Alkali Developable Solder Resist

PSR-4000 SP71

ENACTMENT DATE :

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PSR-4000 SP71

1. FEATURES

PSR-4000 SP71/CA-40 SP71 is a dual-component, alkaline developable liquid photo imageable solder mask for electrostatic spray coating with the following features:

- Glossy Type
- High resolution
- Excellent in electrolytic / electroless gold plating resistance.

1) Specification

Main Agent	PSR-4000 SP71 (UL Name : PSR-4000SP71)
Hardener	CA-40 SP71 (UL Name : CA-40SP71)
Color	Green Color
Mixing Ratio	Main Agent : 80 Hardener : 20 (by Weight)
Viscosity*	120Ps (Before Dilution) [Cone & Plate Type Viscometer, 5rpm/ 25℃]
	60~70 Sec (After Dilution) [IWATA Cup(NK-2), 25℃]
Solid content	57 Wt%(After Dilution)
Specific Gravity	1.30 (After Dilution)
Tack dry window	80℃ × 40min below(Hot Air Convection Oven)
Exposure energy	250 ~ 450mJ/cm^2 (on the surface of resist)
Pot-Life	24 hours after mixing (20~25℃)
Shelf- Life	6 month after manufacturing (Store at dark place, 20℃ or below)

* Viscosity is changed according to using conditions.

2) Lot No. of Product

Lot No.	2002	10	01	2	01
	Year	Month	Day	Division	Number

2. PROCESS

Observe below recommendation process , otherwise you can deteriorate quality and reliability.

1) Process Flow Chart and Parameter

(1) Pre-Treatment : Acid Treatment, Brushing, Buffing (#300 ~ #800), Water Rinse

(2) Printing : wet.90g/m^2 [wet.80g/m^2 ~120g/m^2]

(3) Holding Time : 10 Min

(4) Pre-Cure : ① For double-side exposure
Side A 80℃, 10 ~ 15 Min (Hot air convection oven)
Side B 80℃, 15 ~ 20 Min (Hot air convection oven)
② For single-side exposure
Convection Oven 80℃, 20 ~ 30 Min

(5) Exposure : 300 ~ 500mJ/cm^2 (on the ink surface)

(6) Holding Time : 10 Min

(7) Development : Developer : 1wt% Na_2CO_3
Temperature : 30℃
Spray Pressure : Upper and Lower 2 ~2.5Kg/cm^2 respectively
Dwelling Time : 60 ~90 sec

(8) Water Rinse : Temperature : 30℃
Spray Pressure : 1 ~ 1.5Kg/cm^2
Dwelling Time : 45 ~ 60 sec

(9) Post-Cure : 150℃ × 40 Min (Convection oven or Differential heating oven)
* The maximum level of post-cure is 60min at 150℃.

(10) Post-UV : UV Curing M/C 500 ~ 1000mJ/cm^2

(11) Marking Cure : 150℃, 20 ~ 30 Min × 2 times
* In case no-marking cure – Post cure : 150℃ / 60min

2) Attention

(1) Keep the operation room cleaned. The product must be protected for dust.

(2) The contaminations of board cause the quality and reliability deterioration.

(3) Avoid use in white or day light (direct or indirect). As to the operation environment, it is desirable to deal with ink in the clean room at 20~25℃, humidity 50 ~ 60% RH for printing.

(4) Appropriate coating thickness on copper circuits after cure is 15~25 ㎛. Coating less than the said value may cause lower resistivity in solder heat, chemical and Ni/Au plating, and thicker coat may undercut and insufficient tackness.

(5) As curing condition and window are variable depending on the type of drying oven, the board quantity to input, etc., set it suitable to your process after testing.

(6) As condition of exposure room, Operation in a clean room of ambient temperature at 15~20℃/ 45 ~ 55% RH, under yellow (UV cut) lamp.

(7) Set the exposure energy after the test confirmation because exposure energy is difference to species of core material and thickness., etc.

(8) Control well the quality of developing agent in its density, temperature, spray pressure and dwelling time. Insufficient control may cause deterioration in developability or undercut.

(9) Post cure condition should be set with consideration of curing time of legend ink. Shortage or excess in curing may cause deterioration of coating properties.

3. GENERAL PROPERTIES OF PRODUCT

1) Tack dry window

Dry time (80℃, minute)	20	30	40	50	60
Develop ability	OK	OK	OK	NG	NG

* Test condition and decision standard : Under preceding descriptions recommendation condition eye inspection of drying and development is done at 80℃ after specimen manufacture and inscription of OK or NG is done according to presence of ink trace on the copper.

2) Photosensitivity

Items	Coating Thickness	Exposure (mJ/cm^2)	Developing time	Photo Sensitivity
Photo Sensitivity (Kodak No.2)	30μm	300mJ/㎠	60 sec.	9 step
		400mJ/㎠		10 step
				11 step
Resolution (Between QFP pads)	45μm	300mJ/㎠	60 sec.	70μm
		400mJ/㎠		60μm
		500mJ/㎠		50μm

* Test condition and decision standard : Under preceding descriptions recommendation condition inscription is done after eye inspection of exposure according to exposing energy and development at exposure after specimen manufacture.

3) Characteristics

(1) General properties

Items	Test condition	Test standard	Test result
Pencil Hardness	≥ 6H / on copper	The copper must not be seen	Pass (6H)
Solder heat resistance	260±5℃ / 10 sec×3cycle	No ink peeling	Pass
Adhesion	Cross Cut 10×10, Tape Test	100/100 No peeling	Pass
Appearance /Color	Visual inspection	Identical with past Lot.	Pass

Solvent Resistance	Dipping PGM-Ac 30min/20℃	No peeling by scrubbing	Pass
Acid & Alkaline Resistance	10 Vol.% H_2SO_4 20℃×30min Dipping 10 Wt.% NaOH 20℃×30min Dipping Tape Test	No ink peeling	Pass
Electroless Ni/Au Resistance	Ni(3.0~5.0μm)， Au(0.03~0.05μm) Tape Test	No ink peeling	Pass
Electrolytic Ni/Au Resistance	Ni(5.0μm)， Au(1.0μm) Tape Test	No ink peeling	Pass

(2) Reliability

Dielectric Strength	- Rising 500VDC /sec	No change of ink in DC 500V	Pass (760vt)
Insulation Resistance	- Loading DC100V for 1min - After HASL, Loading DC100V for 1min	More than $5\times10^8\Omega$ More than $5\times10^8\Omega$	- Pass ($1.47\times10^{13}\Omega$) - Pass ($9.44\times10^{11}\Omega$)
Moisture and Insulation Resistance	- After 50℃×24hr, Loading DC100V for 1min - After 25~65℃×85%RH×DC50V×7days(20cycles) Loading DC100V for 1min	More than $5\times10^8\Omega$ More than $5\times10^8\Omega$	- Pass ($1.49\times10^{13}\Omega$) - Pass ($4.5\times10^{11}\Omega$)
Electro Migration	- 85℃×90%RH×DC10V×168hr - Evaluate by decuple magnifying	More than $2\times10^6\Omega$ No change of appearance	Pass
Hydrolytic Stability	- 97±2℃×90~98%RH×28days - Macrography and Ink surface rub	No change of appearance, restless, and crack No ink trace	Pass
Thermal Shock	- 15min/125℃×15min/-65℃ (100cycles) - Evaluate by 30times magnifying	No Discoloration, crack and restless	Pass

* All data mentioned above in this technical data sheet are based on our laboratory test result and only for reference, not to guarantee the same in your process.

4. TROUBLE SHOOTING

Divide	Problem happens	Action	Note
1	Film tacky under exposure	- Ink thickness - Temperature and ventilation of drying - Temperature and time of exposing machine	
2	Under development	- Ink thickness - Temperature and ventilation of drying - Plant/working room humidity	
3	Resolution inferiority	- Ink thickness - Condition of exposure and development	
4	Discoloration	- Ink thickness - Temperature and time of curing	
5	Hole burst	- Ink thickness - Temperature and time of curing	
6	Ink Adhesion inferiority in HASL	- Ink thickness - Condition of pre-treatment and water rinse - Condition of water rinse at development process	
7	Ink Adhesion inferiority in gold plating	- Ink thickness - Condition of pre-treatment and water rinse - Condition of exposure and development	

- Inquire to Business department and research institute of our company.

5. CAUTION FOR SAFETY

- Before use, read caution for safety and use exactly.
- The Caution for safety is to prevent danger or damage beforehand in using the product.
- Make the workers to know the caution for safety in catalog.

WARNING

* Use a suitable conveyance tool at transfer of heavy thing. When convey by oneself, take right posture. Big force may cause injury and lumbago.

* While use, put protection mask, goggle and protection gloves etc. Injury can happen by inhalation and contact in a long or short time

* Establish exhauster in operation room. While use, headache, vomiting, megrim etc. can happen in case inhale stream of volatile solvent.

* After using, annul the empty receptacle without another application.

* Dispose of the waste according to related law. It can cause serious environmental pollution that incinerate or abandon the waste in land and water.

* By spray machine characteristic , electricity spark happens while coating and explosion and fire can break out .

CAUTION AT USE

* Avoid from direct sunlight, heat source and fire.
* Necessarily, keep the optimum temperature(10 ~ 20℃). Use the inks 1day after leaving alone at recommendation temperature to intercept the inflow of water and make the state stable.
* Do not use the product after the term of validity.
* Observe mixture ratio of main agent and hardener. And do not use as other product mixed.
* When the pot-life is expired or the ink is leaved alone long hours, don’t use.

In case of misapplication differ from contents, it results in for Quality and reliability deterioration.

6. REVISION SHEET

No.	Date	Reason For Revision	Before Revision	After Revision
0	Revision History Unmanagement			
1	2004.01.05	- Product Liability Law application - Style revision	-	Refer to the style/data
2	2004.07.29	- Developability deterioration by discoloration Improvement	80℃ × 60min below	80℃ × 40min below
	-End-			