STANNOL

SP6000

FACTBOOK

Table of content

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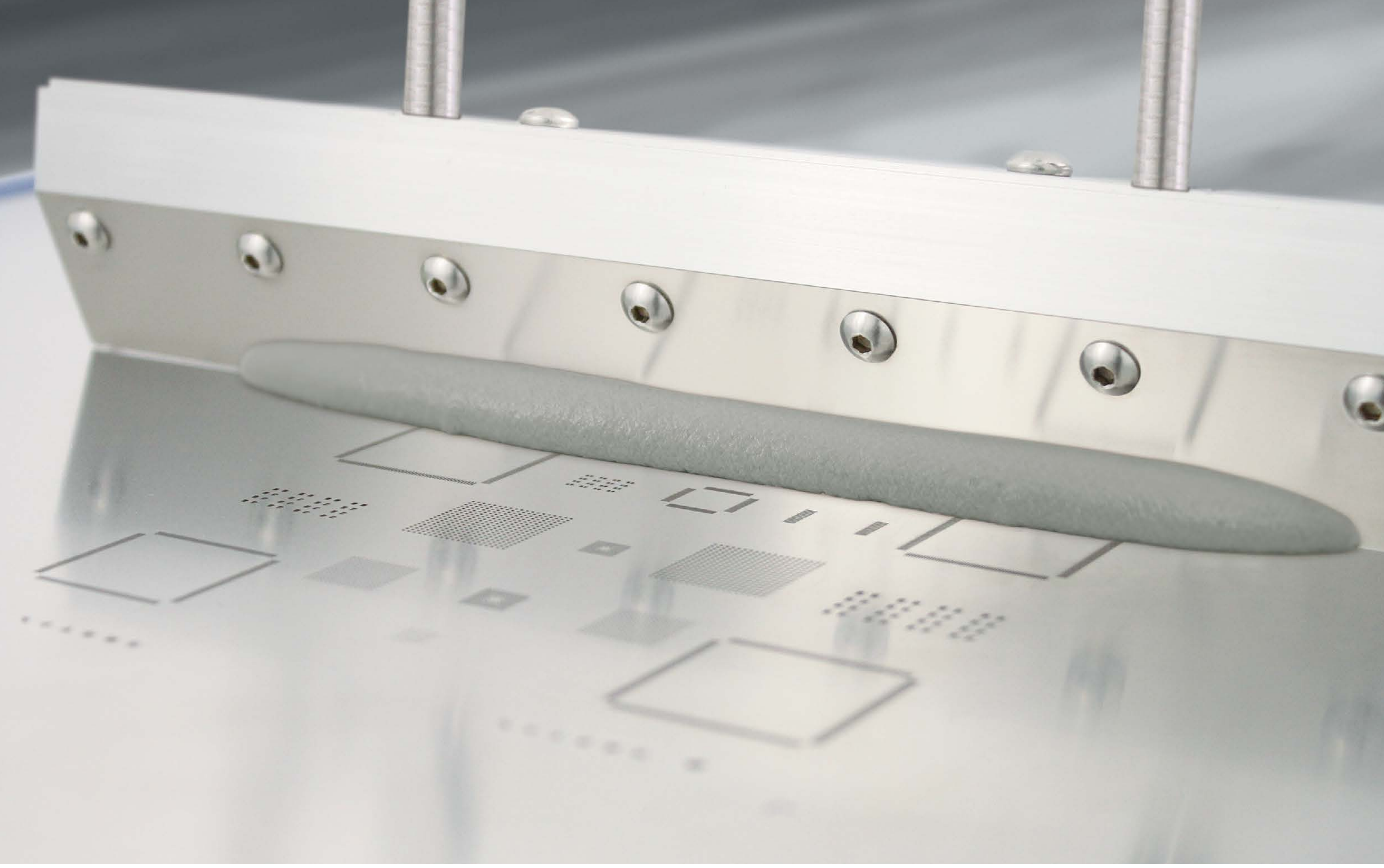

Introduction

Stannol solder paste SP6000 has been specially developed for use with the alloys TSC305 (Sn96.5Ag3Cu0.5) T4 and TSC105 (Sn98.5Ag1Cu0.5) T4.

During the development of SP6000, we placed a special focus on environmental compatibility in addition to the technical properties.

More than 85 percent CO_2 savings

The result: An impressive reduction of CO_2 emissions by more than 85 percent compared to common solder pastes, for example through the use of recycled solder, sustainable packaging materials and climate-neutral transport. With SP6000, we are not only focusing on performance, but also on sustainability.

Larger stencil thickness and step stencils

Another goal was to realise a solder paste in particle size 4 that could be used for a 120-/125-µm stencil as well as for a step stencil with 150 µm. The challenge was to avoid solder balls on passive components (mid-chip balling). The cause of solder balls is the capillary action between the components and the PCB. A larger stencil thickness and fine solder powder promote this phenomenon. Good compatibility with step stencils was also taken into account during development.

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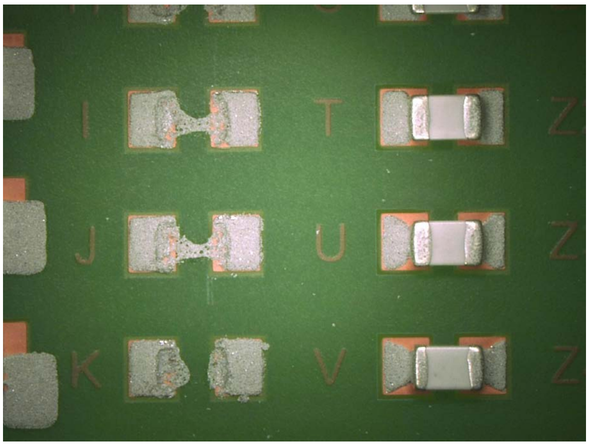
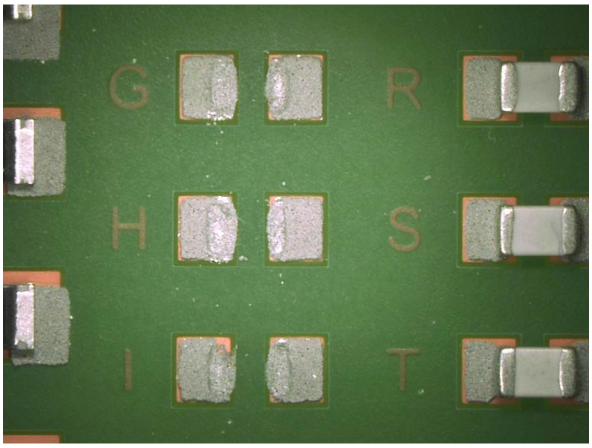
Test results at a glance

Tests	Specification	Result
Copper corrosion:	ANSI/J-STD-004C – IPC-TM-650, Method 2.6.15	pass
Copper mirror:	ANSI/J-STD-004C – PC-TM-650, Method 2.3.32	pass
Surface insulation resistance:	ANSI/J-STD-004C – IPC TM650, Method 2.6.3.3/2.6.3.7	pass
Silver chromate paper test:	ANSI/J-STD-004C – IPC-TM-650, Method 2.3.33	pass
Chlorides:	ANSI/J-STD-004C – IPC-TM-650, Method 2.3.35	no addition
Bromides:	ANSI/J-STD-004C – IPC-TM-650, Method 2.3.35	no addition
Solder balling:	ANSI/J-STD-005A – IPC TM-650, Method 2.4.43 after 1 h at room temperature after 24 h at room temperature	 pass, class 1 pass, class 1
Wetting test:	ANSI/J-STD-005A – IPC TM-650 Method 2.4.45	pass, class 1
Slump test: (T4, stencil 150 µm)	10 minutes at 150 °C	pass, 0,3 mm
Open time:	laboratory internal specification	at least 8 h at 23 °C/65 % rF
Flux activity classification:	J-STD-004	REL0

SP6000 in comparison



Solder paste misprint



Stannol solder paste SP6000

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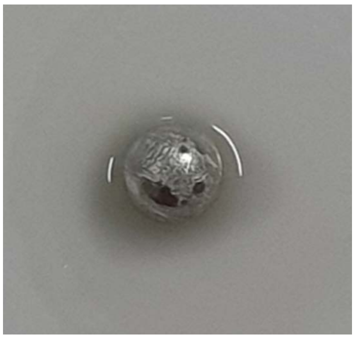
AOI compatibility

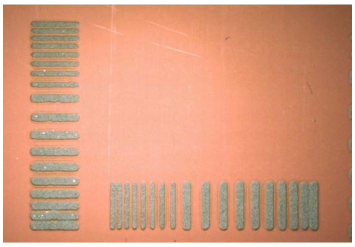


The flux residues of SP6000 are clear and transparent after soldering – this prevents the detection of pseudo defects during automatic optical inspection (AOI).

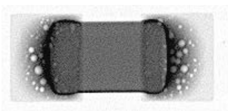
The flux residues of a conventional solder paste are yellowish after soldering.

High stability

Due to the high stability, a very wide process window for solder paste printing is achieved.



Voiding



Void formation with conventional solder paste

Reduced void formation with SP6000

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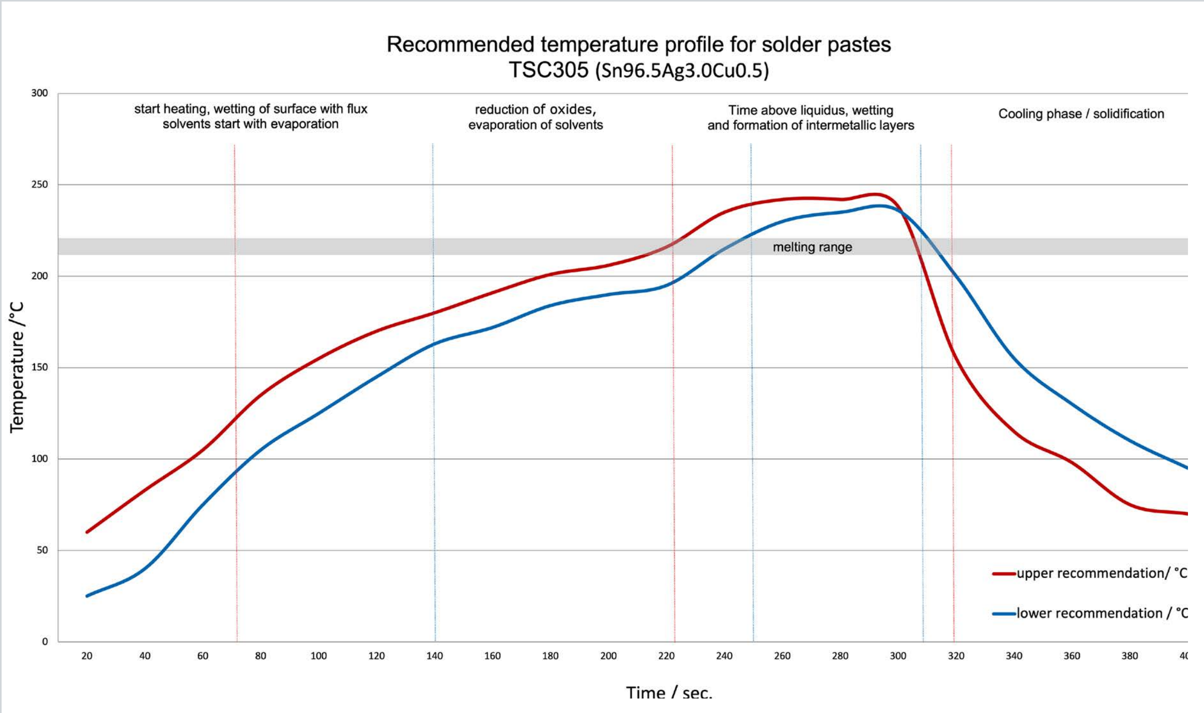
Solder profile



Instructions for use

Cleaning

SP6000 is classified as L0 solder paste and is therefore considered a typical No-Clean product. If cleaning is still required, approved products from Zestron or Kolb Cleaning can be used.

Transport and storage

SP6000 should be transported in packaging in which the temperature of 0 to 8 °C can be kept constant for as long as possible. Transport time should be kept to a minimum. Transport temperatures above 40 °C should be avoided if possible. A supply chain profile can be created with the help of a thermologger. Storage at 0 to 8 °C increases the duration of use. The solder paste SP6000 has a minimum shelf life of six months under the described storage conditions.

Flux classification according to J-STD-004C

The tests described in the standard are used to test and categorise fluxes for their properties under standardised conditions. Depending on the test results, the fluxes are classified into the categories **L, M** and **H**. The number after the test indicates whether the flux is halogen-free or not. The number following the category indicates whether the flux contains halides (1) or is halide-free (0). If all tests are passed in the uncleaned condition, we speak of No-Clean products. However, this designation only states that the corresponding products have passed the tests in the uncleaned state. The test conditions do not cover all extreme conditions that a PCB may experience in the field. The final risk assessment of the residues and the associated decision as to whether the flux residues have to be removed after the soldering process are in any case the responsibility of the respective electronics manufacturer.

Tests

SIR Test
(IPC-TM-650, Method 2.6.3.3/2.6.3.7)

Introduction

The abbreviation SIR stands for Surface Insulation Resistance. In a SIR test, the SIR values of a live PCB are recorded over time under defined environmental conditions and a defined PCB geometry. A drop in the SIR value in the course of the measurement indicates unwanted reactions, e.g. flux residues.

Test conditions

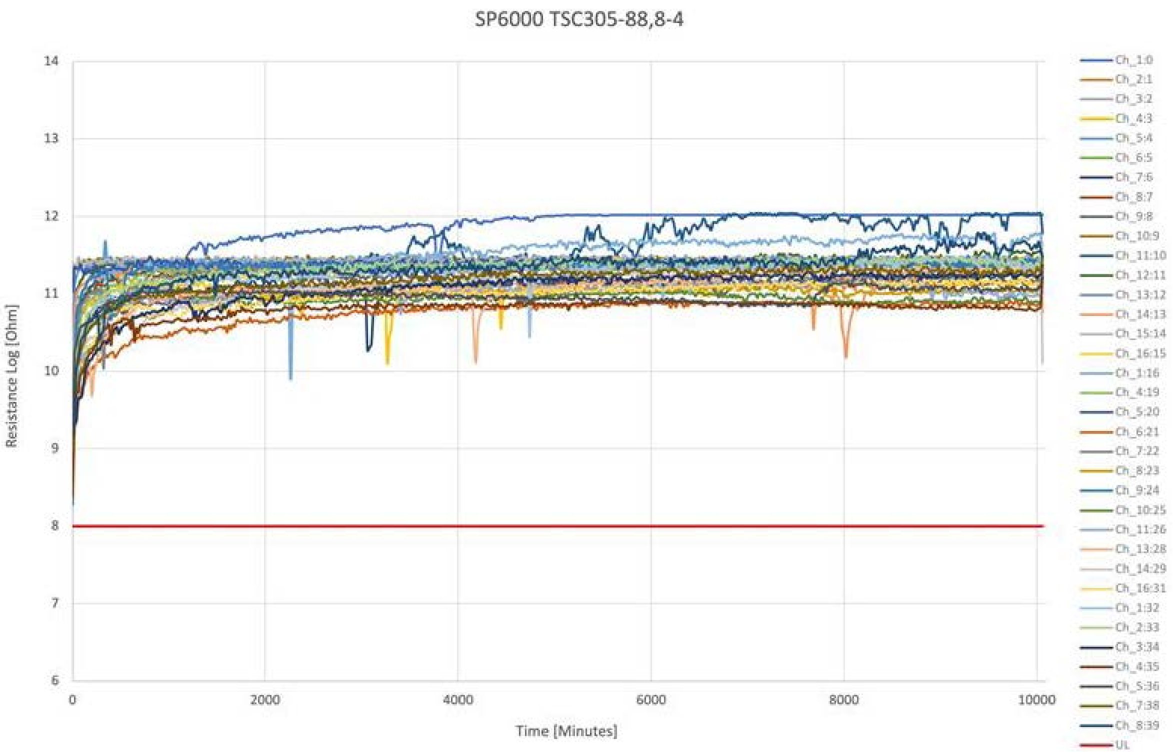
Test boards: 400-200 µm comb pattern
Bare copper on FR-4: 40 ± 1 °C, 90 ± 3 % rH
Measuring range: up to 10^{13} Ω with electrical preload 5 VDC
Test duration: 168 h (7 days)

Test criteria

Criteria for passing the SIR test

- All SIR measurements shall achieve a minimum resistance of 100 MΩ on all test samples after 168 hours.
- There shall be no evidence of electrochemical migration (filament growth) that reduces the conductor spacing by more than 20 percent.
- There shall be no corrosion of the conductors (minor discolouration is acceptable).

Test results



After 168 h >10^8 Ω = pass

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Solderball Test (IPC-TM-650, Method 2.4.43)

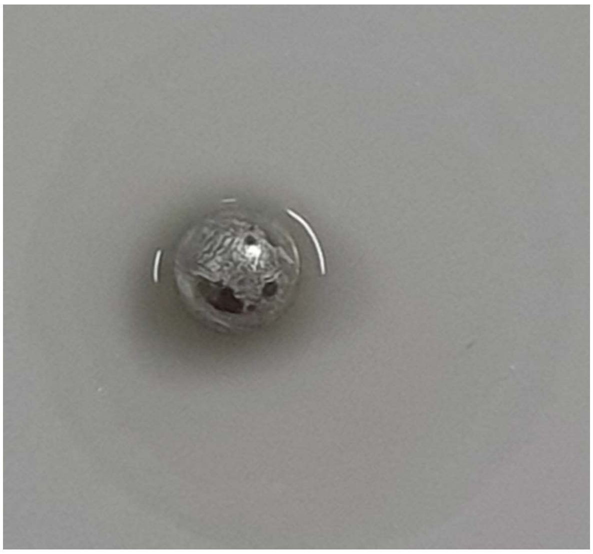
Introduction

The solder ball test is used to assess the quality of the solder paste. For this purpose, defined quantities of solder paste are applied to a ceramic plate using a stencil and melted with the help of a heat source.

Test conditions

Ceramic plate: 50 x 50 x 0,6 mm (Al_2O_3-98 %)
Stencil: 150 µm
Temperature: 150 °C and 250 °C
Test duration: 20 sec and 30 sec

Test results



One *single fully formed solder ball = pass*

Wetting Test (IPC-TM-650, Method 2.4.45)

Introduction

The wetting test is used to assess the activity of the solder paste. For this purpose, defined quantities of solder paste are applied to a copper plate using a stencil and melted using a heat source.

Test conditions

Copper plates: 50 x 50 x 0,8 mm CU sheet ETP
Stencil: 150 µm
Temperature: 150 °C and 250 °C
Test duration: 20 sec and 30 sec

Test results

The surface is completely wetted = pass

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Slump Test

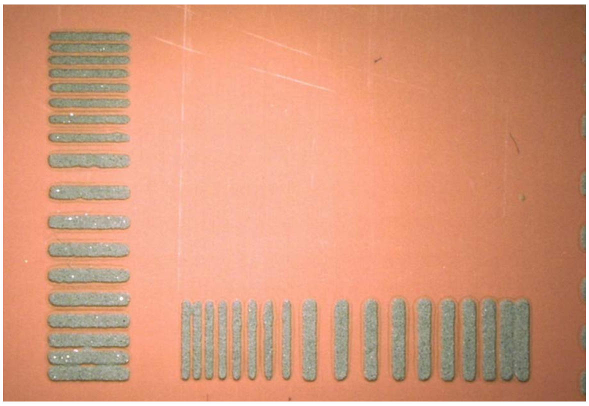
Introduction

The Slump Test helps to assess the stability of the solder paste. For this purpose, defined quantities of solder paste are applied to a substrate using a stencil and dried in a thermal oven.

Test conditions

Substrate: 50 x 50 x 0,8 mm
Temperature: 150 +/-5 °C
Test duration: 10 – 15 min

Test results



Contour stability 0,3

Copper Corrosion (IPC-TM-650, Method 2.6.15)

Introduction

The copper corrosion test is used to determine the corrosive properties of flux residues under defined surrounding conditions.

Test conditions

Test coupon: 50 x 50 x 0,5 mm copper
Climate: 40 ± 1°C, 93 ± 2 % rH
Test duration: 240 h (10 days)

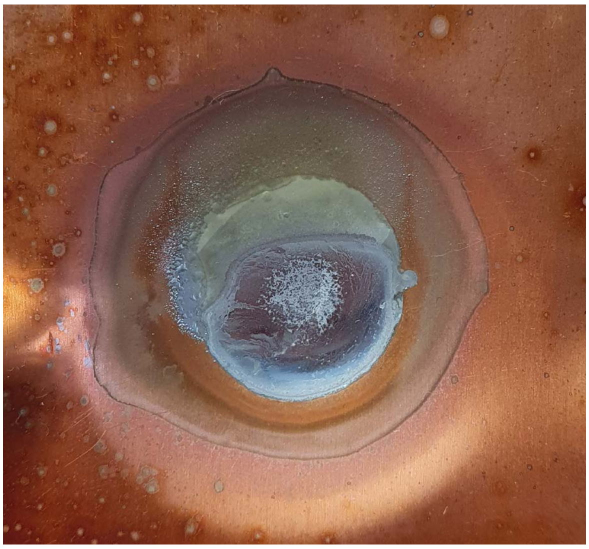
Test criteria

Low/No Corrosion (L): No signs of corrosion are observed. The initial colour change that may develop when the copper coupon is heated during soldering is not considered.

Moderate Corrosion (M): Slight white or coloured spots in the flux residues but without pitting of the copper

High Corrosion (H): Development of green-blue discolouration and/or corrosion with observation of pitting of the copper surface.

Test results



No corrosion: Classification L

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Copper Mirror (IPC-TM-650, Method 2.3.32)

Introduction
The copper mirror test has been developed to determine the removal effect that the flux has on the copper layer.

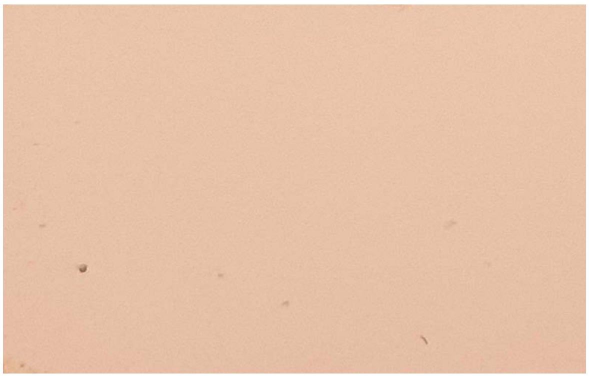
Test conditions
Test coupon: Glas panel with a thickness of approximately 50nm
Climate: 23 ± 2°C, 50 ± 5 % rH
Test duration: 24 h (1 day)

Test criteria
L = The copper layer was not completely removed. No breakthrough of the copper layer

M = Complete removal of copper on a maximum of 50 percent of the surface of the applied solution (breakthrough smaller than 50 percent).

H = Complete removal of the copper layer on more than 50 percent of the wetted area (breakthrough greater than 50 percent).

Test results



No breakthrough = pass (Classification L)

Acid value (IPC-TM-650, Method 2.3.13)

Introduction
The acid value measures the content of acidic, active substances in a sample. The acid value is measured by the amount of potassium hydroxide (KOH) in milligrams needed to neutralise one gram of the substance.

Test criteria
The method is described in IPC-TM-650, method 2.3.13. Method B is used.

Test results
182 mg KOH/g

Halide evidence (IPC-TM-650, Method 2.3.35)

Introduction
The halide test is used for the detection of chloride and bromide ions in liquid or extracted fluxes.

Test criteria
The method is described in IPC-TM-650, method 2.3.35.

Test results
No halides can be detected.

Printability (Benchmark II)

Introduction

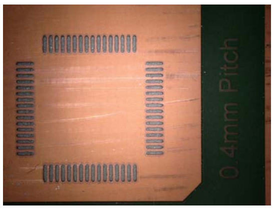
Good printability is important to achieve a good line resolution for consistent results with different printing parameters.

Printer settings

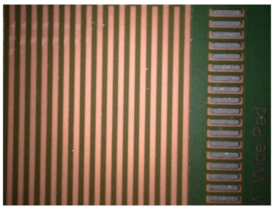
Speed: 50 mm/s
Separation speed: 10 mm/s
Squeegee pressure: 0.25 kg/cm
Stencil thickness: 120 µm

Test results

Printability (Benchmark II):

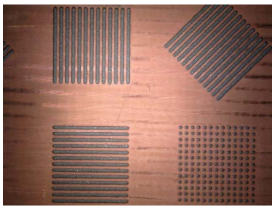


0,4 mm Pitch



100P BQFT (horizontal narrow)

100P BQFT (horizontal narrow)



Print after stencil cleaning

Printing After Wait (Benchmark II)

Introduction

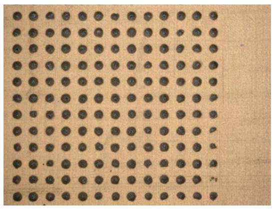
Printing After Wait (PAW) is important for restoring the same print quality immediately after production line downtimes.

Printer settings

Speed: 50 mm/s
Separation speed: 10 mm/s
Squeegee pressure: 0.25 kg/cm
Stencil thickness: 120 µm

Test results

Print after 1 hour wait (180 µm)



Print after 1 hour wait

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Delivery forms

Titel	Alloy	Packaging	Weight
SP6000	TSC305 T4	Jar or cartridge	500 – 1200 g
SP6000D	TSC305 T3	Dispenser	40 – 125 g

Further articles are available on request.

For more technical information,
please visit the Stannol website at
www.stannol.de/en/downloads

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greenconnect

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