Engineering Manual
HF212 Solder Paste

Suitable for use with:

Standard SAC Alloys
High Reliability 90iSC Alloy
Low Ag Alloys

Henkel Excellence is our Passion

Contents

HF212: Performance Summary

- Halogen-free flux: passes IC with pretreatment IPC-TM-650 2.3.34/EN14582
- Halogen-free flux classification: ANSI/J-STD-004 Rev. B for a type ROL0 classification
- Suitable for fine pitch, high speed printing up to 150mm/s (6”/s)
- Enclosed head compatible*
- Optimized for long soak reflow profiles
- Improved fine pitch coalescence
- Excellent humidity resistance
- Excellent solderability on challenging surface finishes, including CuNiZn
- Colorless residues for easy post-reflow inspection

*requires vacuum (v) version

Introduction

HF212 Features & Benefits

Product Attribute	Process Benefit
Halogen Free	•No added halogen •Measured <900ppm chlorine and bromine and <1,500ppm total by oxygen (O_2) bomb test
Halide Free	•Flux classification ROL0 in accordance to J-STD-004B
Application	•Designed for printing, pin-in-paste and enclosed head print capability •Excellent wetting to a broad range of metallisations •Compatible with existing halogen free solutions •Suitable for medium to large board assemblies

Introduction

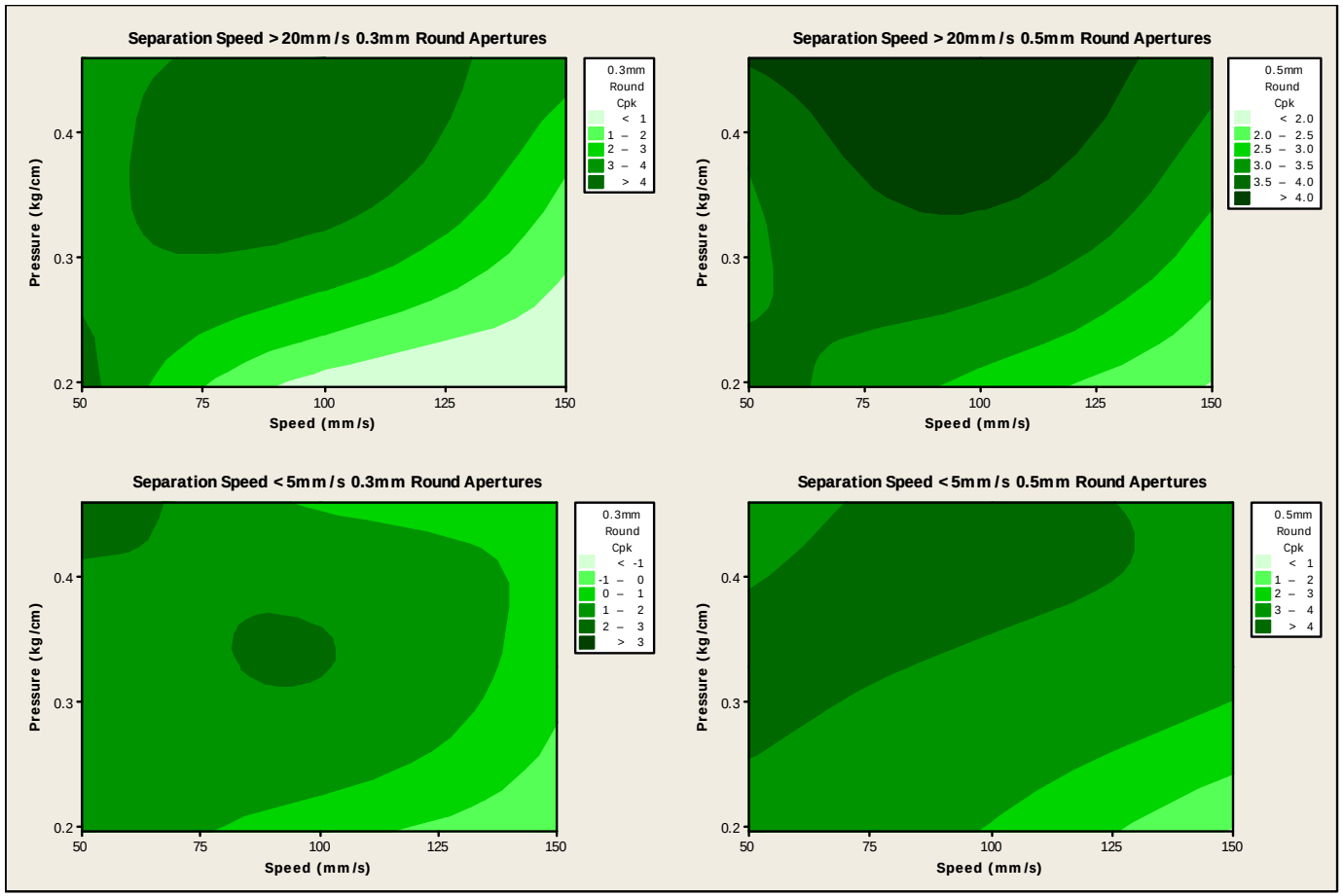
HF212 Features & Benefits

Product Attribute	Process Benefit
Technology Printing Advantages	•Wide process window for printing and minimal slump •Fine pitch capability and reduction in solder bridging •Suited for high throughput production, where yield consistency on print deposits is key •Abandon time of up to 4 hours; work life > 8 hours
Technology Reflow Advantages	•Optimised for long soak reflow processes •Improved fine pitch coalescence •Excellent humidity resistance •Excellent solderability on challenging surface finishes (ENIG, Copper OSP, CuNiZn and Imm Ag)
Low Voiding	•Low void levels increases solder joint reliability •New chemistries allow pursuit of class 3 void levels in accordance to IPC7095B on industry surface finishes: ENIG, Copper OSP, CuNiZn and Imm Ag •Low voiding in CSP
Residues	•Clear, transparent and colourless •Pin testable

Operating Parameters

Print Process Window (97SCHF212DAP88.5)

0.3mm & 0.5mm round apertures (125µm stencil)

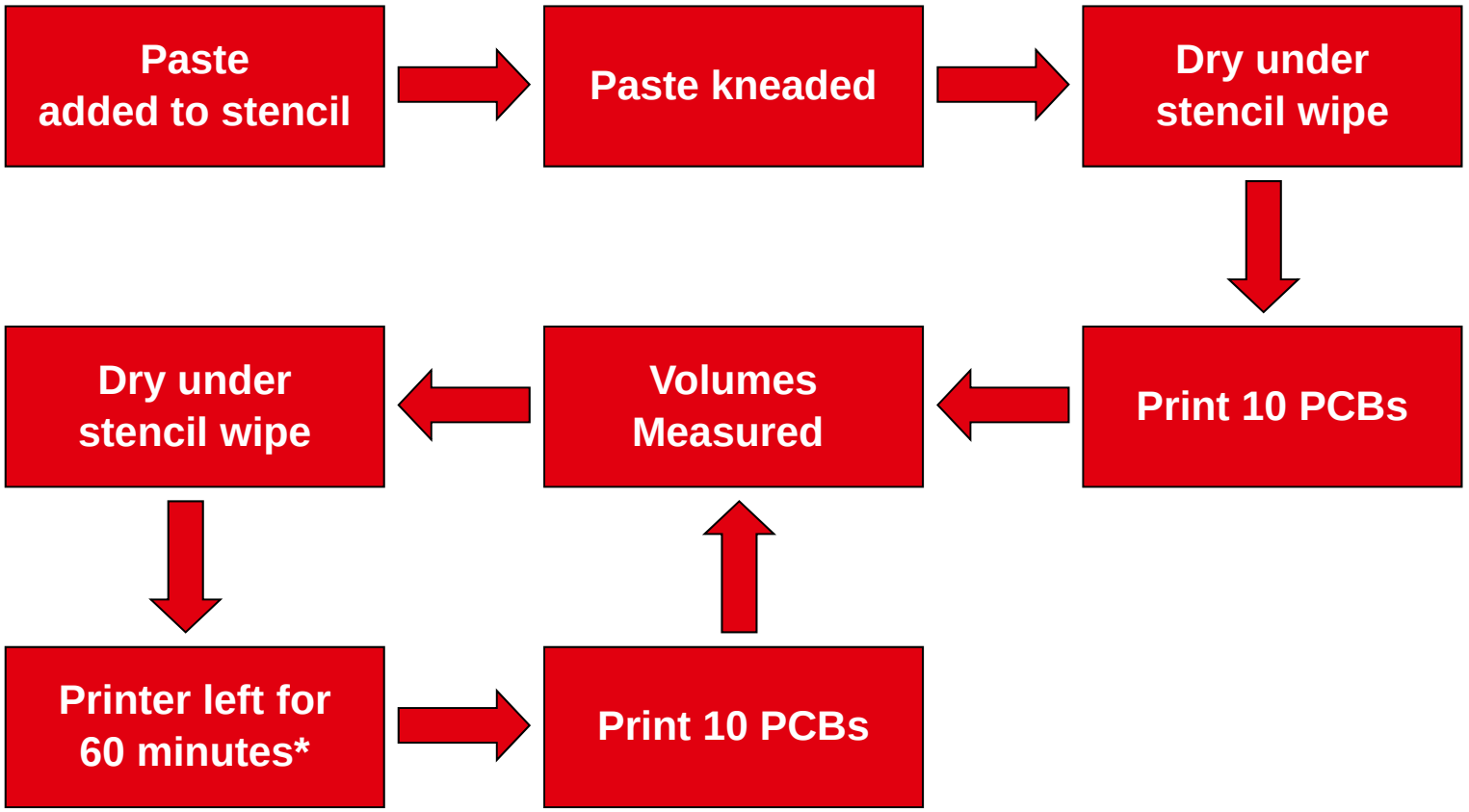


Excellent printing in the range 50 – 150mm/s

Operating Parameters

Abandon Time

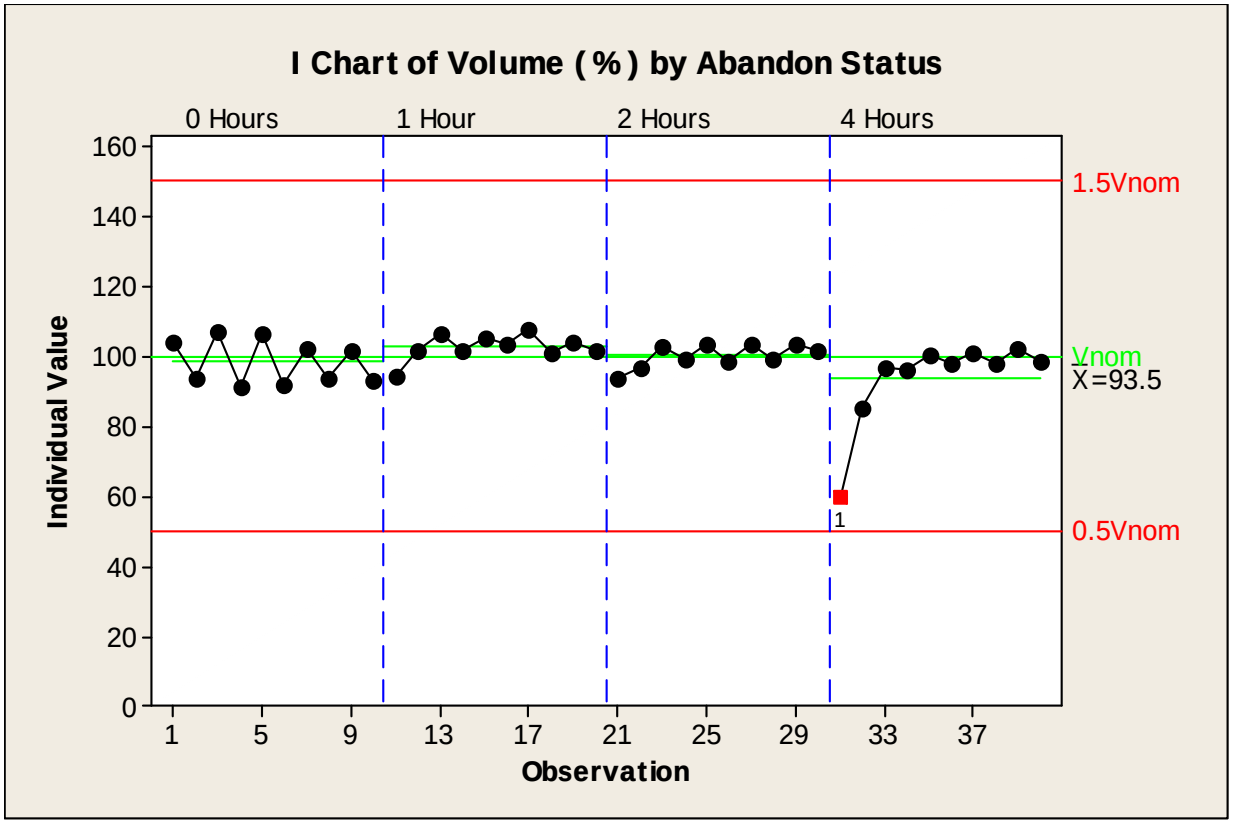
- Process flow for Henkel standard abandon time test as shown below
- 0.5 mm CSP (280 µm apertures) deposits measured



*Abandon repeated for 120 and 240 minutes & 72 hours respectively

Operating Parameters

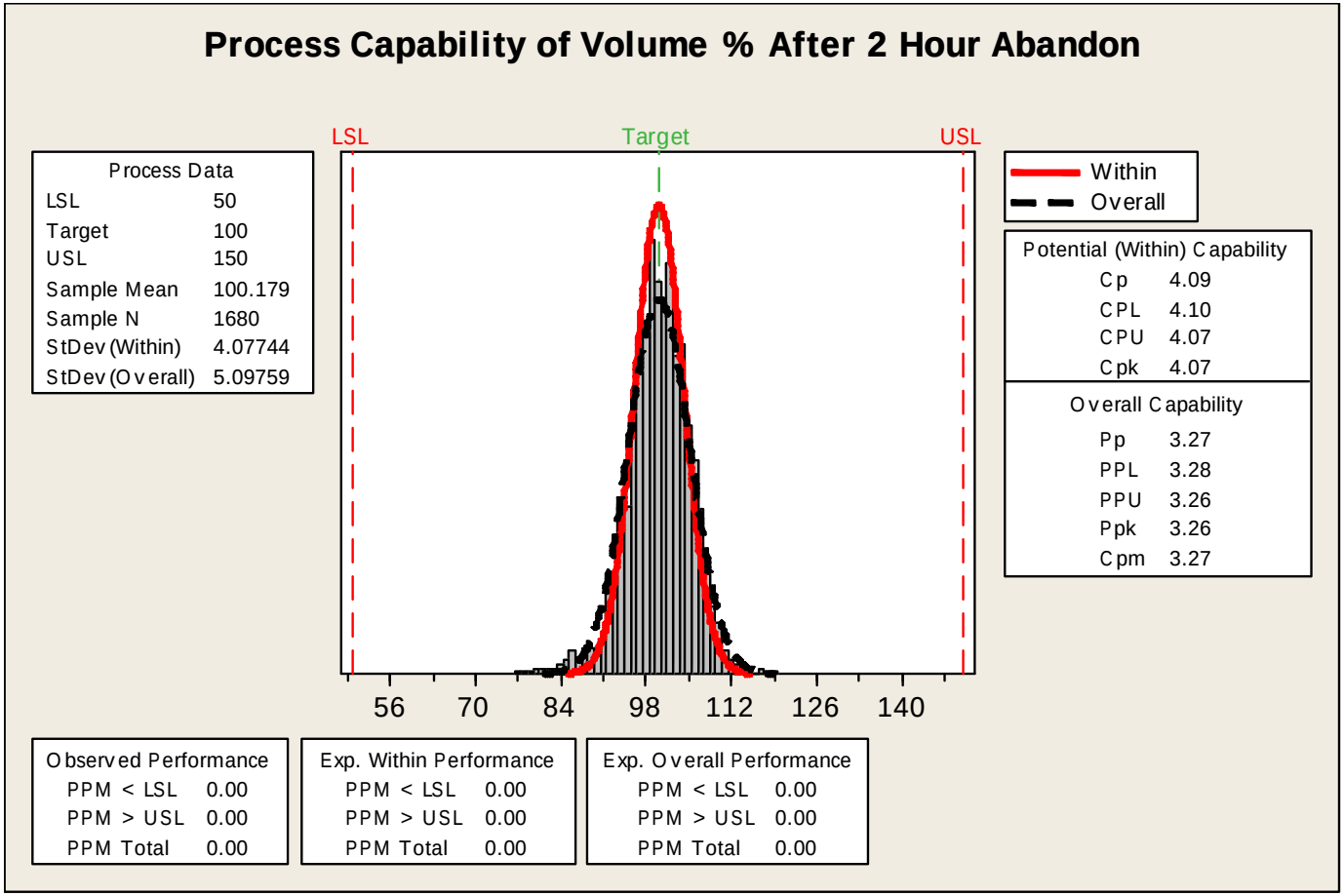
Abandon Time (25°C/50%RH) 1,2 & 4 hours



- Excellent abandon time resistance
- No knead cycle required after 2 hours abandon
- Single knead stroke required after 4 hours abandon

Operating Parameters

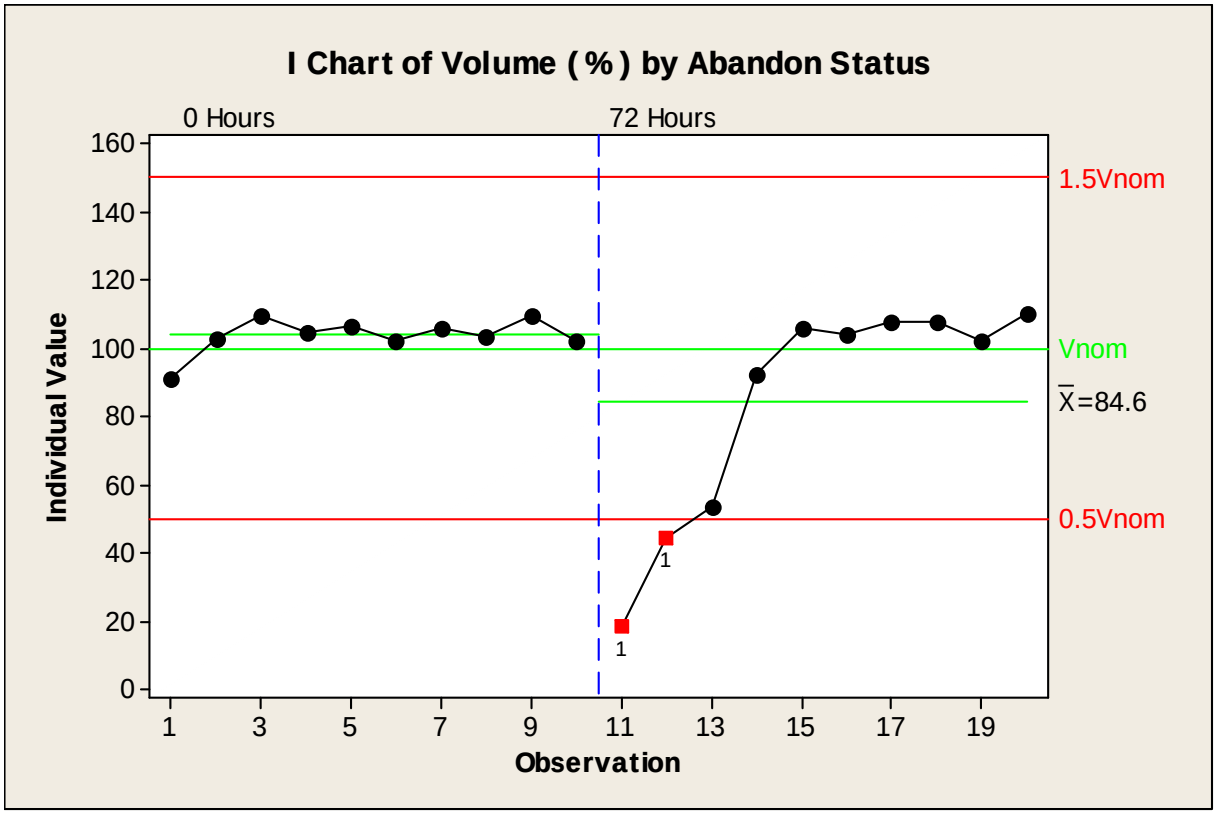
Abandon Time after 2hours



- Superior paste capability without under stencil wipe after 2 hours abandon
- Cpk after 2 hour abandon = 4.07 (6σ (0.002ppm defect rate) Cpk >2)

Operating Parameters

Abandon Time (25°C/50%RH) 72 hours

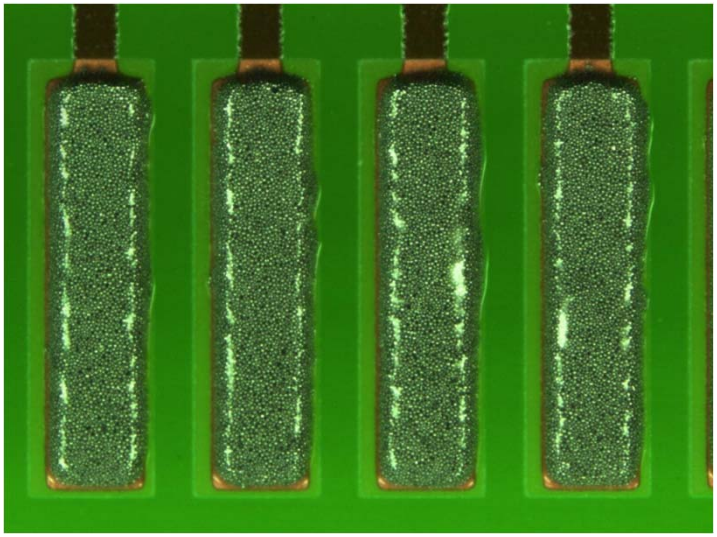


- Excellent abandon time resistance
- Only 3 knead strokes required after 72 hours abandon

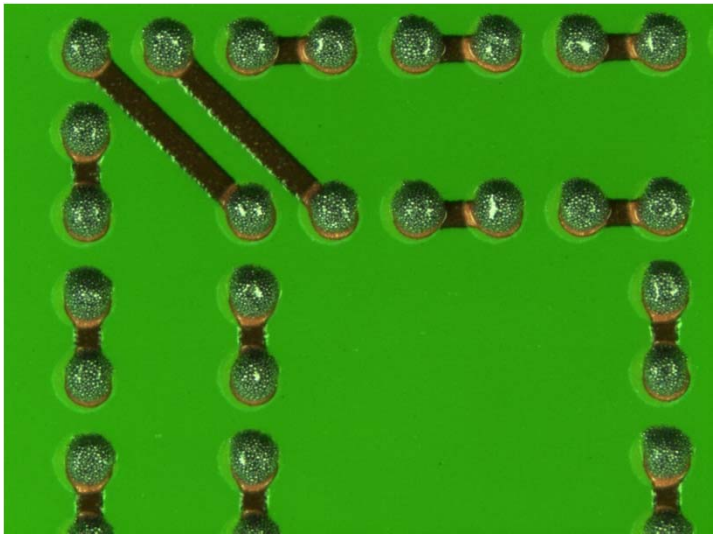
Operating Parameters

Abandon Time (25°C/50%RH) 72 hours

- HF212 solder pastes show exceptional abandon time resistance
- On fine pitch devices only minimal knead strokes are required after extended machine down times
- On coarser pitch deposits it is expected that the first print after abandon can in normal circumstances be perfectly acceptable for production quality



SMT connector: **1st Print after 72 hours abandon**

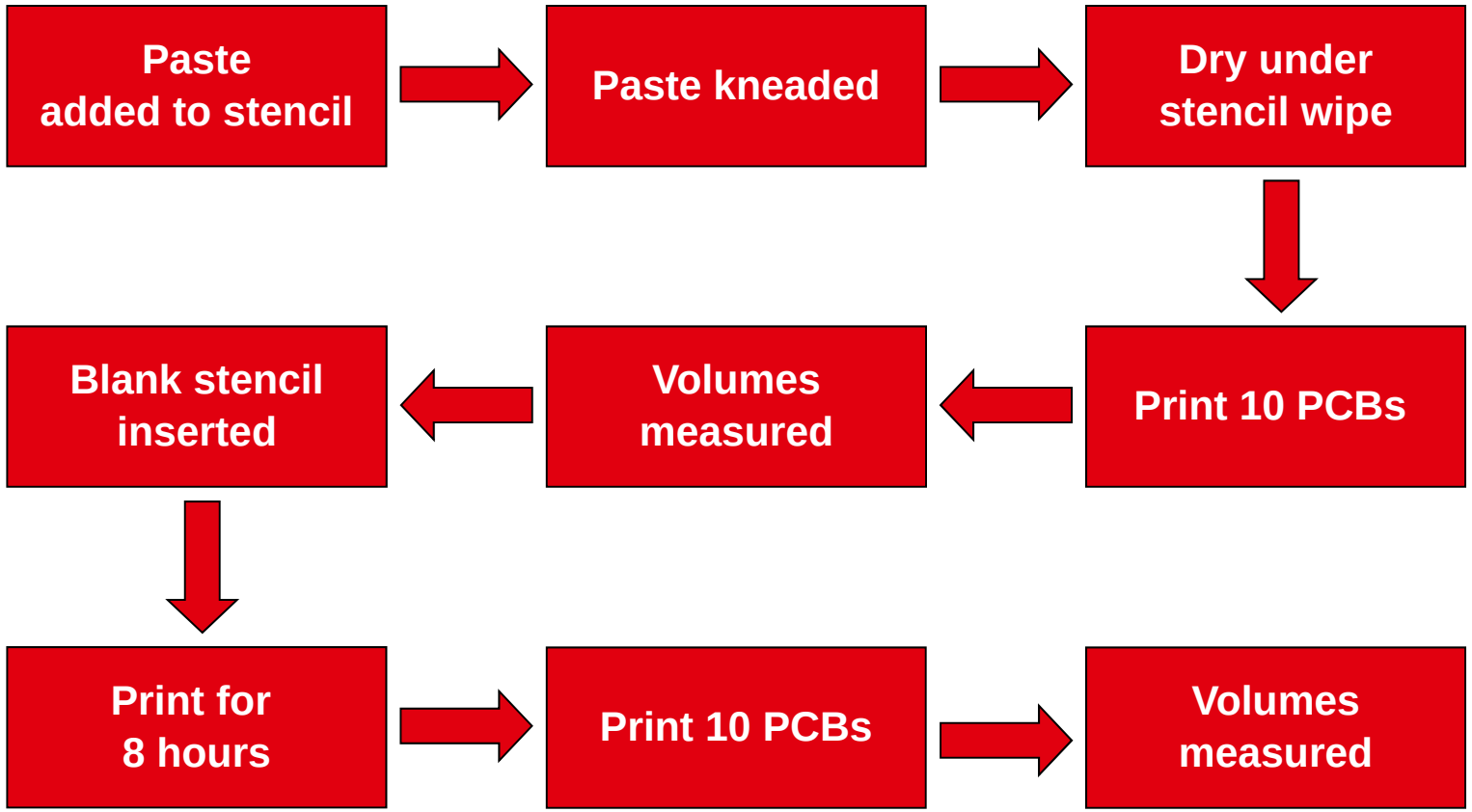


0.5mm CSP: 4th Print after **72 hours abandon**

Operating Parameters

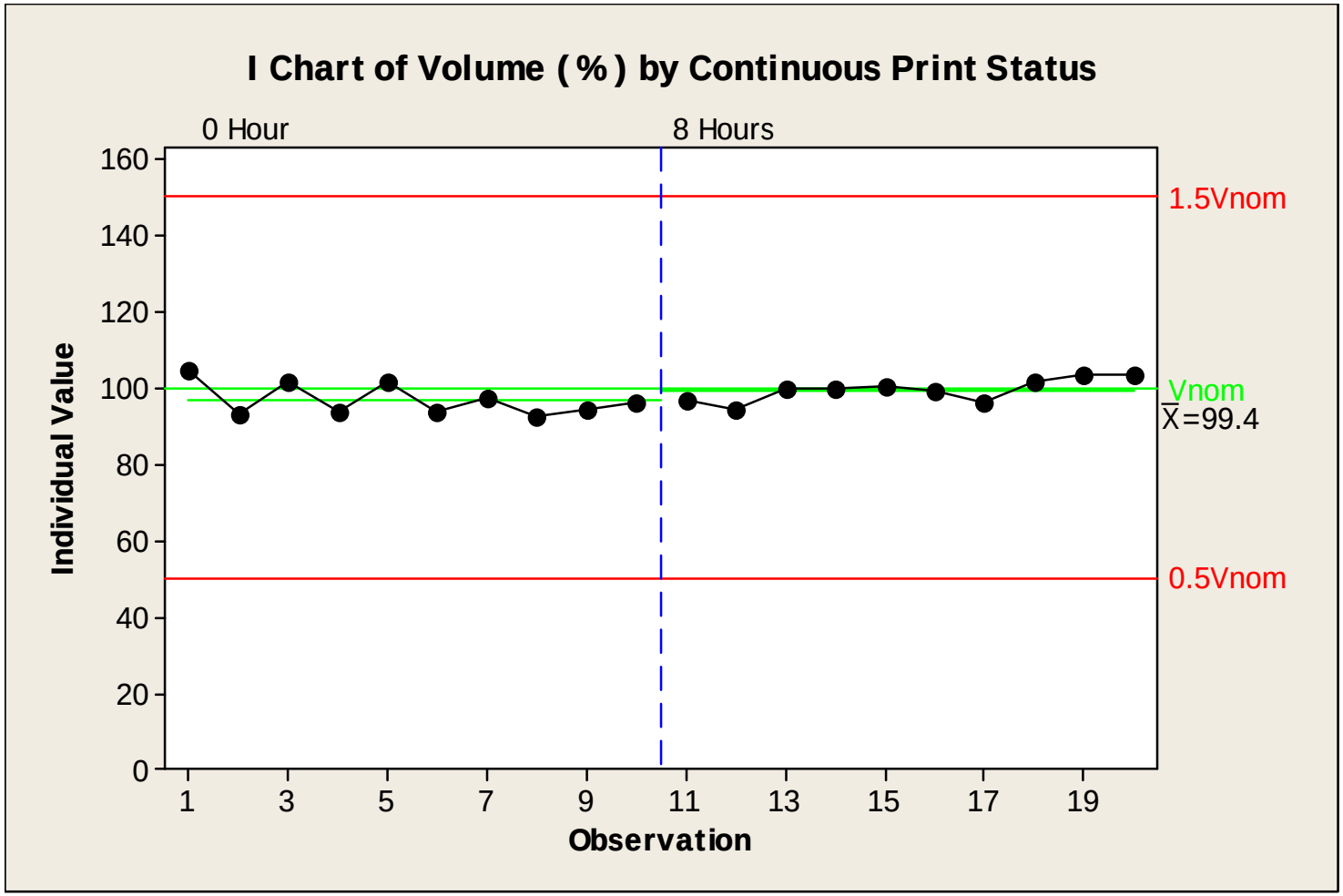
Continuous Print

- Process flow for Henkel standard continuous print test as shown below
- 0.5 mm CSP (280 µm apertures) deposits measured



Operating Parameters

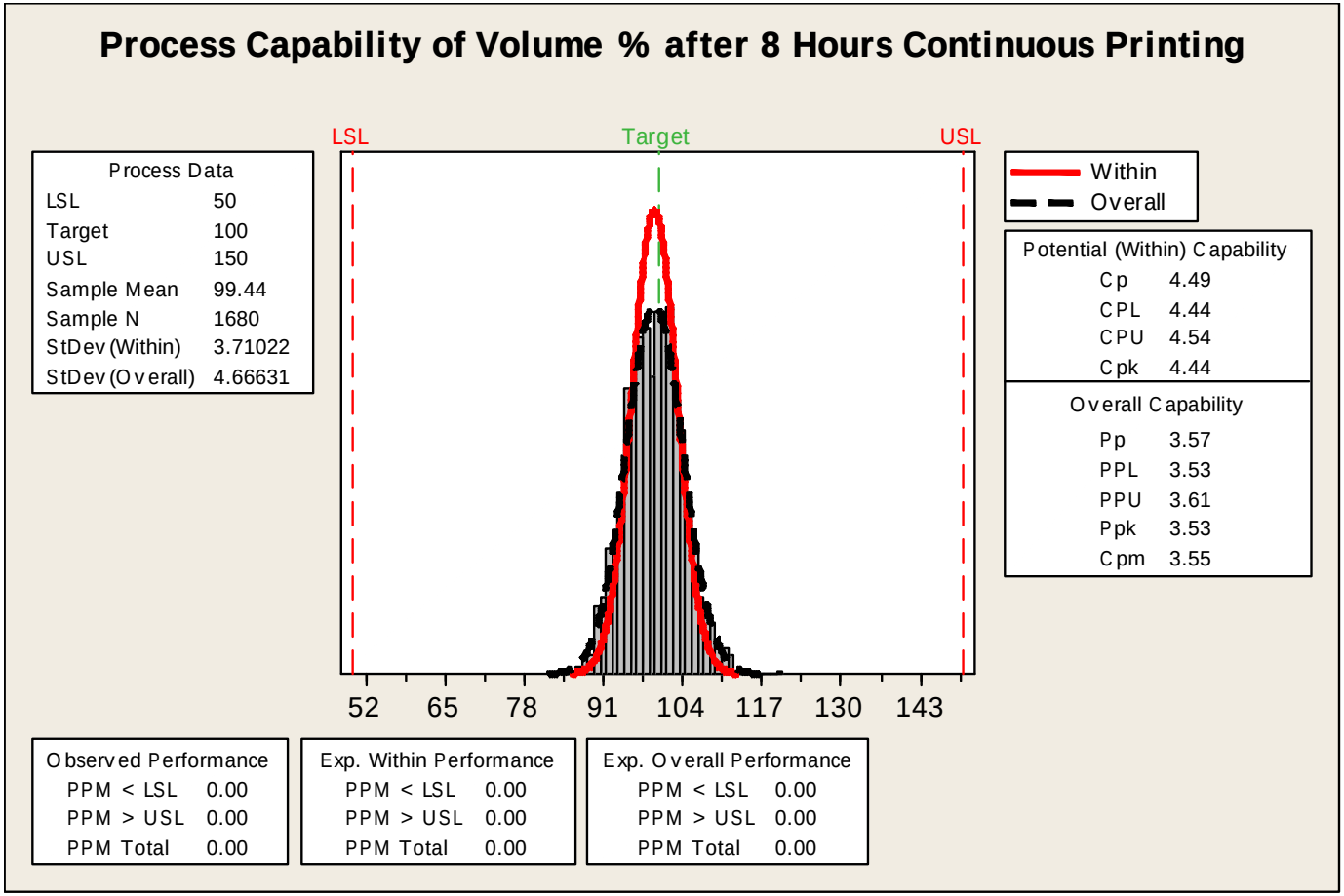
Continuous Print – 8hours



- No impact on print performance after 8 hours printing

Operating Parameters

Continuous Print – 8hours



- No impact on print performance after 8 hours printing
- Cpk after 8 hour continuous = 4.44 (6σ (0.002ppm defect rate) Cpk >2)

Operating Parameters

Slump

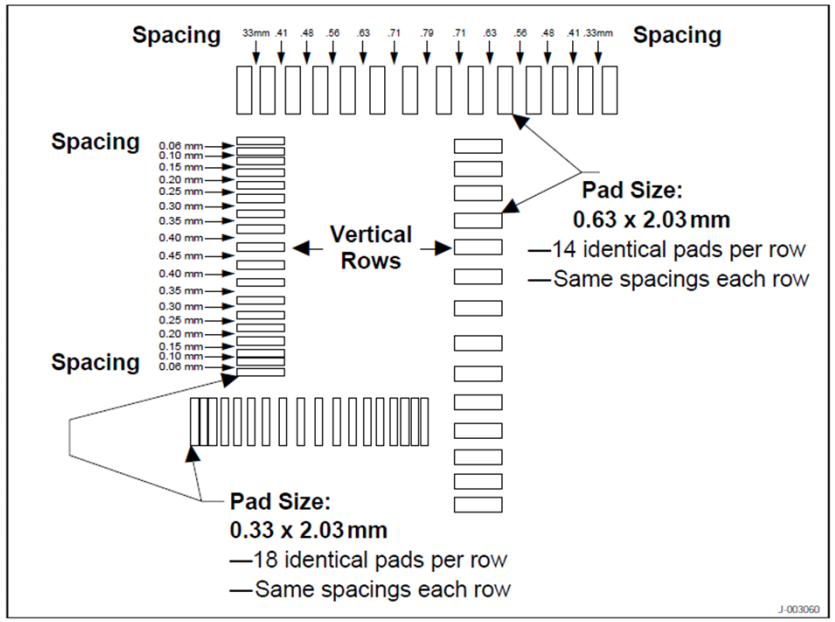


Figure 1 Slump test stencil, IPC-A-21

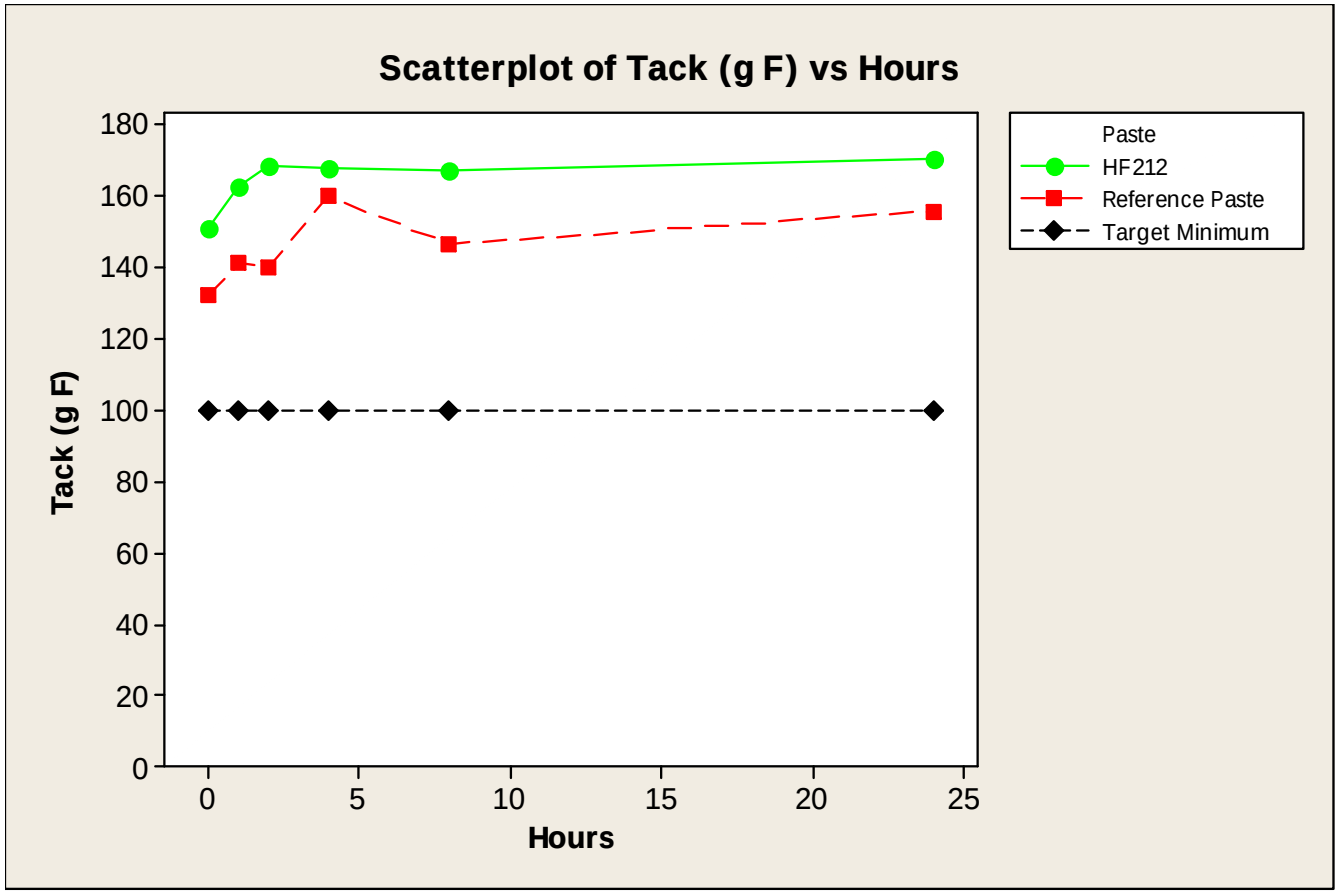
- Slump evaluation was performed in accordance with IPC-TM-650 2.4.35
- First spacing with no bridge recorded after 15mins at 150°C

Aperture	0.63 x 2.03mm	0.33 x 2.03mm
Pass mark	0.63mm	0.30mm
Initial (Room Temperature)	0.33mm	0.20mm
HF212 Result	0.33mm	0.20mm

Operating Parameters

Tack Force

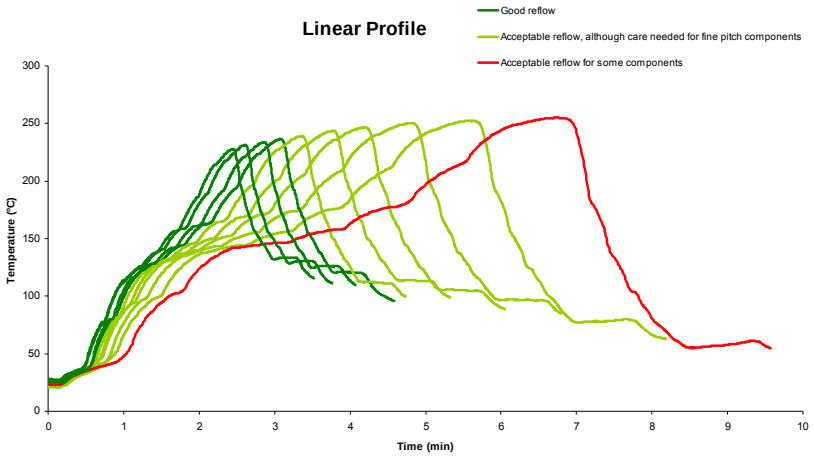
- Test to JIS-Z-3284 test method and Malcom Tackiness Tester TK1

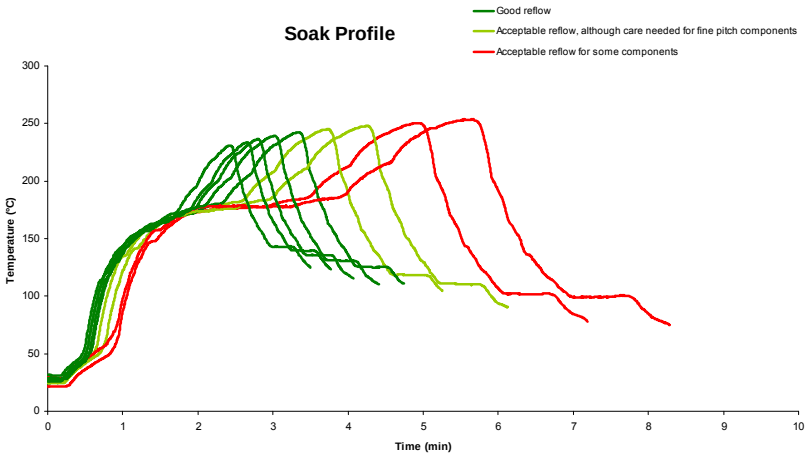


Operating Parameters

Reflow Process Window (Air)

- Henkel Loctite HF212 solder paste offers halogen containing reflow performance in a truly halogen free formulation
- There is no single profile that works for all applications and each process should be assessed individually, under laboratory conditions the following profiles have been found to give good results
- These process window guidelines are suitable for both DAP & AGS powder including standard SAC, high reliability 90iSC and low Ag alloys



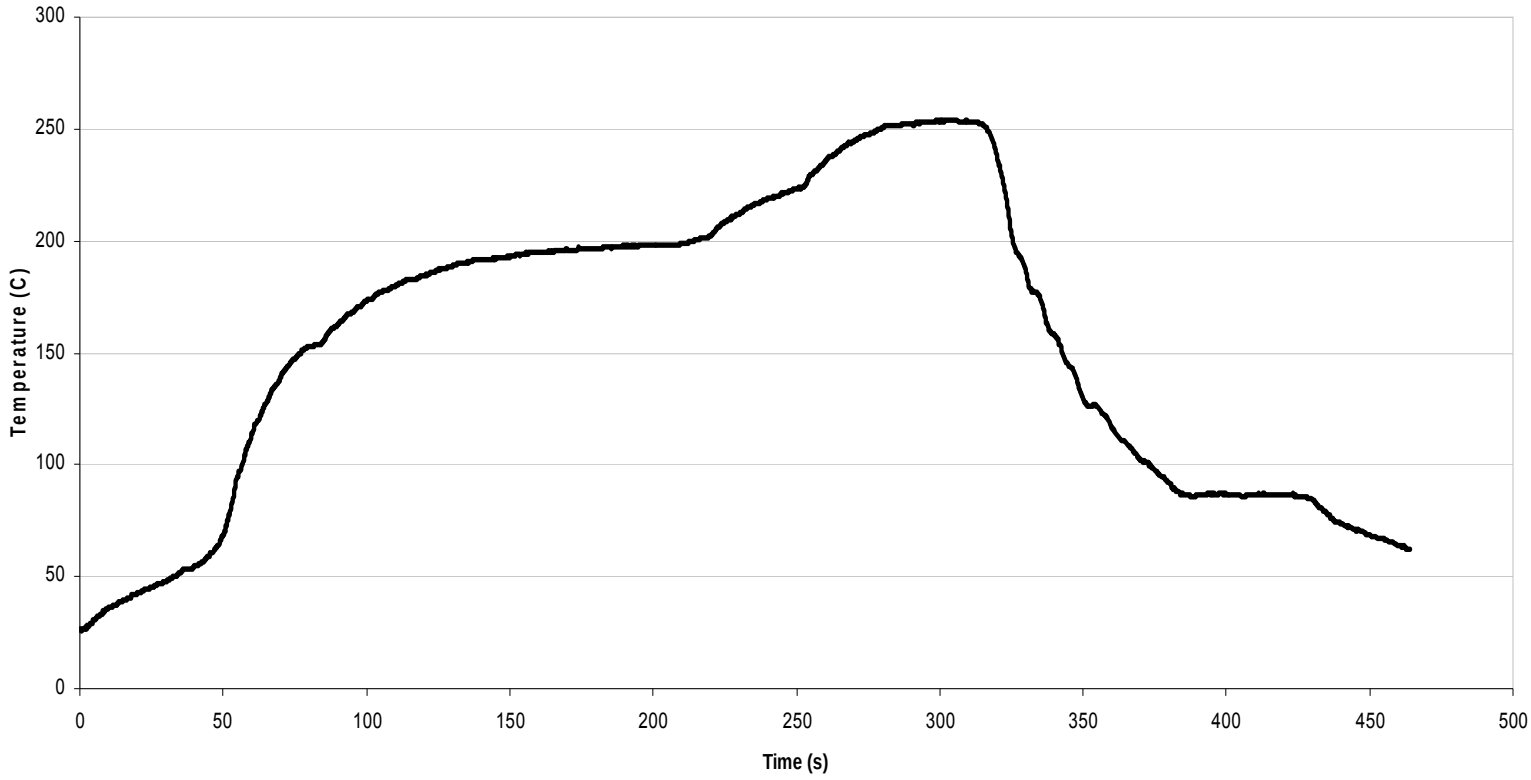


- Reflow Key
  - Good Reflow
  - Acceptable reflow, although some care needed for very fine pitch components
  - Acceptable reflow for most components

Operating Parameters

Reflow Process Performance (Long-Hot Soak)

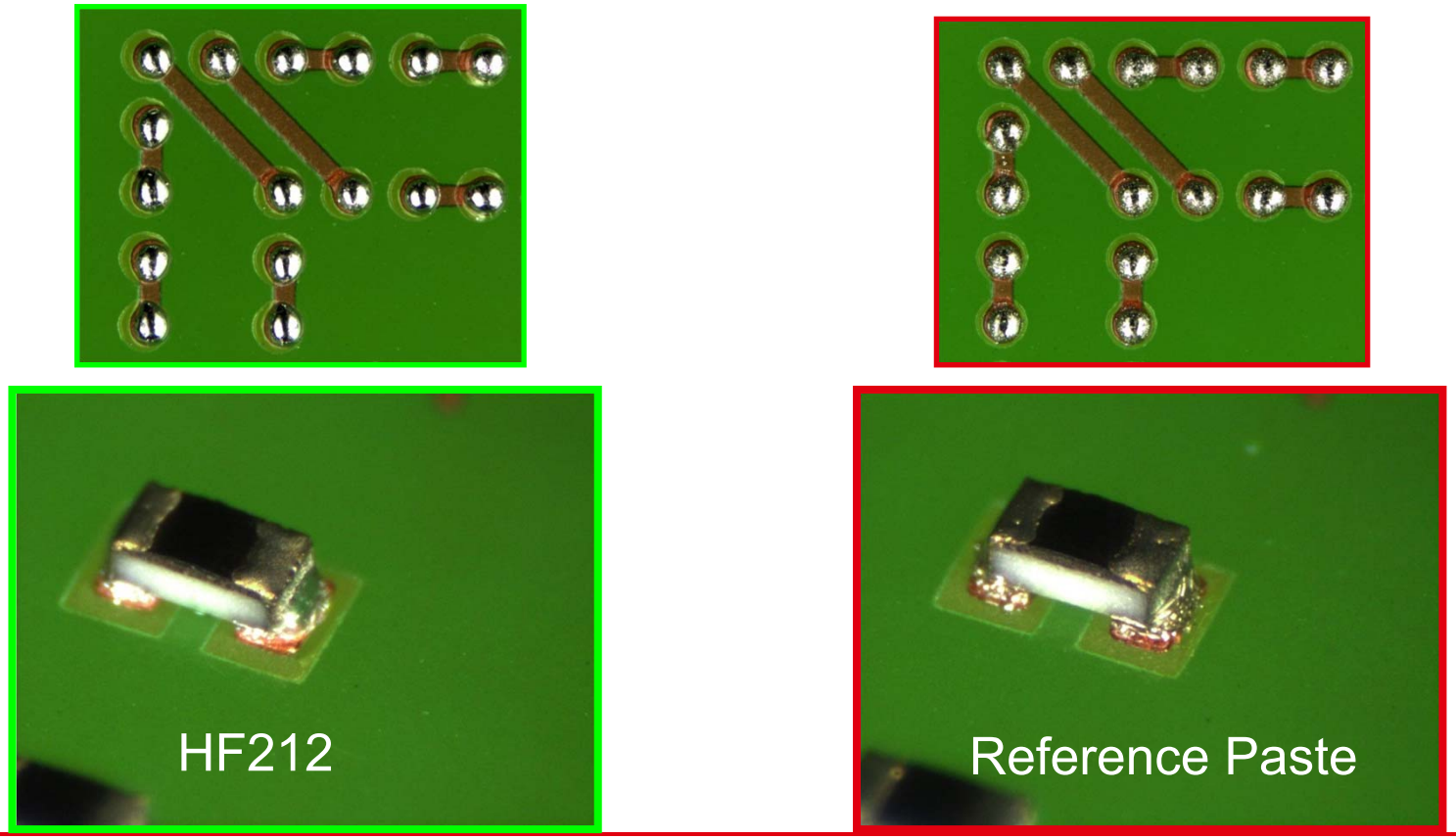
- Example profile for 97SCHF212DAP88.5 Reflow Testing



Operating Parameters

Reflow Process Performance (Long-Hot Soak)

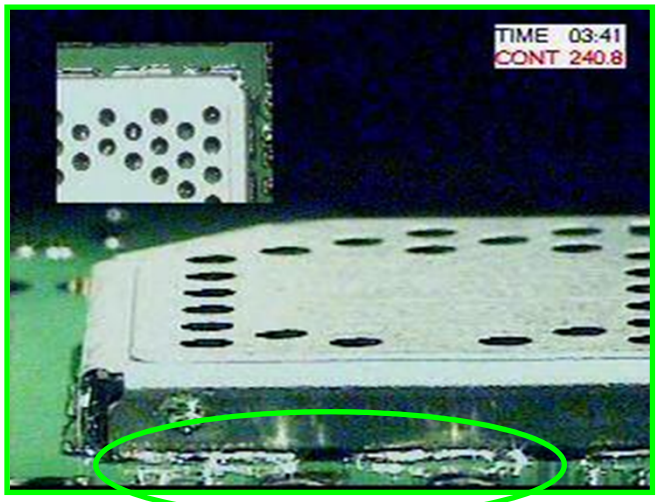
- HF212 shows excellent coalescence onto a range of PCB and component finishes especially during long-hot profiles



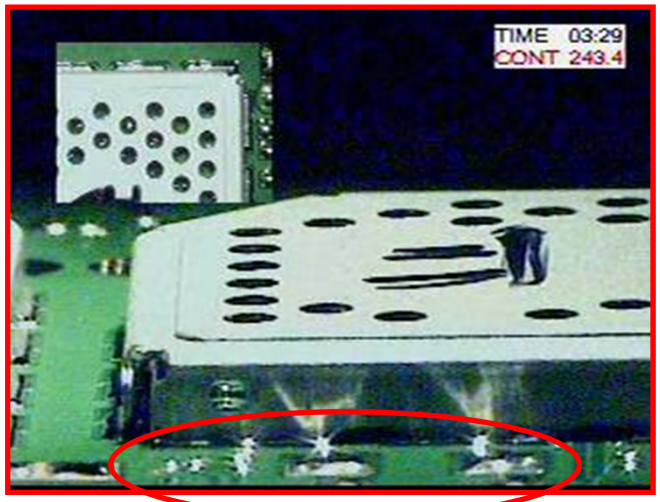
Operating Parameters

Reflow Process Window

- HF212 Flux Medium has been optimised for excellent wetting onto difficult to solder surfaces such as CuNiZn commonly used in RF shield applications



HF212 optimised for shield wetting



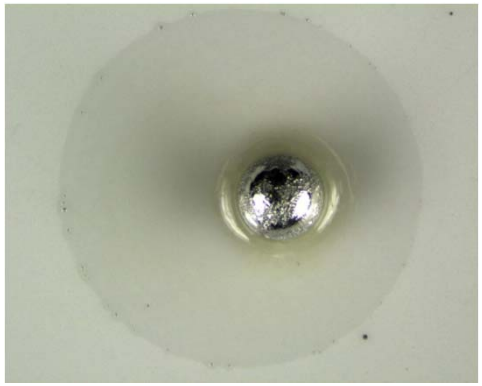
Reference paste exhibiting poor wetting

Operating Parameters

Solder Balling

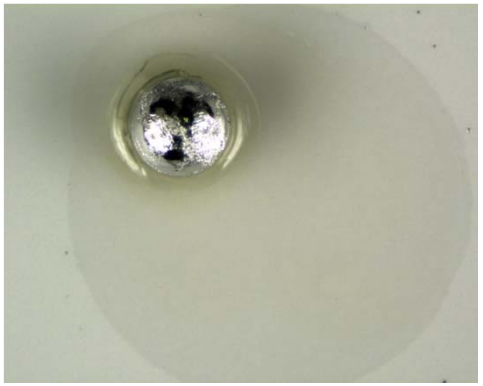
- Solder balling performance as been assessed in accordance with an extended version of IPC-TM-650 2.4.4.3

Initial



Preferred Pass

24hrs 25°C 50% RH



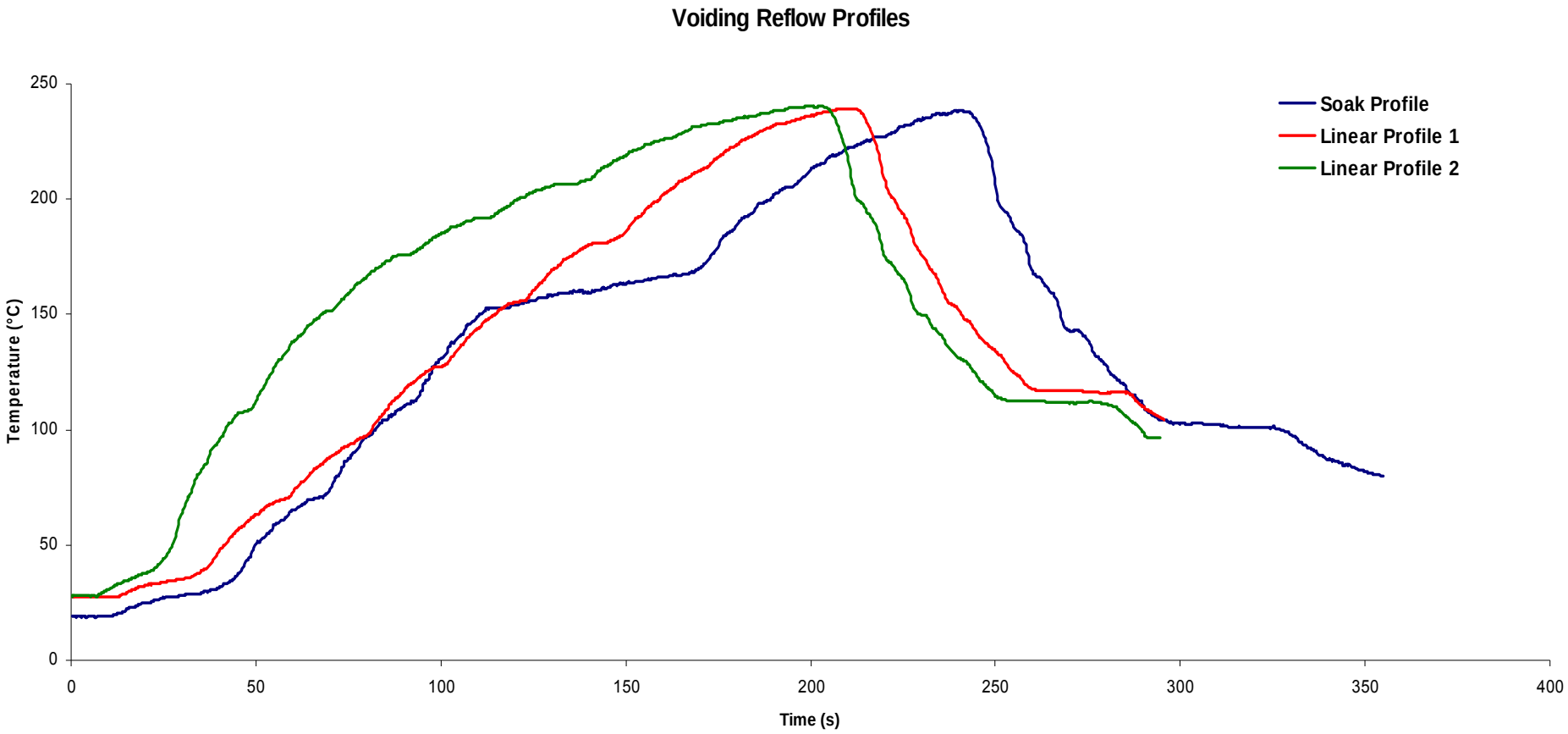
Preferred Pass

- Clear and colourless residues observed post-reflow

Operating Parameters

Voiding

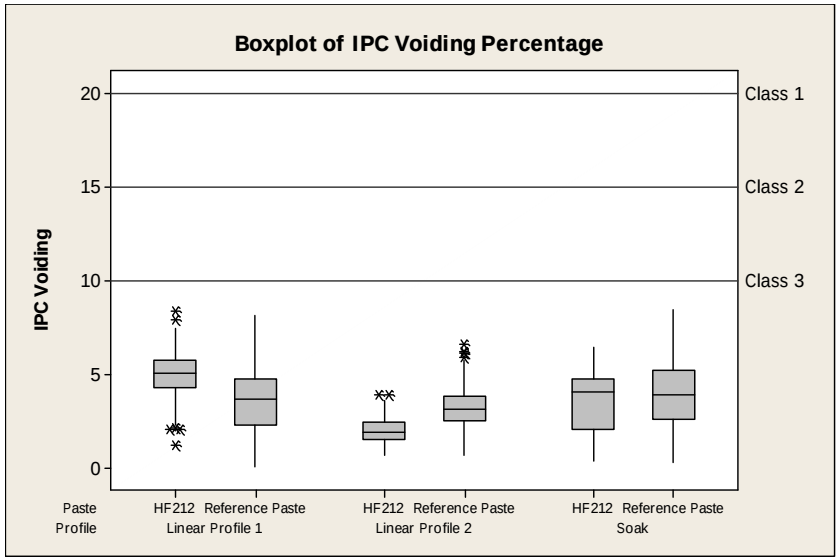
- Void performance assessed using 3 different reflow profiles

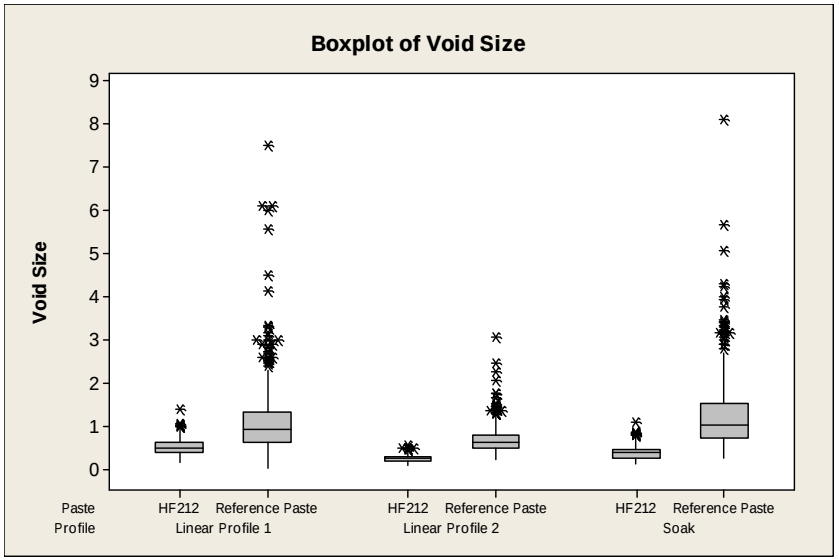


Operating Parameters

Voiding

- HF212 shows low levels of voiding over a range of profiles
- Void Percentage analysed in accordance with IPC7095B





HF212 meets IPC7095B class 3

HF212 Reliability and Specification Testing

Flux reliability

Standard	Test	Result
ANSI/J-STD-004b	Cu Corrosion	Pass
	Cu Mirror	Pass
	Halogen	Pass (none detected)
	Surface Insulation Resistance	Pass
	Flux classification	ROL0

HF212 J-std004b classification ROL0

HF212 Reliability and Specification Testing

SGS Report

- SGS report for HF212
- To meet halogen free requirements, Br<900ppm, Cl <900ppm, and combined <1500ppm

- Halogen – Fluorine - ND
- Halogen – Chorine - ND
- Halogen – Bromine – ND
- Halogen – Iodine – ND

SGS

Test Report No. : CE/2013/60268 Date : 2013/06/07 Page: 2 of 4

HENKEL CORPORATION
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Test Result(s)

PART NAME No.1 : GRAY PASTE

Test Item(s)	Unit	Method	MDL	Result No.1
Halogen				
Halogen-Fluorine (F) (CAS No.: 14762-94-8)	mg/kg	With reference to BS EN 14582:2007. Analysis was performed by IC.	50	n.d.
Halogen-Chlorine (Cl) (CAS No.: 22537-15-1)			50	n.d.
Halogen-Bromine (Br) (CAS No.: 10097-32-2)			50	n.d.
Halogen-Iodine (I) (CAS No.: 14362-44-8)			50	n.d.

Note :
1. mg/kg = ppm; 0.1wt% = 1000ppm
2. n.d. = Not Detected
3. MDL = Method Detection Limit

HF212 has no detectable halogen and is designated as halogen free

Henkel

HF212 Reliability and Specification Testing

Cleaning

Current Status (June 13th 2013)

- **Zestron: Cleaning in accordance to**
  - IPC A-610E
  - J-STD-001E
  - IPC-TM-650:

- We have completed the cleaning trials and have provided it to our MKT department for final approval. All the fluxes were easily cleaned using our standard Defluxing chemistries.

- **Message from Kyzen:**

- Samples were started testing last week. Should have results in two to three weeks.

HF212: Performance Summary

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Thank you!