PRODUCT DATA SHEET

Indium6.4R

Water-Soluble Pb-Free and SnPb Solder Paste

Introduction

Indium6.4R is a versatile, water-soluble solder paste flux, formulated for air or nitrogen reflow. It is capable of SnPb and Pb-free assembly processes with an exceptional reflow process window. This solder paste provides exceptional stencil printing performance, with long stencil life and excellent response-to-pause.

Indium6.4R exhibits superior wetting to a variety of surface finishes and exhibits the best voiding performance, with fewest voids, reduced size of largest voids, and overall minimized voiding for BGAs, CSPs, and BTCs (QFNs, DPAKs, LGAs, etc.).

Features

- Lowest voiding water-soluble flux for solder paste:
  - Reduced largest voids
  - Fewer voids
  - Minimized voiding overall
  - For BGA, CSP, and bottom termination components, such as QFNs
- Exceptional printing process window:
  - Excellent response-to-pause
  - Long stencil life (>8 hours in controlled environment)
  - Prints consistently at a wide range of speeds
- Wide reflow process window for profiling
- Excellent wetting on a variety of surface finishes
- Maintains tack over time
- Suitable for SnPb eutectic alloys as well as Pb-free alloys

Alloys

Indium Corporation manufactures low-oxide spherical powder composed of eutectic SnPb and SnPbAg, as well as many Pb-free alloys for printed circuit board assembly in the industry standard Type 3 and Type 4 mesh size (J-STD-006). Other non-standard mesh sizes are available upon request. The metal load is the weight percent of the solder powder in the solder paste and is dependent upon the powder type, alloy, and application. Standard product offerings are detailed in the following table.

Standard Product Specifications

Alloy Grouping	Indalloy® #	Common Name	Composition	T4 (%)	T3 (%)
SnPb Near-Eutectic	106	Sn63	63Sn/37Pb	89.5	89.75
	–	Sn62	62Sn/36Pb/2Ag		
	100	–	62.6Sn/37Pb/0.4Ag		
Pb-Free Alloys	241	SAC387	95.5Sn/3.8Ag/0.7Cu	88.5	88.75
	256	SAC305	96.5Sn/3.0Ag/0.5Cu		
	258	SAC105	98.5Sn/1.0Ag/0.5Cu		
	268	SACm®	98.5Sn/0.5Ag/1.0Cu+Mn		

Bellcore and J-STD Tests and Results

Test	Result
J-STD-004 (IPC-TM-650)	
Flux Type (per J-STD-004A)	ORH1
SIR	Pass
Wetting Test	Pass

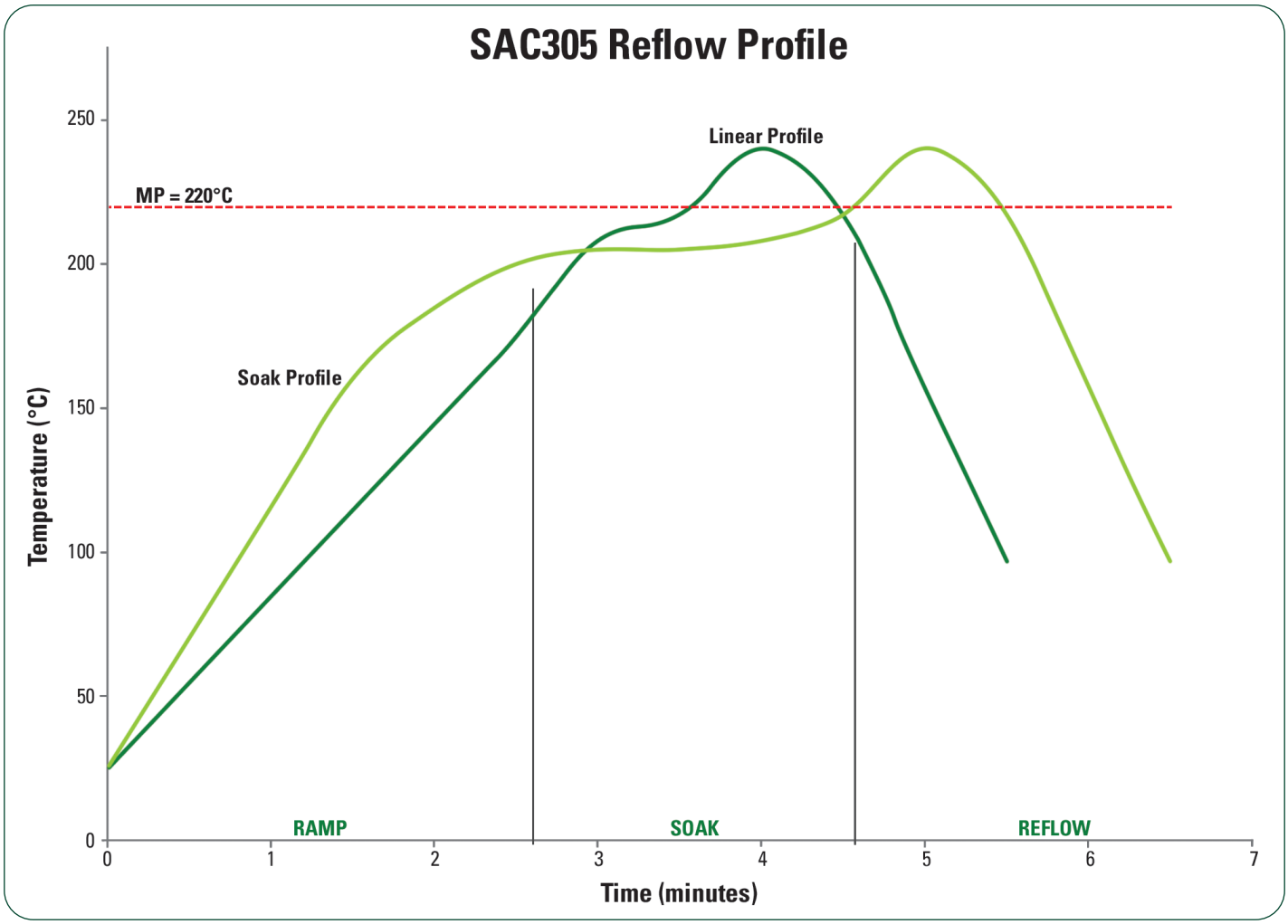
Test	Result
J-STD-005 (IPC-TM-650)	
Typical Solder Paste Viscosity Malcolm (10rpm) (SAC305 T4 88.5%ml))	1,600 poise
Slump Test	Pass
Solder Ball Test	Pass
Typical Tackiness	50g
Wetting Test	Pass

All information is for reference only.
Not to be used as incoming product specifications.

PRODUCT DATA SHEET

Indium6.4R

Water-Soluble Pb-Free and SnPb Solder Paste



Start with the linear profile, then move to the optional soak profile, if needed.

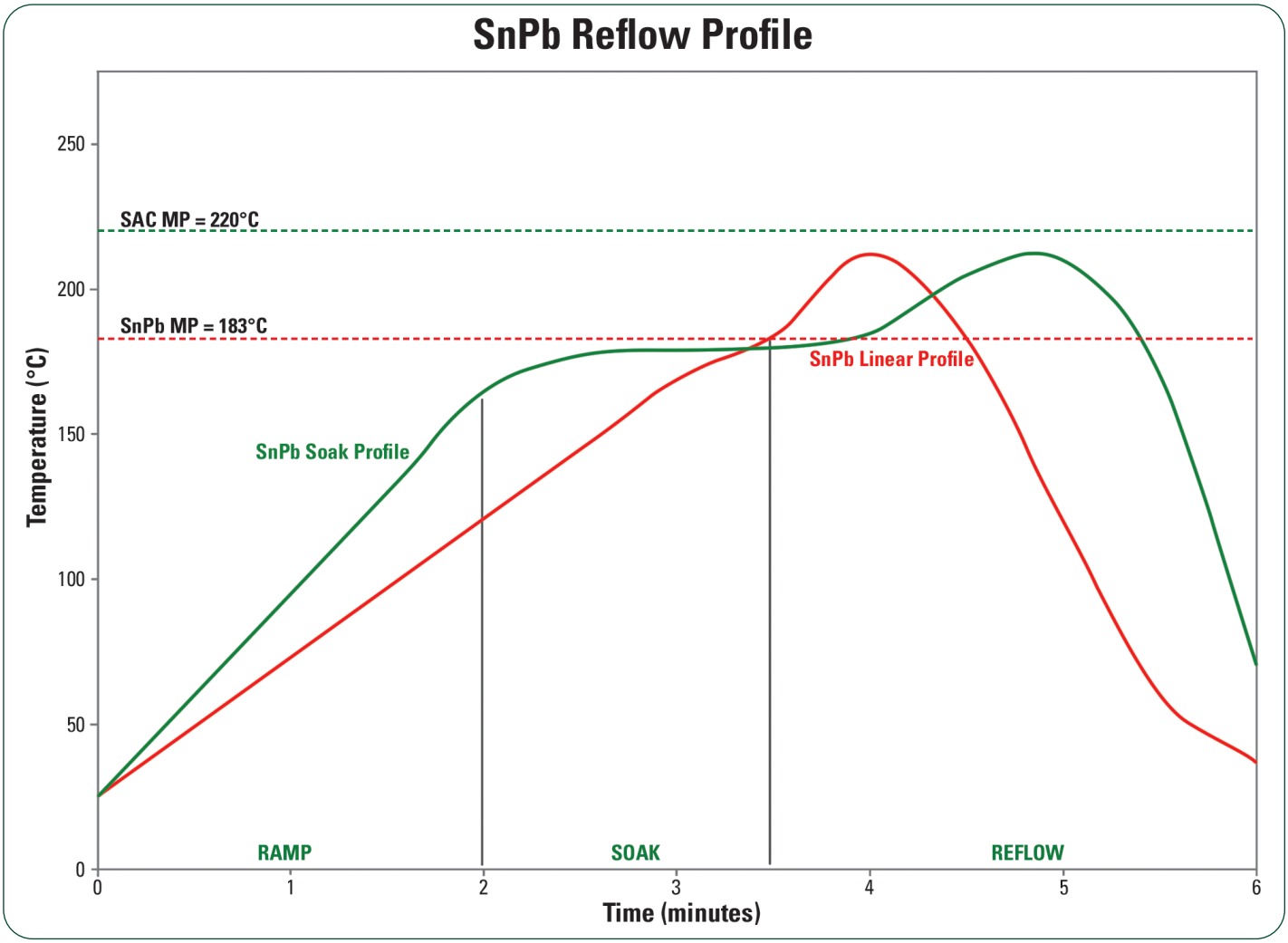
Reflow Profile Details	SAC305 Parameters		Comments
	Recommended	Acceptable	
Ramp Profile (Average Ambient to Peak)—Not the Same as Maximum Rising Slope	1.0–1.5°C/second	0.5–2.5°C/second	To minimize solder balling, beading, hot slump
Soak Zone Profile (optional)	20–60 seconds	30–120 seconds	May minimize BGA/CSP voiding Eliminating/reducing the soak zone may help to reduce HIP and graping
	140–160°C	140–170°C	
Time Above Liquidus (TAL)	45–60 seconds	30–100 seconds	Needed for good wetting/reliable solder joint As measured with thermocouple
Peak Temperature	230–260°C	230–262°C	
Cooling Ramp Rate	2–6°C/second	0.5–6°C/second	Rapid cooling promotes fine-grain structure
Reflow Atmosphere	Air or N_2		N_2 preferred for small components

All parameters are for reference only.
Modifications may be required to fit process and design.

PRODUCT DATA SHEET

Indium6.4R

Water-Soluble Pb-Free and SnPb Solder Paste



Start with the linear profile, then move to the optional soak profile, if needed.

Reflow Profile Details	SnPb Parameters		Comments
	Recommended	Acceptable	
Ramp Profile (Average Ambient to Peak)—not the same as maximum rising slope	0.5–1.0°C/second	0.5–2.5°C/second	To minimize solder balling, beading, hot slump
Soak Zone Profile (optional)	30–90 seconds	30–120 seconds	May minimize BGA/CSP voiding
	140–150°C	130–170°C	
Time Above Liquidus (TAL)	45–60 seconds	30–100 seconds	Needed for good wetting/reliable solder joint
Peak Temperature	205–215°C	205–235°C	
Cooling Ramp Rate	2–6°C/second	0.5–6.0°C/second	Rapid cooling promotes fine-grain structure
Reflow Atmosphere	Air or N_2		N_2 typically preferred

Note: All parameters are for reference only. Modifications may be required to fit process and design.

PRODUCT DATA SHEET

Indium6.4R

Water-Soluble Pb-Free and SnPb Solder Paste

Printing

Stencil Design:

Electroformed and laser cut/electropolished stencils produce the best printing characteristics among stencil types. Stencil aperture design is a crucial step in optimizing the print process. The following are a few general recommendations:

- Discrete components—A 10–20% reduction of stencil aperture has significantly reduced or eliminated the occurrence of mid-chip solder beads. The "home plate" design is a common method for achieving this reduction.
- Fine-pitch components—A surface area reduction is recommended for apertures of 20mil pitch and finer. This reduction will help minimize solder balling and bridging that can lead to electrical shorts. The amount of reduction necessary is process-dependent (5–15% is common).
- For optimum transfer efficiency and release of the solder paste from the stencil apertures, industry standard aperture and aspect ratios should be adhered to.

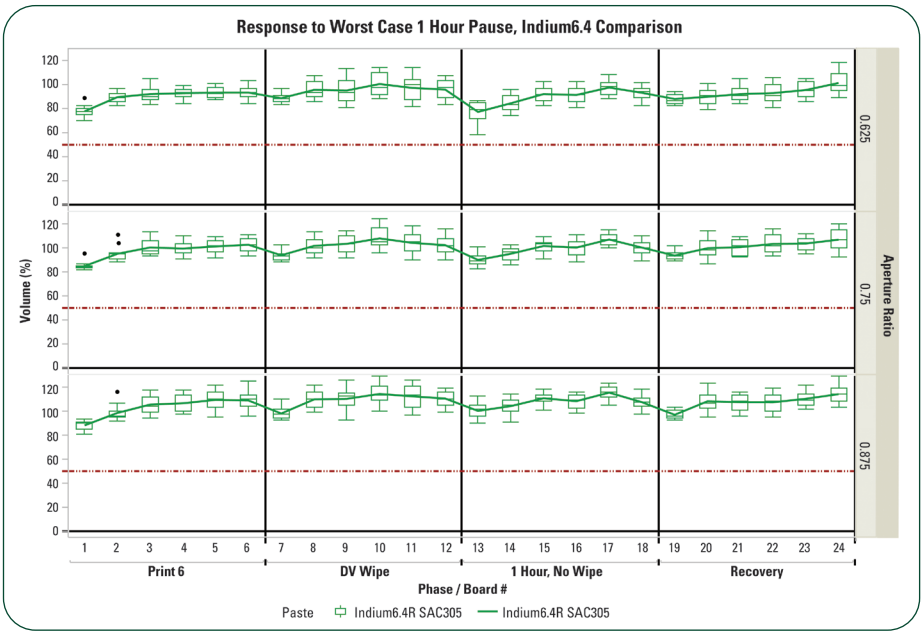
Printer Operation:

The following are general recommendations for stencil printer optimization for **Indium6.4R**. Adjustments may be necessary based on specific process requirements:

Solder Paste Bead Size	20–25mm in diameter
Print Speed	25–100mm/second
Squeegee Pressure	0.018–0.027kg/mm of blade length
Underside Stencil Wipe	Once every 10–25 prints or as necessary (dry wipe recommended)
Solder Paste Stencil Life	>8 hours (at 40–60% RH and 22–28°C)

8-Hour Print Life Procedure:

- Print speed/pressure optimization at 50 and 100mm/second (6 boards at each speed after DV wipe)
- Continue at 100mm/second and optimal low pressure
- Six boards printed every 30 minutes (DV wipe before pause)
- After 4 hours, print 6, DV wipe, print 6 to show impact of just a wipe
- 1 hour pause following DV wipe (best case pause)
- 1 hour pause without DV wipe before (worst case)
- 2 hour pause following DV wipe (long pause)
- Elapsed time: 8 hours or more, approximately 100 boards printed



Area Ratio Chart (mils)		
Aperture Size (mils)	Aperture Size (µm)	Stencil Thickness 4
7	177.80	0.438
8	203.20	0.500
9	228.60	0.563
10	254.00	0.625
11	279.40	0.688
12	304.80	0.750
13	330.20	0.813
14	355.60	0.875

PRODUCT DATA SHEET

Indium6.4R

Water-Soluble Pb-Free and SnPb Solder Paste

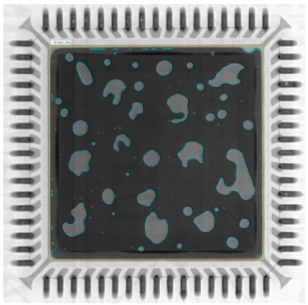
Voiding

The following data was collected using QFNs on a test vehicle. More details can be found in the table. Both SAC305 and Sn63 results are provided using a 4mil stencil. Voiding results are highly dependent on many factors, such as the reflow profile, flux chemistry, alloy, PCB surface finish and design, and components, so your results may vary.

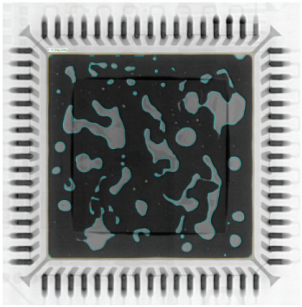
QFN Voiding			
Alloy	**Profile**	**Average**	**Standard Deviation**
SAC305	5 minutes	19.48	3.65
SAC305	3 minutes	22.15	2.45
Sn63	5 minutes	29.02	1.66
Sn63	3 minutes	23.38	3.46

- Two boards, 12 components, measured per condition
- Worst case test for QFN voiding
- Print paste on whole thermal pad square
- Profiles: Ramp to 245°C peak for SAC305
  Ramp to 215°C peak for Sn63
- Time to peak: 3 minutes and 5 minutes

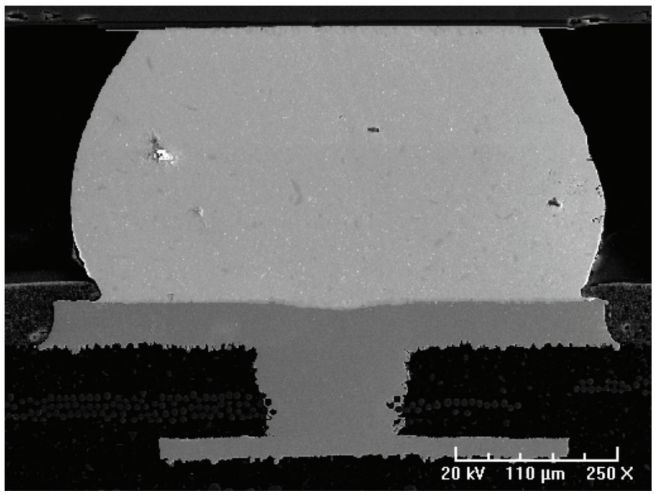
SAC305 T4

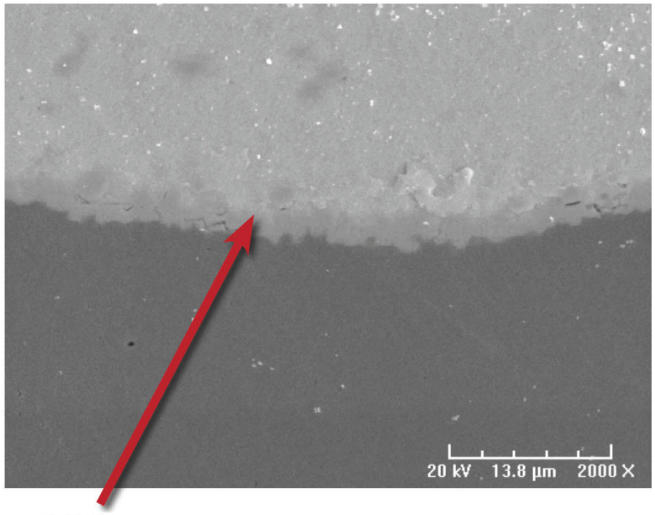


Sn63 T4



Indium6.4R with SAC305 (250x and 2,000x)





IMC Layer

Compatible Products

- **Rework Flux**: TACFlux®025-NP
- **Flux Pen**: FP-1095-NF
- **Cored Wire**: CW-301
- **Wave Flux**: 1095-NF

Placement

The high tack value of **Indium6.4R** assures consistent component holding power. It allows high speed component placement operation, including use of tall components. Tack remains adequate for over 8 hours over a wide humidity range.

PRODUCT DATA SHEET

Indium6.4R

Water-Soluble Pb-Free and SnPb Solder Paste

Storage and Handling Procedures

Refrigerated storage will prolong the shelf life of solder paste. The shelf life of **Indium6.4R** is 6 months when stored at <10°C. When storing solder paste contained in syringes and cartridges, the packages should be stored with tip down.

Solder paste should be allowed to reach ambient working temperature prior to use and before opening the jar. Ideally, the working environment would be 23–28°C and 40–60% RH. Generally, paste should be removed from refrigeration at least 2 hours prior to use. Actual time to reach thermal equilibrium will vary with container size. Paste temperature should be verified before use. Jars and cartridges should be labeled with date and time of opening.

Packaging

Standard packaging for stencil printing applications includes wide-mouth 500g jars and 600g cartridges. For dispensing applications, 30cc syringes are available. Other packaging options may be available upon request.

Cleaning

Indium6.4R flux residue is cleanable up to at least 72 hours after reflow and is best cleaned using DI water with a spray pressure of at least 40psi and a temperature of at least 40°C. These parameters are a function of board complexity and cleaner efficiency. Electrical testing should be performed after the flux residue is removed.

Stencil cleaning is best performed using an automated stencil cleaning system for both stencil and misprint cleaning to prevent extraneous solder particles. Most commercially available stencil cleaners and isopropyl alcohol (IPA) work well.