20 ml pipet pH 7.0 buffer
50 ml burette pH 4.0 buffer
250 ml beaker 100 ml graduated cylinder
pH meter

Reagents: 0.5 N Sulfuric acid (H₂SO₄) - Commercially available from chemical supplier.

Procedure:

1. Obtain a sample of the bath and enclose in a container until it reaches room temperature.
2. Pipette 20 mls of cooled working bath into a 250 ml beaker containing 100 ml of deionized water.
3. Calibrate a pH probe with 4.0 and 7.0 buffer solution.

4. Titrate with 0.5N Sulfuric acid to a pH of 8.00. **Titrate slowly once the pH approaches 9.5 or the endpoint will be missed.** Refill the buret. Do not use hydrochloric acid or toxic fumes will evolve.
5. Titrate slowly to pH 4.60 being careful not to overshoot the end point. Note the amount of acid used to titrate from 8.00 to 4.60.

Calculation:

(Mls titrated from pH 8.00 to pH 4.60) x (N acid) x 5.2995 = gm/l Na₂CO₃

BATH LIFE:

Pre-dip The pre-dip bath should be replaced when the square footage run through the bath exceeds 250 SSF/gal. of working solution or 10 ppm copper.

Oxide – The oxide bath should be replaced when the square footage run through the bath exceeds 2,000 SSF/gal. of working solution or when the carbonate level is greater than 25 g/l.

CAUTIONS:

MAGNABOND CO-300A is a strong oxidizer and **MAGNABOND CO-300B** is strongly alkaline. These materials should be stored accordingly based upon their reactivity.

Protective clothing including eye protection, gloves, and aprons should be worn when handling. If contact should occur, flush exposed area with water for 15 minutes and contact a physician if necessary. It is very important to prevent **MAGNABOND CO-300A** and the working bath from coming in contact with strong acids to prevent the generation of toxic chlorine gas. If mixing should occur, evacuate area and notify the proper authorities.

WASTE DISPOSAL:

It is important to neutralize the oxidizer prior to disposal of spent material. The following process is recommended:

1. Prepare a sodium thiosulfate solution consisting of 4 lbs/gal of sodium thiosulfate and 3 oz/gal of sodium carbonate.
2. Dilute each gallon of spent material with 4 gallons of water.
3. Add the spent bath to the thiosulfate solution slowly. No more than 10 gallons of diluted spent material should be added to three gallons of the thiosulfate solution.
4. Allow to stand for 30 minutes and then neutralize to a pH of 7 with 20% by volume sulfuric acid.
5. Allow any precipitate to settle, decant the supernatant liquid and dispose of in accordance with all local, state and federal regulations.