



## **MEKLEEN MAC-5330 RTU**

### **ACID CLEANER**

#### **DESCRIPTION**

MEKLEEN MAC-5330 RTU is a pre-treatment cleaner specially designed for the MecEtchBond process.

After treatment, conventional cleaners have chemical residues on the boards inhibiting the effect of the roughening agent in the following process step.

MEKLEEN MAC-5330 RTU effectively removes not only fingerprints but also oxide, residues as well as dry film adhesives from Cu surfaces without leaving itself any residues after treatment.

It works differently than conventional degreasing chemicals or rust removing agents by slightly etching away (abt 0.1-0.2  $\mu\text{m}$ ) inhibitors and foreign materials that only mechanical scrubbing could remove so far. Therefore it is also usable as cleaner prior to ENIG.

MEKLEEN MAC-5330 RTU is also very efficient as pre-treatment prior to HASL. It removes residues on the copper pads which might stay there after curing the soldermask.

#### **FEATURES**

1. Effectively removes inhibitors. MEKLEEN MAC-5330 RTU can effectively remove inhibitory substances that interrupt further copper surface treatment.
2. Can make the best surface condition for MecEtchBond process. Because the treated surface is free of foreign materials, MEKLEEN MAC-5330 RTU can be used as preconditioning for every post-treatment. Using MEKLEEN MAC-5330 RTU prior to the consecutive processes an even and smooth topography can be created on Cu surfaces.
3. Easy to control. Having a sulphuric acid/hydrogen peroxide base, MEKLEEN MAC-5330 RTU can etch the Cu surface. However, since the etching amount is minimal and etching speed is very stable, the solution control is basically to replenish the dragged-out amount, which helps to reduce running costs.

#### **PHYSICAL PROPERTIES**

##### **MEKLEEN MAC-5330 RTU**

Appearance	Colorless to clear light yellow liquid
Specific gravity(20°C)	1.113 ~ 1.143
Ready to use.	

## HOW TO USE

### 1. Solution control

For making-up and replenishing use 100% MEKLEEN MAC-5330 RTU.

### 2. Working condition

Apply by spraying or dipping. Spraying can remove inhibitors faster and more effectively. Etching speed becomes faster at lower copper concentrations, therefore copper concentration of the working solution should be kept at 5 g/l or more to treat a fine line board.

General application:

Temperature used : 20-30°C

Contact time : 10-30 sec. (Standard: Abt. 0.1 - 0.3 µm/15 sec. by spray application)

Prior to HASL:

Temperature used : 40-50°C

Contact time : 20-30 sec.

ER: 0.4 - 0.7 µm

Notes :

- (1) In case of dipping treatment, stir the working solution appropriately to make it certain condition.
- (2) If treating boards on racks, space boards 1 cm or more apart. If applied to overlapping boards, the temperature between boards can rise and cause over-etching.
- (3) After treatment, rinse boards abundantly in water and dry promptly.

### 3. How to replenish

Replenish the dragged-out amount of MEKLEEN MAC-5330 RTU working solution (When treating boards with large pattern areas, check copper concentration to decide when to replace and replenish MEKLEEN MAC-5330 RTU. To maintain solution performance, analyze the following parameters and replenish the solution so that it stays within the control range :

- (1) Copper concentration.
- (2) Hydrogen peroxide concentration.
- (3) Sulfuric acid concentration.

## **ANALYTICAL CONTROLS**

### **A. H<sub>2</sub>O<sub>2</sub>**

#### **KMnO<sub>4</sub> titration method**

1. Pipette 1 ml of MEKLEEN MAC-5330 RTU bath solution.
2. Add 50 ml of deionized water and 5 ml of 50%-H<sub>2</sub>SO<sub>4</sub>.
3. Mix well and titrate with 0.10 N-KMnO<sub>4</sub> to a pink endpoint.
4. Calculation :  
$$35 \% \text{ H}_2\text{O}_2 \text{ (g/l)} = 4.857 \times f \times V \text{ (= 1 if 0.1 N-KMnO}_4 \text{ is used)}$$
where f = the factor of 0.10N- KMnO<sub>4</sub>  
V = the titrated volume (ml)

#### **Electric potential difference titration method**

1. Pipette 1 ml of MEKLEEN MAC-5330 RTU bath solution into a 100 ml beaker.
  2. Add 50 ml of deionized water.
  3. While agitating, titrate with 0.10N-NaHSO<sub>3</sub> (10.4 g/l NaHSO<sub>3</sub>) to an endpoint where the potential drops fast.
  4. Calculation :  
$$35 \% \text{ H}_2\text{O}_2 \text{ (g/l)} = 9.71 \times f \times V$$
where f = the factor of 0.10N-NaHSO<sub>3</sub>  
V = the titrated volume (ml)
- \*Prepare required quantity of 0.10N-NaHSO<sub>3</sub> at the time of analysis.

**Working hydrogen peroxide range = 30 g/l or more**

### **B. Cu**

1. Pipette 1 ml of MEKLEEN MAC-5330 RTU bath solution.
2. Add 50 ml of deionized water.
3. Add aqueous ammonia to a blue endpoint.
4. Add 0.2 g of 0.4%-Murexide reagent (diluted Potassium Sulphate)
5. Titrate with 0.025M-EDTA 2Na from a reddish yellow to a purple endpoint.
6. Calculation :  
$$\text{Cu (g/l)} = 1.5885 \times f \times V$$
where f = the factor of 0.025M-EDTA 2Na  
V = the titrated volume (ml)

**Working copper concentration range = 40 g/l or less  
(etching speed stabilizes when approx. 2-3 g/l or more Cu are dissolved)**

### **C. H<sub>2</sub>SO<sub>4</sub>**

1. Pipette 1 ml of MEKLEEN MAC-5330 RTU bath solution.
2. Add 50 ml of deionized water.
3. Add 2 to 3 drops of Methyl Orange indicator.
4. Titrate with 0.50N-NaOH from a reddish orange to a yellow endpoint.
5. Calculation :  
$$\text{H}_2\text{SO}_4 \text{ (g/l)} = 24.5 \times f \times V$$
where f = the factor of 0.50 N-NaOH  
V = the titrated volume (ml)

**Working sulphuric acid concentration range = 90 g/l or more**

**D. ETCHRATE MEASUREMENT**

1. Weigh a piece of single or double sided copper laminate to the nearest mg. = W1
2. Measure the total surface = S in dm<sup>2</sup>
3. Process this piece through the horizontal or vertical process.
4. Weigh again to the nearest mg = W2

$$\text{Calculation : } \frac{W1 - W2}{S \times 8.9} \times 100 = \mu\text{m etched (single sided)}$$

$$\frac{W1 - W2}{S \times 8.9} \times 50 = \mu\text{m etched (double sided)}$$

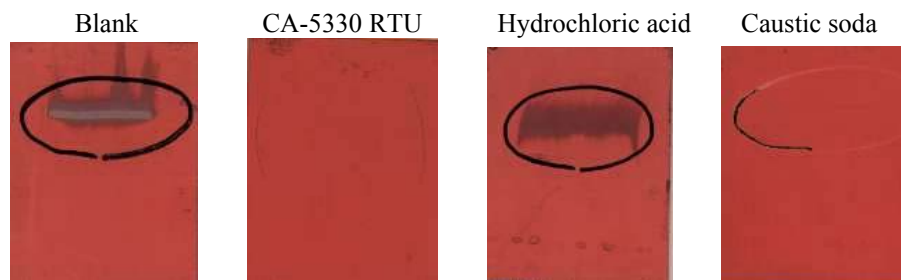
**PERFORMANCE**

1. Inhibitor removal test

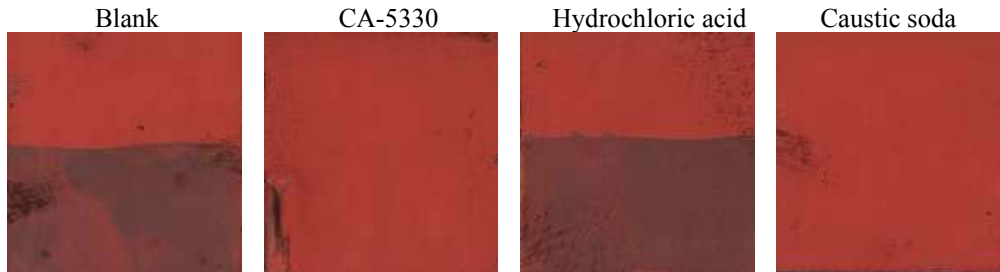
Pretreatment agent	MAC-5330 RTU	Hydrochloric acid	Caustic soda	Conventional MEC degreasing agent
Fingerprints	O	X	Δ ~ X	Δ
Copper plating additive (A)	□	X	□	O
Copper plating additive (B)	□	□	X	-
DF adhesive	□	X	X	-
Soluble ink from AOI check	□	X	□	Δ
Anti-tarnish	O	□	O	Δ
Rust remove	O	O	X	O
Effect on MecEtchBond	O	O	O	X

- : Excellent
- O : Good
- Δ : Sufficient
- X : Inferior
- : Not good

Soluble ink from AOI check: inhibitor removal performance after pre-treatment and 0.5 μm etching by MEB CZ-8100



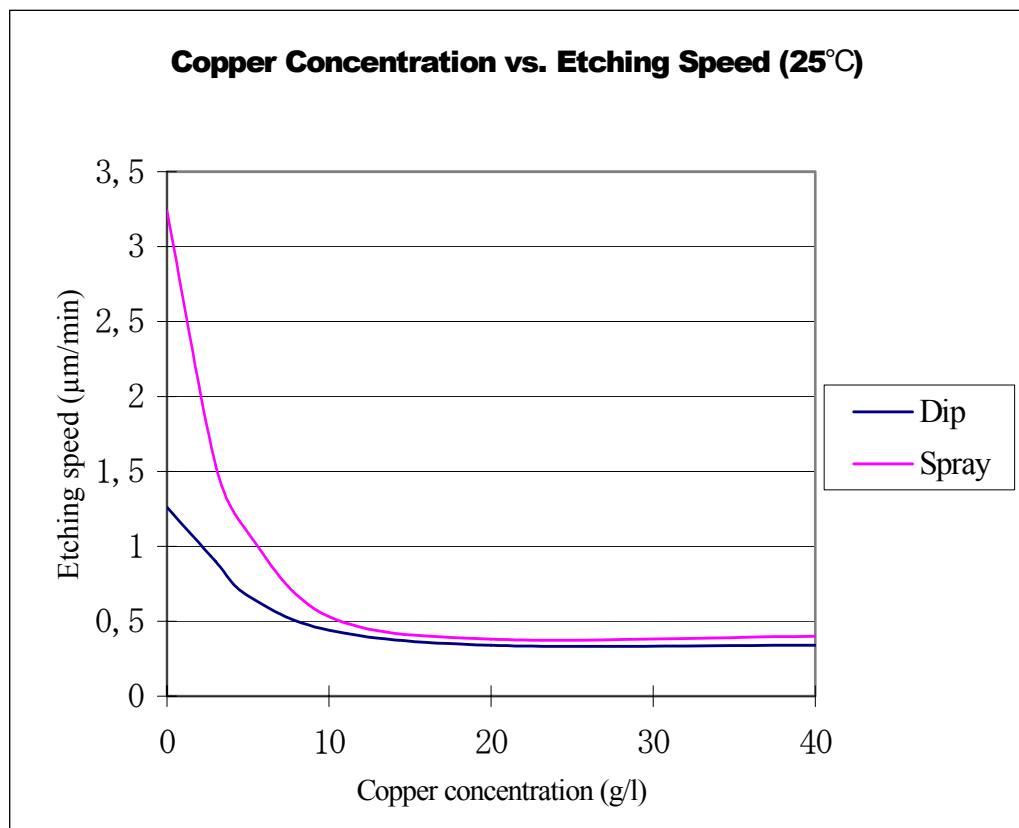
Copper plating additive (A): inhibitor removal performance on lower half of test piece after additive application, pre-treatment and 0.5  $\mu\text{m}$  etching by MEC CZ-8100



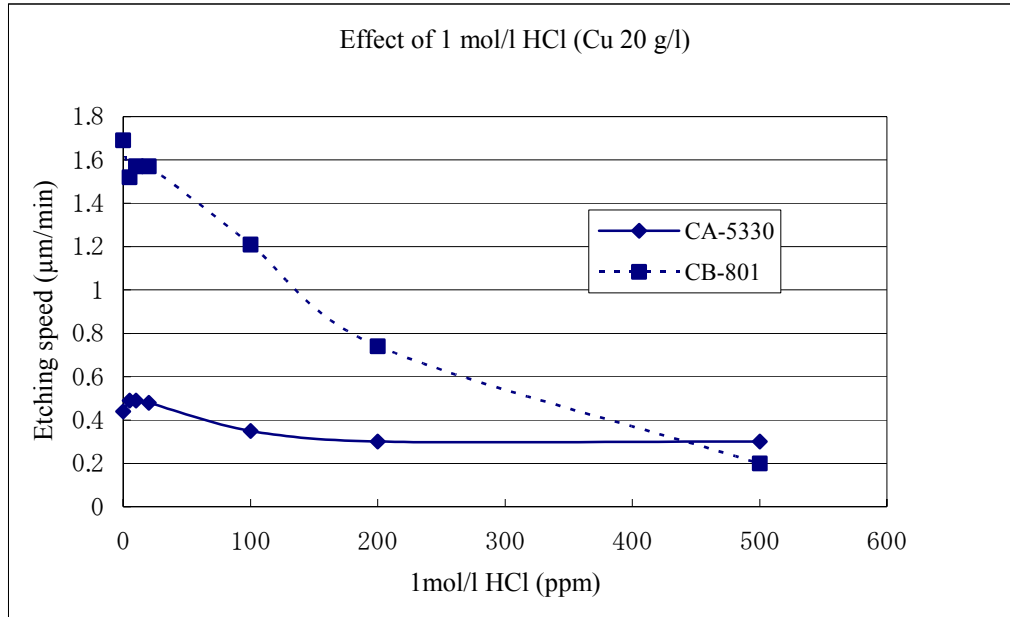
## 2. Etching amount

MEKLEEN MAC-5330 RTU is not an etchant. However, it slightly etches the Cu surface to remove inhibitors. The amount is indicated below.

### Copper Concentration vs. Etching Speed



Effect of Chlorine contamination



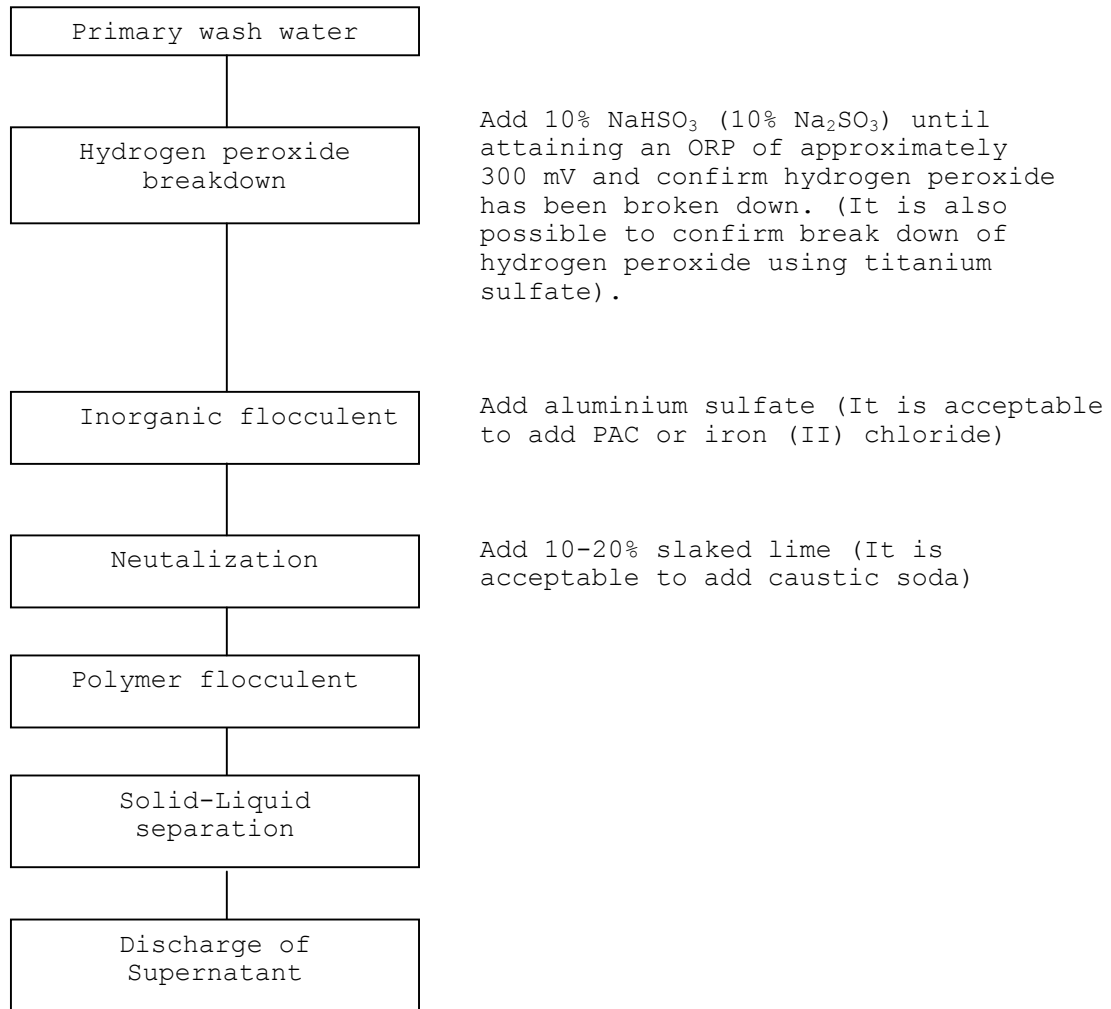
**WASTE TREATMENT**

MEKLEEN MAC-5330 RTU spent solution and any waste water must be treated and/or disposed in accordance with all applicable regulations.

The following procedure is provided as a guideline for treating the spent solution.

Contact a professional subcontractor to treat the spent solution and concentrated rinse water.

Decompose and neutralize hydrogen peroxide in the first rinse water using a reducing agent.



MEKLEEN MAC-5330 RTU (0.1% water solution) . . . COD / 95 ppm

## COMPATIBLE MATERIALS

Material	Evaluation	Material	Evaluation
Stainless steel 304 rod	O	Rigid PPE	O
Stainless steel 316 rod	O	Soft PVC	X
Titanium	X	Soft Thermoplastic	O
Welded stainless steel	X	Elastomer	
Welded titanium	X		
		Foamed PVC	O
Rigid PVC	O	EPDM for O-rings	X
Rigid PP	O	FPM(Viton) for O-rings	O
Rigid PE	O		
Rigid Ulmoler/PE resin	O		

O : compatible

X : not compatible

Δ : contact MEC's sales office

A PE coil is recommended for the cooling coil.

## OPERATING CAUTIONS

### Precautions in use

1. Ventilate the area where used.
2. Be carefull not to spill when pouring from its container.
3. Wear protective gloves, goggles and other suitable gear when handling, avoid contact with skin, especially eyes.
4. Wash hands and gargle after use.
5. Seal airtight and store in a cold dark place avoiding direct sunlight.
6. Soak up spills with dry earth or sand and collect in a chemically safe container.

### In the event of an emergency

1. If contacted with skin, flush abundantly with soap and water until all substance runs off.
2. If contacted with eyes, flush immediately with clean water for at least 15 minutes and consult a physician.
3. If inhaled, seek fresh air. Consult a physician as required.
4. If swallowed, force plenty of water and consult a physician immediately.

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