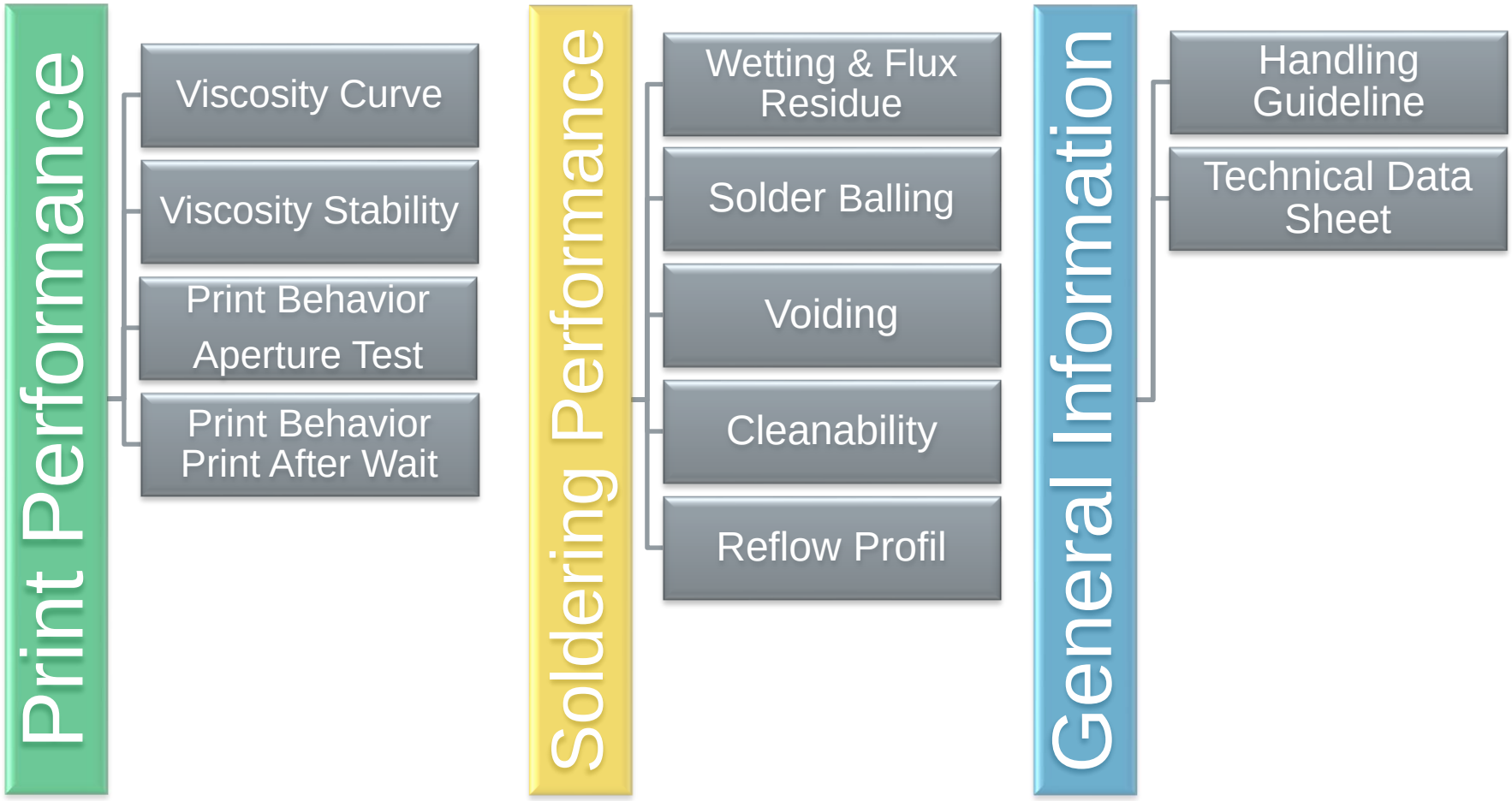
New Lead Free Flux-Platform SOP 91121

MICROBOND SOP 91121 P SAC305-89 M3

Technical Information Book

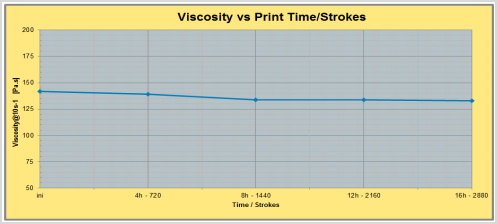


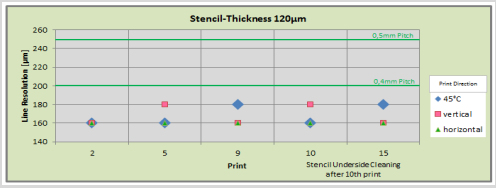
Notes

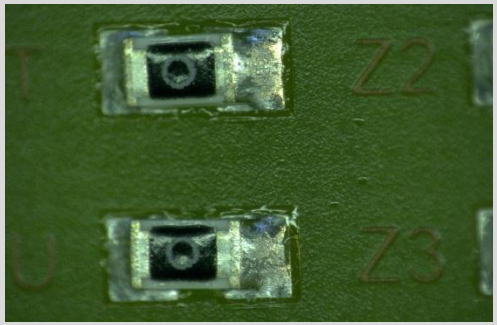
"The content of this document does not release the purchaser from verifying the suitability of the solder paste for its intended purpose prior to application. For further details, please refer to the Product Information Note on the last page of this Technical Information Book."

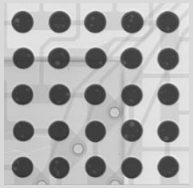
Product – Key properties

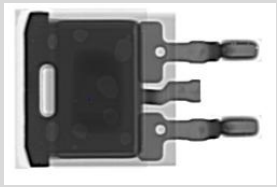
- Excellent Viscosity Stability
- Very Good Print Behavior
- Transparent Flux Residue
- Excellent Wetting In Air & Nitrogen
- Low Voiding











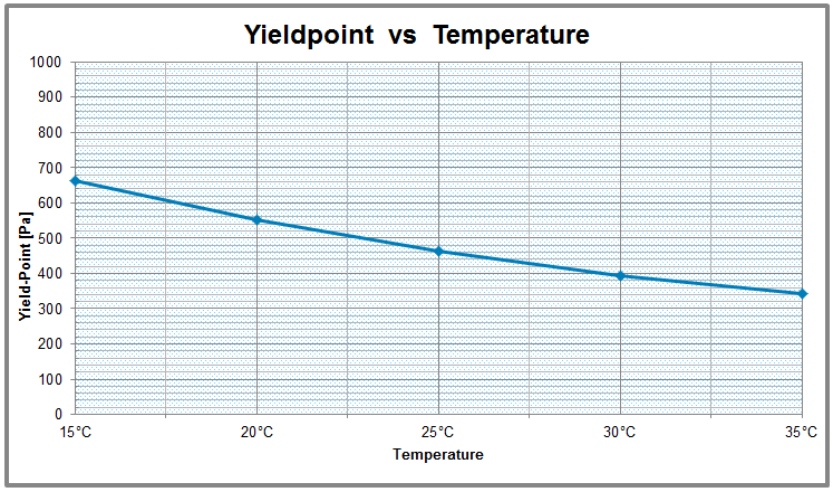
Viscosity Curve

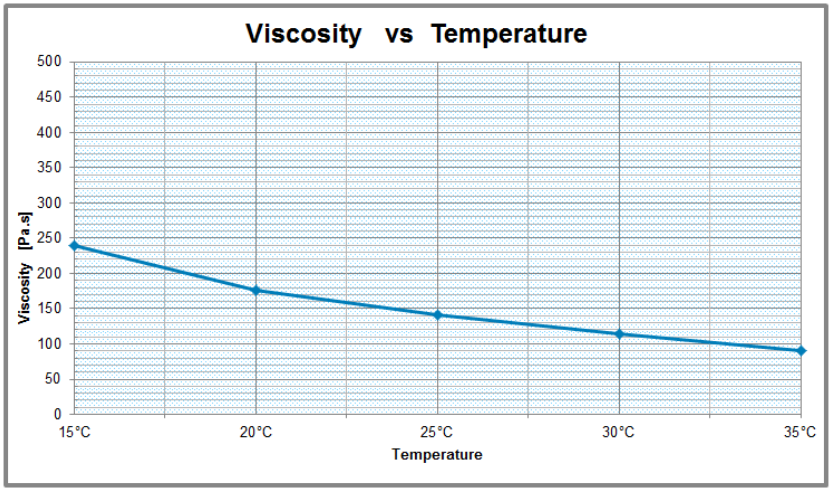
Test method: CSS
0 Pa to 2000 Pa within 2 min

Equipment: Physica MCR 150
Plate/Plate r=50 mm

Temperature (°C)	Yieldpoint (Pa)	Viscosity@ $10s^{-1}$ (Pas)
15	663	240
20	553	176
25	462	142
30	392	114
35	342	90

Viscosity & Yieldpoint vs Temperature





Viscosity Stability

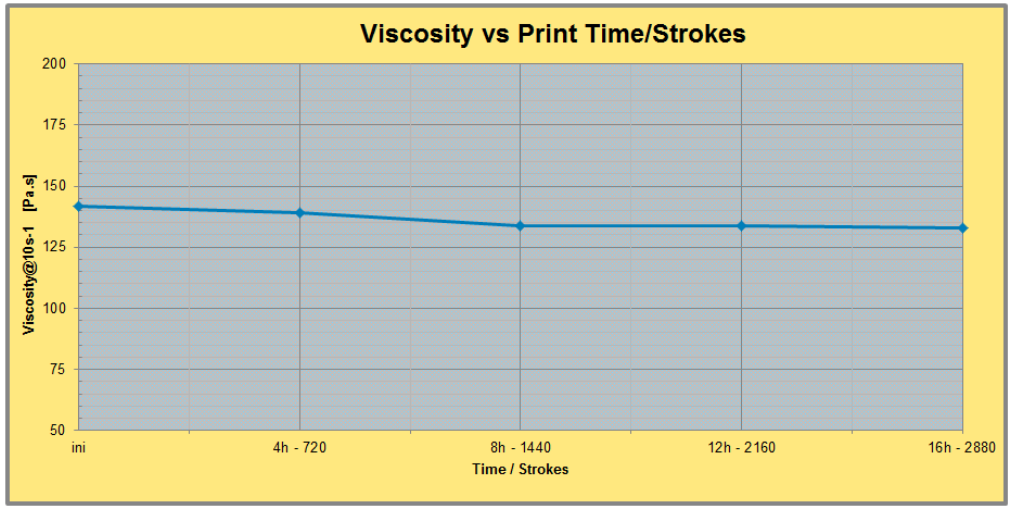
- **Test method:**

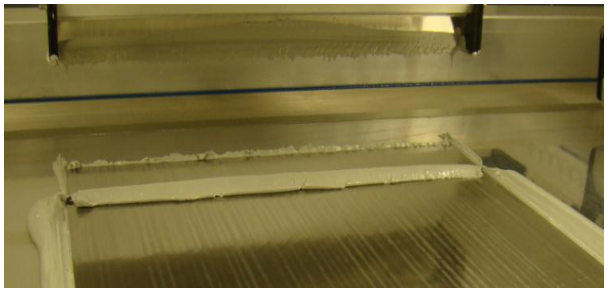
  Continous Printing: 180 strokes/hour

  - **Requirements after 16 h - pass:**
    - Rolling of paste
    - Viscosity stability

•Print parameters:

Stencil:	Sealed Up Stencil
Printer:	EKRA E4
Squeegee:	200mm / steel 60°
Print speed:	50 mm/s
Stencil separation speed:	10mm/s
Atmosphere:	25°C ± 4°C





after 16h / 2880 strokes

Excellent Viscosity Stability

Viscosity Stability

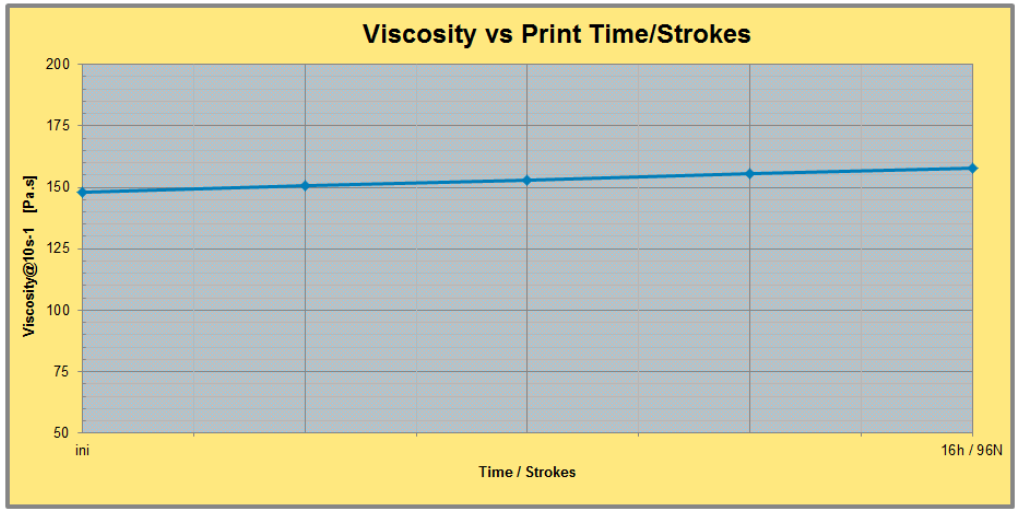
- **Test method:**

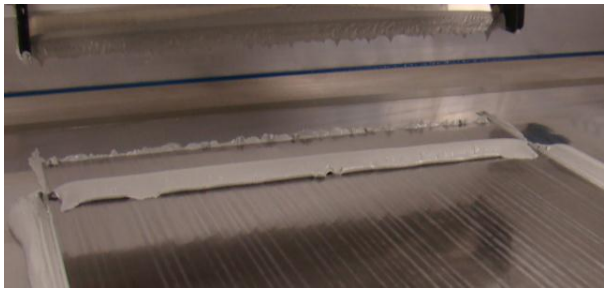
  Printing with breaks: 6 strokes/hour

  - **Requirements after 16 h - pass:**
    - Rolling of paste
    - Viscosity stability

•Print parameters:

Stencil:	Sealed Up Stencil
Printer:	EKRA E4
Squeegee:	200mm / steel 60°
Print speed:	50 mm/s
Stencil separation speed:	10mm/s
Atmosphere:	25°C ± 4°C





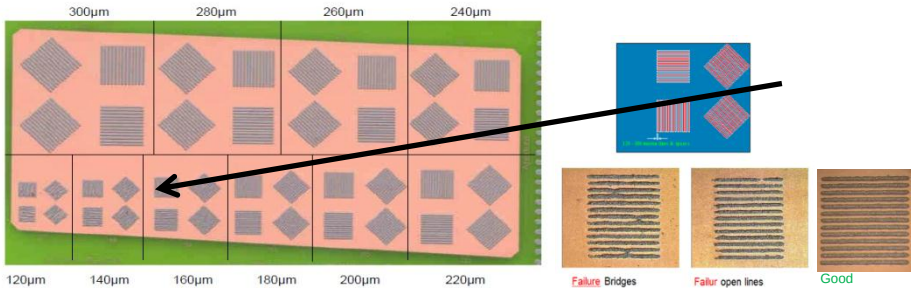
after 16h / 96 strokes

Excellent Viscosity Stability

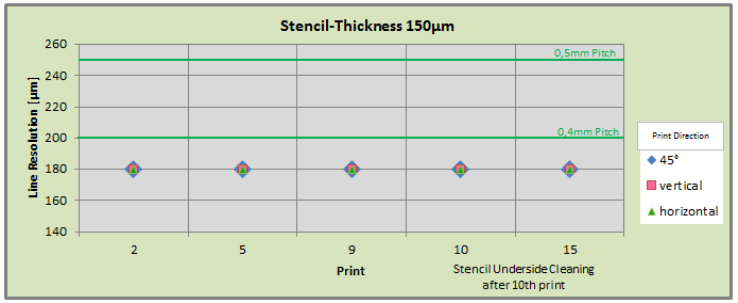
Aperture Test – Line Resolution

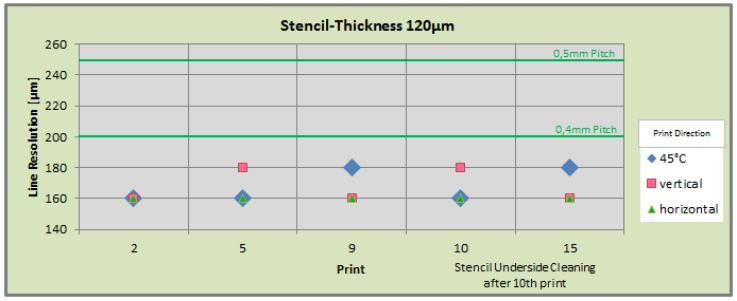
➢ **Test method:**

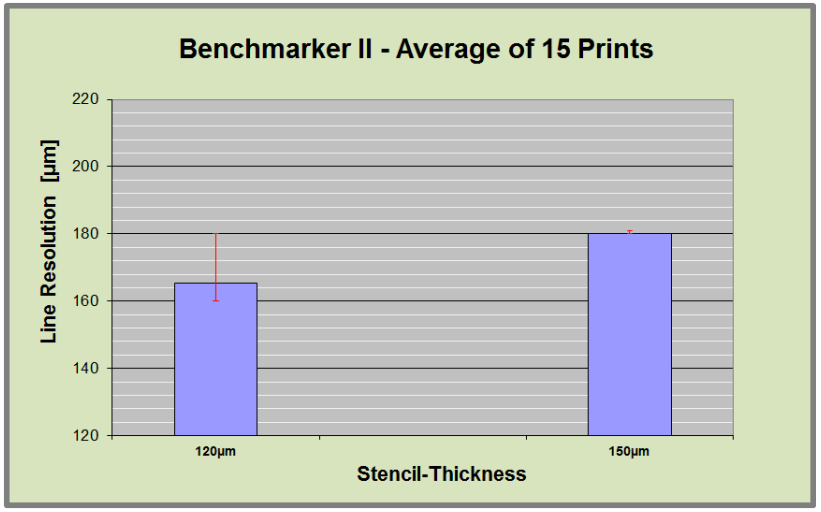
10 groups of fine pitch apertures with same width ranging from 120µm to 300µm in 20µm steps, vertical, horizontal and 45° angle was printed.
The analysis criteria was showed at the right side.



Print- Results of 15 prints with stencil thickness of 120µm and 150µm







Very Good Print Behavior

Print After Wait

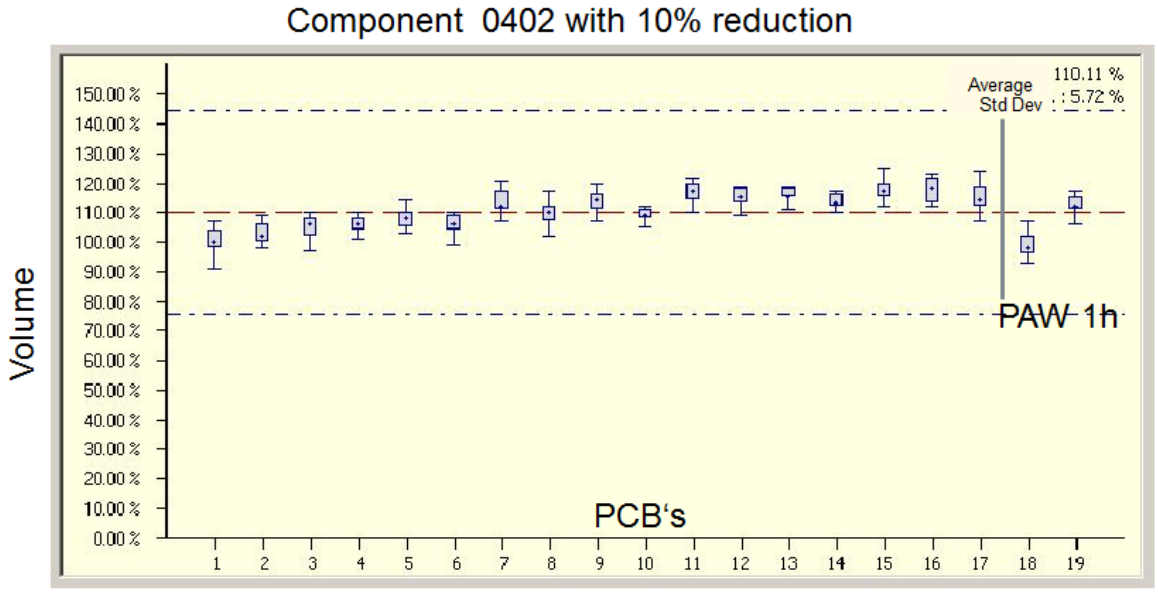
➢ **Test method:**

Print 19 Benchmarker II Boards. Measured it with the SPI (Solder Paste Inspection System). After the 17th print we waited 1h . After 1h we performed print 18th and 19th. Afterwards we compared print 17th vs 18th .

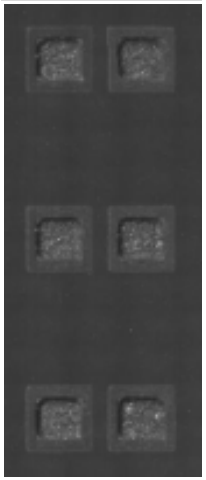
•**Print parameters:**

Stencil:	B18 : 120µm
Printer:	EKRA X5
Squeegee:	200mm / steel 60°
Print speed:	50 mm/s
Stencil separation speed:	10mm/s
Atmosphere:	25°C ± 4°C

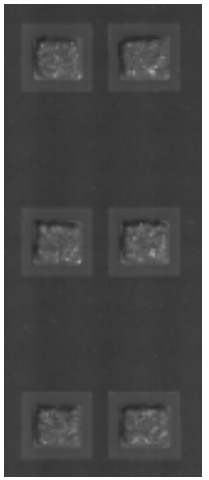
SPI – Results and the corresponding pictures



Initial 17th print



After 1h 18th print

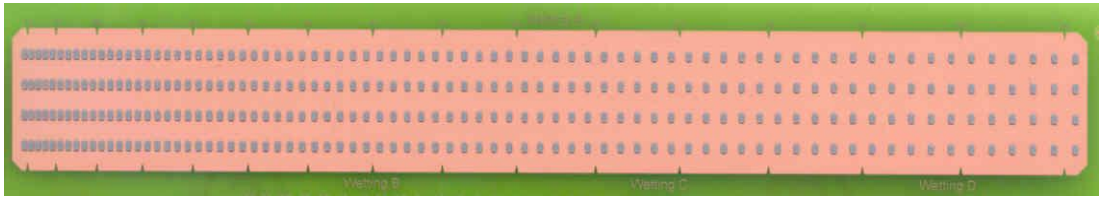


Wetting

➢ **Test method:**

Print at least 2 boards each combination (board surface, atmosphere, profile); reflow & inspect wetting areas* “A”, “B”, “C” and “D”

area “A”:

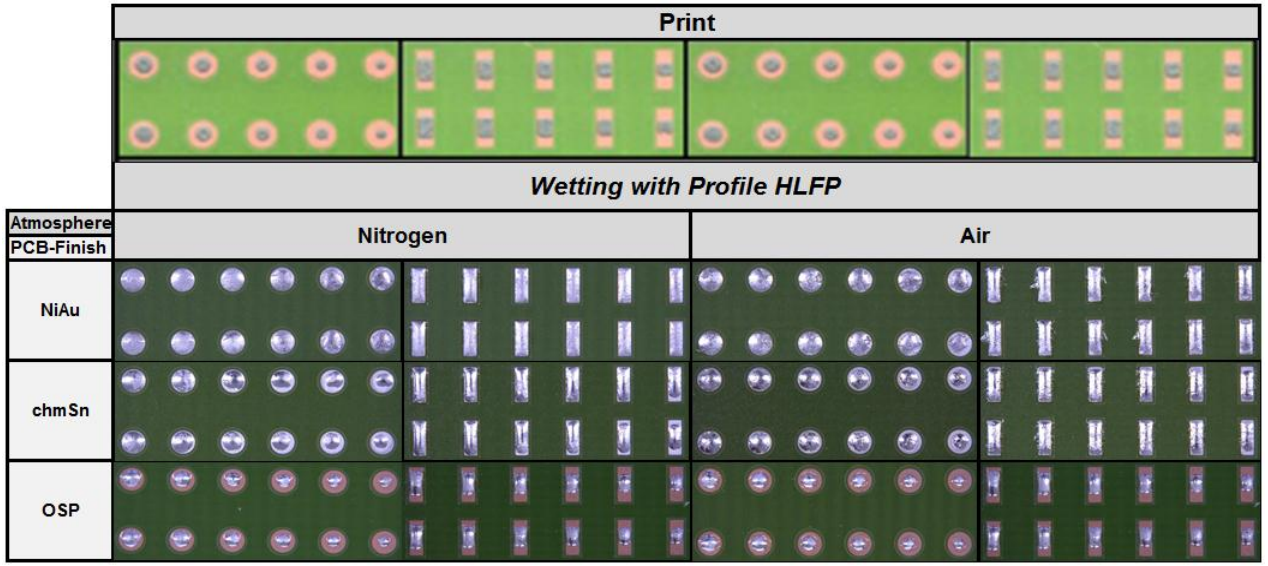


*the pictures show printed paste

area “B”:

area “C”:

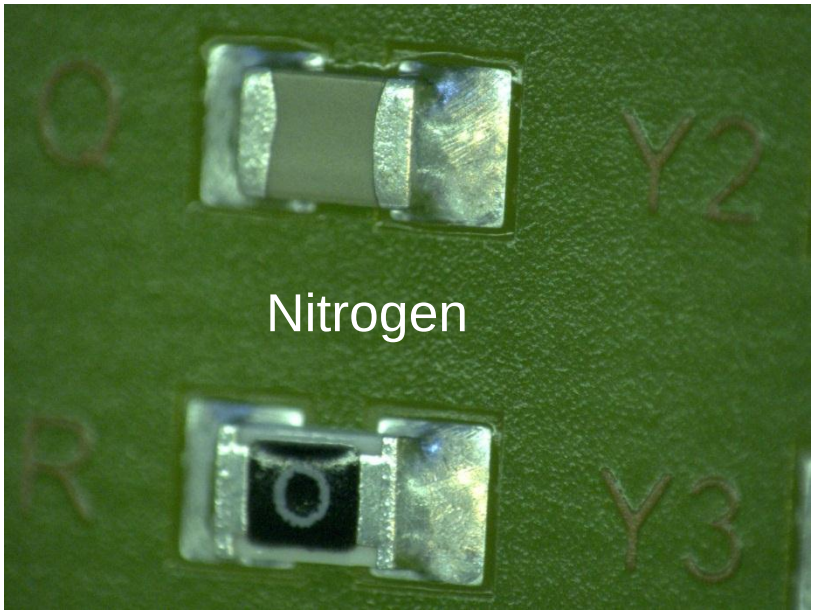
area “D”:

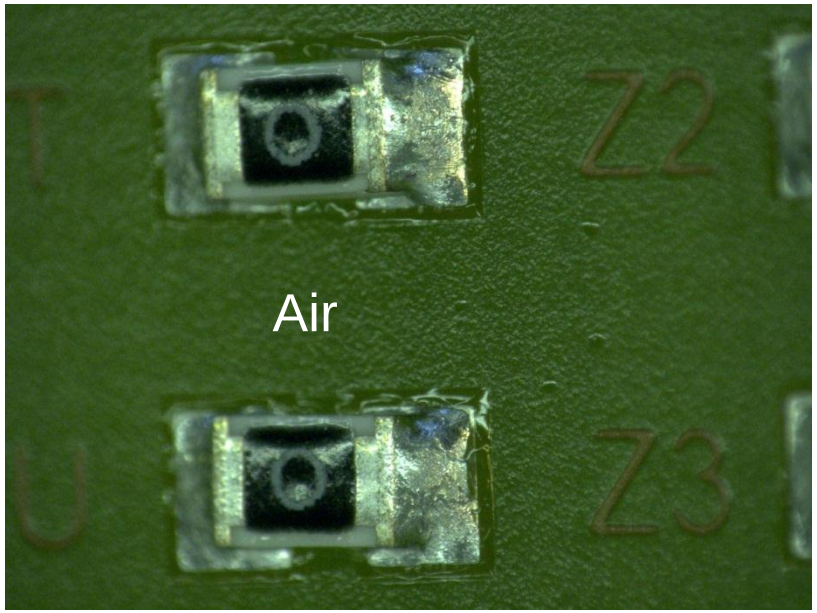


Excellent Wetting

Wetting

- **Test method:**
- **PCB-Type:Benchmarker II**
- **PCB-Surface : chmSn**
- **Stencil Thickness: 150µm**
- **Reflow Profile: HLFP**
- **Atmosphere: Air and Nitrogen**





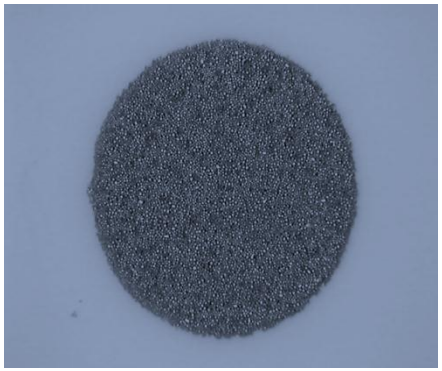
Excellent Wetting & Transparent Flux Residue Under Air Or Nitrogen

Solder Balling

- **Test method:**

Prepare two test pieces by printing the paste on each alumina plate (50 x 50 x 0.8tmm) with a 0.150mm thick stencil provided with three 5mm diameter apertures with a distance between centers of 15mm.	Inspect the degree of reflow referring to 'Solder balling evaluation standard' using the x 10 to 20 magnifying glass.

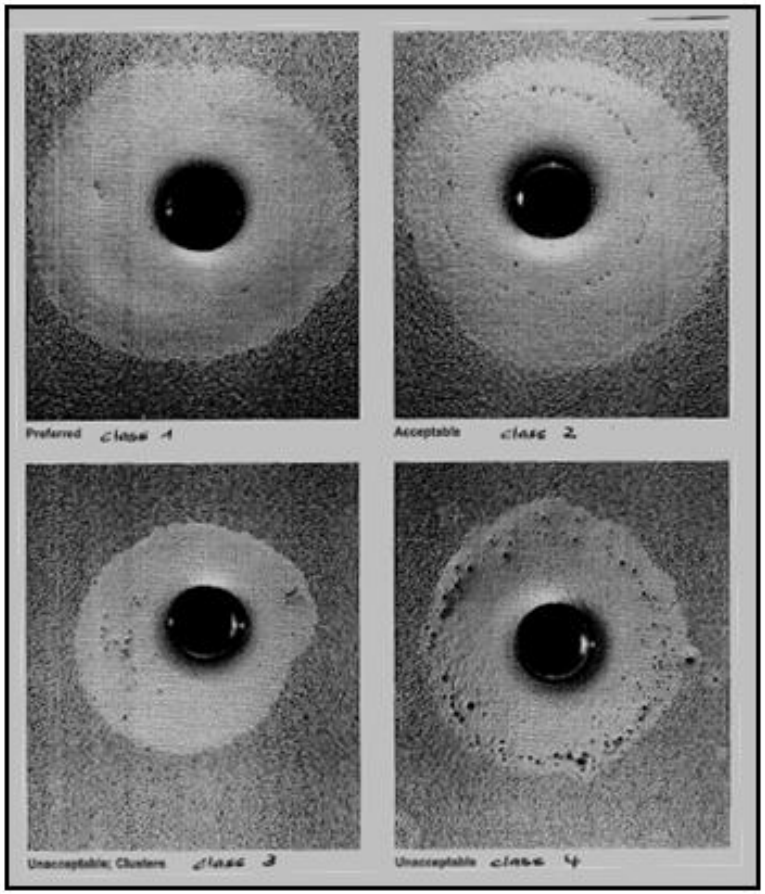
Initial Print



1h Air

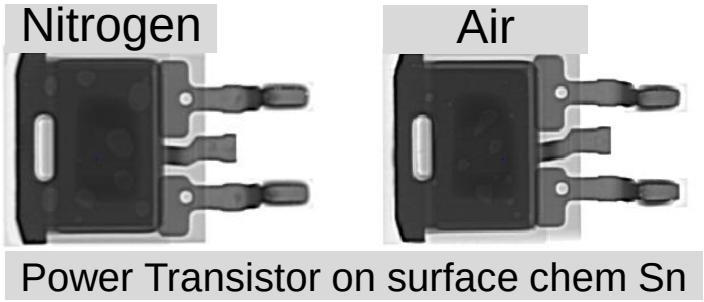
Class 2

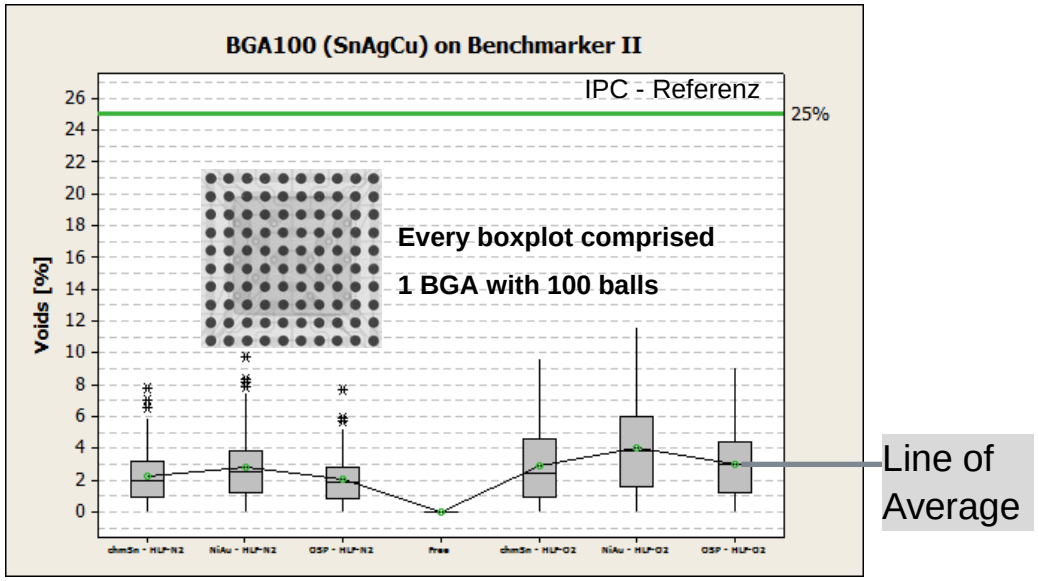
Optical Inspection according IPC-TM-2-4-43

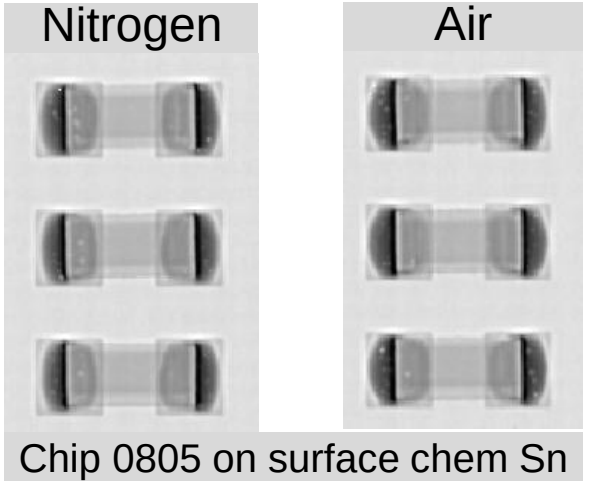


Voiding

- **Test method:**
- **PCB-Type:Benchmarker II, Reliability1**
- **PCB-Surface : chmSn,NiAu,OSP**
- **Stencil Thickness: 150µm**
- **Reflow Profile: HLFP**
- **Atmosphere: Air and Nitrogen**



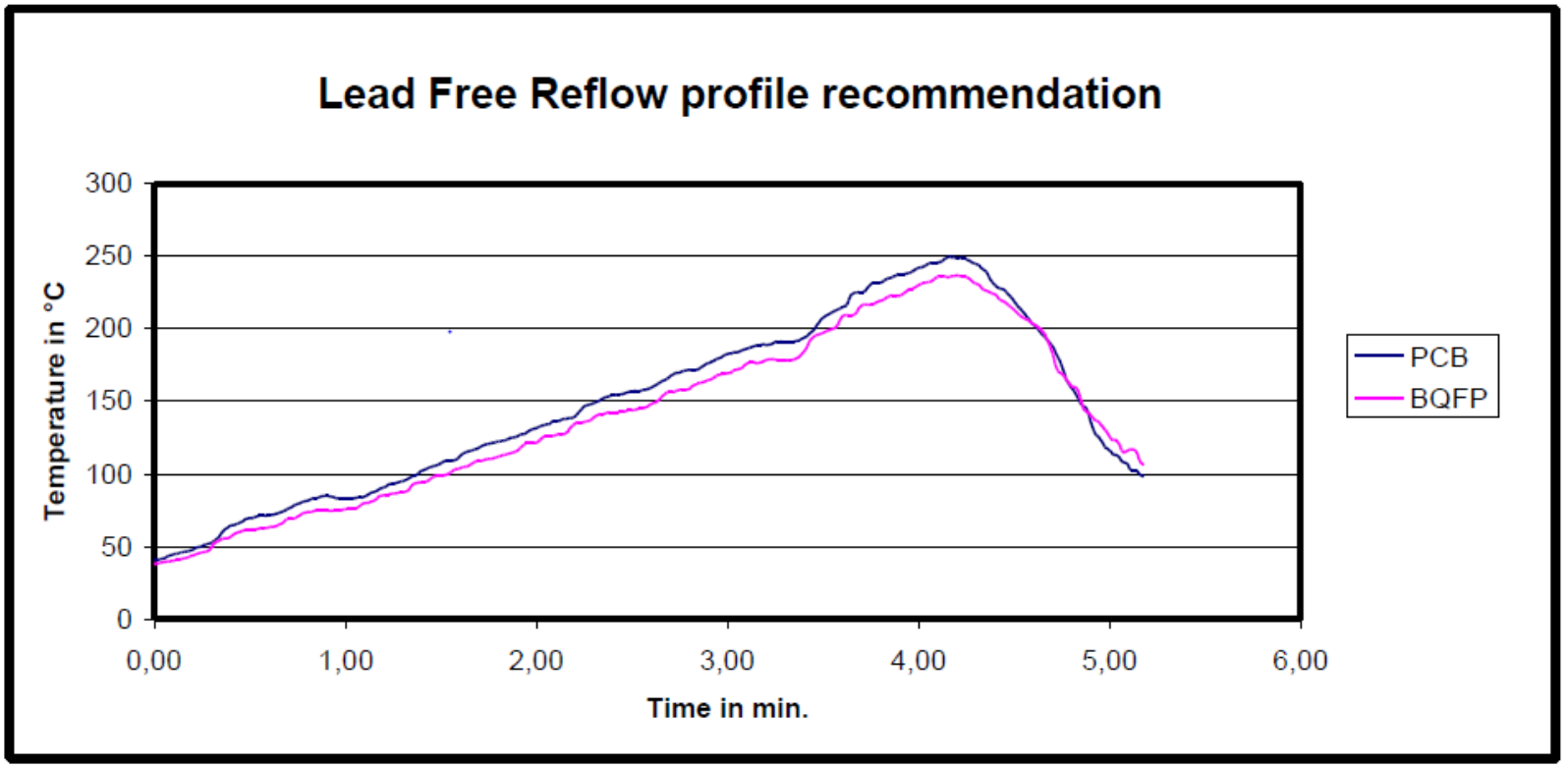




Low Voiding

Reflow Profile

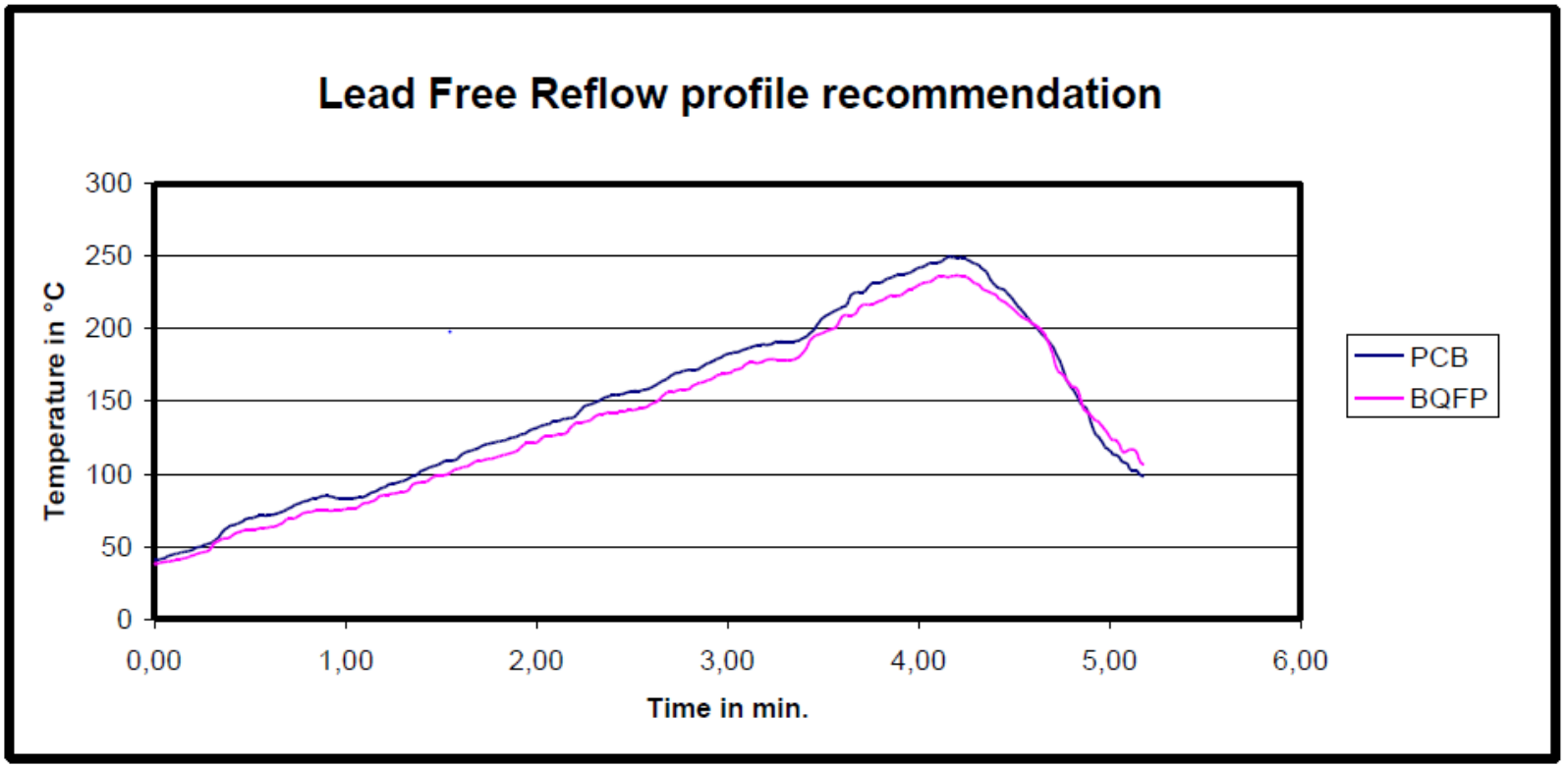
Heraeus Lead Free Profile = HLFP in Air or Nitrogen



Profile	Peak Temp °C		Time above 219°C		Time to reach :
	BQFP	PCB	BQFP	PCB	219°C
Lead Free	235 +/- 5	250 +/- 5	40 +/- 5	55 +/- 5	235 +/- 15

Reflow Profile

Heraeus Lead Free Profile = HLFP Nitrogen



Profile	Peak Temp °C		Time above 219°C		Time to reach :
	BQFP	PCB	BQFP	PCB	219°C
Lead Free	235 +/- 5	250 +/- 5	40 +/- 5	55 +/- 5	235 +/- 15

Handling Guideline

Storage of the paste

- store the paste in the refrigerator at 2 to 10°C

Take the paste out from the fridge before use

- take paste out from the fridge min. 2 hours before use in the production in order that the paste in the jar/cartridge reaches the room temperature
- do not open the jar/cartridge while it is cold to prevent water condensation on the surface of the “cold solder paste” - moisture on the paste can cause increase of viscosity, solder balling etc.
- in volume production with shift operation it can be useful that the shift starting the work takes the corresponding paste quantity for the following shift out of the fridge

Do not heat the paste.

Solder paste check before putting it on the stencil

- check the jar/cartridge for mechanical damage – do not use the paste if package is broken
- check if the jar/cartridge was properly closed – do not use the paste if jar/cartridge is not closed properly
- during transportation and storage (with time/temperature) slight separation of the flux can occur - see the picture. Homogenizing the paste before putting it on the stencil allows for same printing performance as with paste without separation.

Solder paste immediatelly after filling no separation

Solder paste after longer storage slight separation

Homogenizing the paste before putting it on the stencil

- Important !! After opening the jar mix/homogenize the paste for approx. 30 to 60 sec in order to mix the separated flux in the paste. After mixing the paste must have creamy appearance.
- Use spatula with round edges for mixing – by using spatula with sharp edges parts of the jar and/or spatula can be merge with the paste

Solder paste quantity on the stencil

- at the beginning of the print take care to put enough paste on the stencil - as a rule of thumb put 1 to 1.5g per 1mm squeegee length of paste on the stencil
- The min. quantity of the paste on the stencil should be not less than 0.35g per 1mm squeegee length. Latest when you reach this paste quantity add fresh paste to the stencil. The re-filling of the paste can be done in fixed intervals, e.g. after defined number of printed PCBs, this is programmable at many printers.

Solder paste at the edge of the squeegee

- put the paste from the edge of the squeegee latest within an hour to the major paste quantity in from of the squeegee
- if this is not done regularly within max. 1 hour scrap the paste at the edge of the squeegee

Set optimal squeegee pressure

- reduce the squeegee pressure until a thin paste layer remains on top of the stencil. Then increase the pressure in small steps until you get a clean wipe / no paste remains on the top of the stencil

PCB support in the printer

- should be as large area as possible. In case of double sided reflowed boards use punctual support but use as many supports as possible and distribute them uniformly. Optimal is a solid print nest support.

Handling Guideline

Printing / Squeegee

Kind:	**Flat**
Material:	**Rubber or metal blade**
Angle:	**45° or 60°**
Pressure:	**Lowest pressure to get a clean wipe on the upper side of the stencil**
Squeegee speed:	**20 – 100 mm/sec.**

Stencil

Thickness :	**200 ~ 120µm for 0,65 – 0,4mm pitch pattern**
Snap-off distance :	**0 ~ 3mm**

Ambiance

Temperature:	**22 - 30°C**
Wind:	**Wind badly affects stencil lie and tack performance of solder pastes. Caution: In case of local air conditioning, make sure it doesn't enhance the drying out of the solder paste.**

MICROBOND SOP 91121 P SAC305-89 M3

Heraeus

Description

MICROBOND SOP 91121 P SAC solder paste series is a lead free no clean solder paste that promotes outstanding wetting and minimizes soldering defects. The SOP 91121 flux system is specifically optimized for lead free alloys, e.g. Sn/Ag/Cu. This formula provides superior perfomance on a variety of surfaces finishes and leaves behind a clear residue. The flux is designed to comprise with J-STD-004 L0 classification.

Key Benefits

- Exceptional print to print consistency
- Min. 8 hours tack and work life
- very clear flux residues
- otpimized voiding under BGA and large area components

Compliant Products

Product Code and Alloy

Code					Powder Properties			Application		
Paste	Alloy	Metal Content	Viscosity	Powder Type	Particle Size	Alloy	Melting Point	Stencil Printing	Screen Printing	Dispensing
SOP 91121 SA30C5		89	M	3	25 - 45 µm	Sn96,5/Ag3,0/Cu0,5	217°C	☑	☐	☐
SOP 91121 SA30C5		89	M	4	20 - 38 µm	Sn96,5/Ag3,0/Cu0,5	217°C	☑	☐	☐
SOP 91121 SAC105		89,2	M	3	25 - 45 µm	Sn98,5/Ag1,0/Cu0,5	227°C	☑	☐	☐
SOP 91121 SAC105		89,2	M	4	20 - 38 µm	Sn98,5/Ag1,0/Cu0,5	227°C	☑	☐	☐

Flux Activity

No Clean	Water Washable	ISO 9454-1:1990 [DIN EN 29454-1:1993]	J-STD-004A:2004	Bellcore GR-78-Core [Issue 1:1997]	Siemens Norm [SN 59650:1998]
☑	☐	1.2.2.C	Lo	not tested	static qualification passed

Halogen Content

Halogen Free ☐
Halogen Free-Tolerances from IEC 61249-2-21: Cl or Br <900 ppm, total <1500 ppm; measured according to BS EN 1458

Halogen Zero - No Halogen added in the Flux: ☐
Halogen Zero - Tolerance: Halogen < 50 ppm; measured according to BS EN 14582

Paste Conditioning

Remove paste from fridge: Before opening the package leave paste 2 hours at room temperature so that paste warms up. Do not open jar/cartridge while paste is cold to prevent condensation of moisture on the paste - this causes defects, e.g. solder balling etc. Do not heat the paste.
Before use of paste jar: To obtain uniform, stable viscosity stir paste for 1 to 2 min, using a stainless steel or chemically resistive plastic spatula.
Caution: When automatic stirring equipment is used, do not stir the paste longer than 2 min.

Reflow

Peak temperature: 20-30°C above the melting tempera ture of the alloy. Time above melting temperature: 30 to 90 seconds.

Cleaning

After reflow flux residues may remain on the circuit and do not need to be washed. For cleaning of wet paste or if desired for cleaning of flux residues Zestron and Vigon cleaners can be used – see separate cleaning recommendations.

Storage

Store the solder paste in tightly-sealed containers and avoid exposure to sunlight and high humidity.
In jars & cartridges: min. 6 month for jar and 3 month for cardriges in a refrigerator at 2-10°C. Stor e cartridges with tip pointing downwards!

Contact www.heraeus-contactmaterials.com **Version** TDS_SOP 91121 P SAC Series (Draft)_8. April 2013

Product Information Note

- *This product is in the scale-up phase and may not be commercially available in the future. The information shown here has been determined for reference only and its formulation and/or manufacturing method may change after the finalization of the scale-up phase.*
- *The descriptions and engineering data shown here have been compiled by Heraeus using commonly-accepted procedures, in conjunction with modern testing equipment, and have been compiled as according to the latest factual knowledge in our possession. The information was up-to date on the date this document was printed (latest versions can always be supplied upon request).*
- Although the data are considered accurate, we cannot, without prior written express agreement, provide a guarantee as to the accuracy of such data, the achievement of any intended results from the use of the solder paste or the non-infringement of any patent by the use of the solder paste
- *The data is supplied on the condition that the user shall conduct tests to determine materials suitability for a particular application.*