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TECHNICAL BULLETIN
OMIKRON™ OA-8
Immersion White Tin Solution

I. Description

OMIKRON™ is a specially engineered "Immersion White Tin" process that can be used as a direct replacement for the hot air solder leveling process. It will cover active copper surfaces with a very dense white tin that retains its solderability in excess of one year. The key to the process is the type and structure of the deposit. It is a fine crystalline structure that is non-porous. This process should not be confused with conventional "gray immersion tins" coatings that should only be used for cosmetic enhancement.

This process will always produce a flat solderable surface that is desirable for surface mount components. The coating is uniform over the total copper area.

The **OMIKRON™** process consists of two proprietary products. The first is **OV-4,** a pre dip solution that activates the copper surface. This insures that the subsequent step, **OA-8,** will chemically deposit the correct structure of white tin. For long term storage (excess of one year) or for multiple heat cycle assembly requirements (greater then three) the minimum deposit thickness is 0.65 microns of pure tin (1.0 microns total tin). This thickness of pure tin remains on the surface even after long storage periods and high temperature exposure giving excellent soldering results

II. Operating Parameters

Make-Up	100 % **OA-8**
Temperature	140° F to 160° F (60° C to 71° C)
Immersion Time	10 to 15 minutes
Process	Batch tank or horizontal flood bar
Agitation	Will speed through hole coverage
Circulation	Continuous
Filtration	Batch filter cold through a 1-3 micron filter
Ventilation	Advised
Tanks	Polypropylene, Polyethylene. Do not use PVC.
Racks, Baskets	Plastic coated stainless steel; use polypro or Halar (black or green). Do not use PVC.
Heaters	Quartz, Enamel, Teflon, PTFE with power < 2 W per sq. cm.

III. Physical Properties

Specific gravity	1.26 – 1.28
Appearance	Viscous yellow liquid
Odor	Semi-sweet odor

IV. Control Procedures

OA8 should be analyzed regularly and small additions should be made frequently. This will keep the OA8 bath operating at optimal conditions.

OA8 dissolves copper as tin is plated. As the copper concentration increases, a white precipitate will form in OA8. The white precipitate is a copper-thiourea complex. The copper-thiourea complex will dissolve in heated OA8, but will precipitate out as the OA8 is cooled to room temperature. It is best to filter out the white, copper precipitate when the OA8 baths are at room temperature. This should be done on a weekly basis.

Iron contamination can cause a dark tin deposit and possibility solderability issues. It is very important that metal parts do not come in contact with the OA8 bath. All metal parts used must be coated in an appropriate type of plastic. See section II. Operating Parameters above.

V. Analysis Procedures

Specific Gravity

OA8 baths should be analyzed for specific gravity at least daily, and maintained between 1.24 and 1.30 (measured at room temp ~ 25C). Determine specific gravity by hydrometer or accurately weighing a known volume of OA-8 bath at room temperature (25C). If done by weight, the specific gravity is the ratio of weight in grams divided by volume in millimeters.

Operation of the Room Temperature OA-8 strike bath.

During the use of the room temperature OA-8 strike bath, OV-4 pre-dip will drag into the bath and OA8 solution will be dragged out. This will decrease the specific gravity. Specific gravity should be maintained daily, through the removal of water by evaporation. Small frequent additions are recommended.

Operation of the Heated OA-8 bath.

During the use of the heated OA-8 bath, water will evaporate from the bath and solution will be dragged out. This will lower the bath volume and increase the specific gravity. Specific gravity should be maintained daily, through the addition of de-ionized water. Small frequent additions are recommended.

Acid Normality
Reagents and Equipment

1.0 N Sodium Hydroxide
Cresol Red indicator solution (0.1g in 100 ml alcohol) or a pH meter
250 ml Erlenmeyer flask
2.0 ml pipet
50 ml buret

Procedure – using Cresol Red:

1. Pipet 2.0 ml of **OA-8** working solution into the 250 ml Erlenmeyer flask.
2. Add ~75 ml of de-ionized water and 2 to 3 drops of Cresol Red indicator solution.
3. Titrate with 1.0 N sodium hydroxide from yellow to a purple endpoint.
4. CALCULATIONS:

Acid Normality = (mls of base) x (Normality of base) x 0.5

An active **OA-8** solution should have an acid normality between 5.0 and 8.0. Maintain acid normality through specific gravity adjustments. Evaporation of water out of the OA8 bath will increase the acid normality. Additions of DI water will decrease the acid normality.

If cresol red indicator is not available; analysis can be made using a pH meter. See the analysis below.

Procedure – using a pH meter:

1. Pipet 2.0 ml of **OA-8** working solution into a 300 ml beaker.
2. Add ~75 ml of de-ionized water and mix.
3. Calibrate the pH meter using pH=4.00 and pH=7.00 buffers.
3. Titrate with 1.0 N sodium hydroxide to a pH of 7.4 to 8.6. (the pH will change rapidly in this region)
4. CALCULATIONS:

   Acid Normality = (mls of base) x (Normality of base) x 0.5

Determination of Stannous Tin Content

Reagents and Equipment

25 ml buret
5.0 ml pipet
250 ml Erlenmeyer Flasks
50 ml graduated cylinder
0.05 M EDTA Solution
Acetate Buffer Solution

(270 grams of sodium acetate trihydrate & 60 mls glacial acetic acid diluted to 1.0 liter in D. I. water) OR
(162 grams of anhydrous sodium acetate & 60 mls of acetic acid diluted to 1.0 liter in D. I. water)

Methylthymol Blue indicator crystal blend

(1 gram of methylthymol blue, tetrasodium salt mixed with 99 grams of potassium chloride crystals)
[Fisher Scientific part # AC10637-0050 or VWR Scientific part # JTR164-1]
The indicator crystal blend is stable indefintely.

Procedure:

1. Add 25 mls of Acetate Buffer solution and ~75 mls of de-ionized water into a 250mL Erlenmeyer flask.
2. Pipet 5.0 mls of working solution into the flask.
   (Be careful to pipet only the liquid, solids will cause errors in the titration.)
3 Mix and add Methylthymol Blue crystal blend until a red-orange color is present.
4. Titrate the solution with 0.05 M EDTA solution from red-orange to a yellow endpoint.
5. CALCULATIONS:

   Stannous Tin (g/L) = (mls of EDTA Solution) x (Molarity of EDTA Solution) x 24

Maintain the level of stannous tin above 18 grams per liter. To increase the stannous tin concentration by 1 g/L, add 18 mls of **OR-3** per liter of bath.

We recommend evaporation of water out of the OA8 bath to make room for **OR-3** additions. This will help maintain the specific gravity and acid normality of the OA8 bath.

Determination of Copper Content

Copper concentration is best determined by Atomic Absorption. Use one of the folllowing dilution ratios for best results: 0.1 mL OA8 into 100 mL of DI water, or 1.0 mL OA8 into 100 mL of DI water.

Copper is removed from OA8 by cooling the OA8 bath to room temp. and then filtering out the white copper-thiourea precipitate. It is best to use a larger filter rating initially and work down to a small filter rating to remove all of the copper precipitate. For example, start with a 20 micron filter, then a 10 micron filter and finish with a 1 micron filter. Discard the filters when they are plugged with copper precipitate.

We recommend maintaining the copper concentration below 6 grams per liter.

V. Safety

OA-8 is a corrosive, acidic solution containing organic acids. Avoid breathing vapors. **CONTAINS METHANE SULFONIC ACID**. Use in a well-ventilated area. When handling concentrate or working solution, wear protective clothing, gloves and chemical safety goggles. In case of skin contact, remove contaminated clothing and flush affected area with plenty of cold water. In case of eye contact, flush immediately with plenty of cold water and seek medical attention immediately.

Store **OA-8** in its original container. Keep away from direct sunlight and temperature extremes. Protect from freezing.

VI. Waste Treatment

OA-8 contains organic and tin metal salts. In the process of activating copper clad material, some copper may be removed and dissolved in solution. The spent working solution of **OA-8** may be treated by pH adjusting the solution to a pH above 10 with dilute caustic soda. Allow the precipitate to settle. Filter the solution and make a final pH adjustment of the solution to between 6 and 8 with dilute sulfuric acid before sending the spent solution to the sewer. Consult with local officials for further waste disposal regulations.

VII. Miscellaneous

Packaged in 1 gallon, 5 gallon, 55 gallon drums