PRODUCT DATA SHEET
NC-SMQ80
Solder Paste

Introduction

NC-SMQ80 is a halide-free, no-clean solder paste formulated for use with indium-based alloys. Indium-containing alloys offer the benefits of reduced leaching/scavenging of metallizations of precious metals like gold or silver, and improved ductility to compensate for coefficient of thermal expansion (CTE) mismatches between dissimilar materials. **NC-SMQ80** is a medium residue, air-reflow paste with exceptional wetting capabilities. **NC-SMQ80** meets or surpasses all ANSI/J-STD-004, -005, and Bellcore test criteria.

Features

- Formulated for use with indium-based alloys
- No-clean residue
- Exceptional wetting in air reflow
- Reduces leaching/scavenging of precious metals
- Halide-free

Alloys

Indium Corporation manufactures low-oxide spherical powder composed of Sn/In/Ag and numerous indium-based alloys in the industry standard Type 3 mesh size (J-STD-006). Other non-standard mesh sizes are available upon request. The weight ratio of the flux/vehicle to the solder powder is referred to as the metal load and is typically in the range of 83–92% for standard alloy compositions.

Standard Product Specifications

Indalloy®	Metal Load		Mesh Size	Particle Size
	Printing	Dispensing	Type 3	25–45µm
1E (52In/48Sn)	89%	84%	-325/+500	0.001–0.0018"
205 (60In/40Pb)	89%	84%	-325/+500	0.001–0.0018"
227 (77.2Sn/20In/2.8Ag)	89%	84%	-325/+500	0.001–0.0018"
254 (86.9Sn/10In/3.1Ag)	89%	84%	-325/+500	0.001–0.0018"

Packaging

Standard packaging for stencil printing applications includes 4oz jars and 6 or 12oz cartridges. For dispensing applications, 10 and 30cc syringes are standard. Other packaging options are available on request.

Storage and Handling Procedures

Refrigerated storage will prolong the shelf life of solder paste. The shelf life of **NC-SMQ80** is 6 months at storage temperatures of -20–5°C. Storage temperatures should not exceed 25°C. When storing solder paste contained in syringes and cartridges, they should be stored tip down.

Solder paste should be allowed to reach ambient working temperature prior to use. Generally, paste should be removed from refrigeration at least 2 hours before 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.

Bellcore and J-STD Tests and Results

Test	Result
J-STD-004 (IPC-TM-650)	
Flux Type Classification	ROL0
Flux-Induced Corrosion (Copper Mirror)	Pass
Presence of Halide Silver Chromate	Pass
Fluoride Spot Test	Pass
Post-Reflow Flux Residue (ICA Test)	45%
Corrosion	Pass
SIR	Pass
Bellcore Electromigration	Pass
Acid Value	107

Test	Result
J-STD-005 (IPC-TM-650)	
Typical Solder Paste Viscosity (Indalloy®205, 89%, -325/+500) (Indalloy®227, 89%, -325/+500) Brookfield (5rpm)	950kcps 900kcps
Typical Thixotropic Index (ICA Test (#205)	-0.69
Slump Test	Pass
Solder Ball Test	Pass
Typical Tackiness (Indalloy®205)	33g
Wetting Test	Pass

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

Technical Support

Indium Corporation's internationally experienced engineers provide in-depth technical assistance to our customers. Thoroughly knowledgeable in all facets of Material Science as it applies to the electronics and semiconductor sectors, Technical Support Engineers provide expert advice in solder preforms, wire, ribbon, and paste. Indium Corporation's Technical Support Engineers provide rapid response to all technical inquiries.

Safety Data Sheets

The SDS for this product can be found online at http://www.indium.com/sds

From One Engineer To Another®

INDIUM CORPORATION®

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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 adequate release of solder paste from stencil apertures, a minimum aspect ratio of 1:5 is suggested. The aspect ratio is defined as the width of the aperture divided by the thickness of the stencil.

Recommended Printer Operation

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

Solder Paste Bead Size	20–25mm in diameter
Print Speed	12.5–50mm/second
Squeegee Pressure	0.018–0.027kg/mm of blade length
Underside Stencil Wipe	Once per every 10–25 prints
Solder Paste Stencil Life	>6 hours (at 30–60% RH and 22–28°C)

Cleaning

NC-SMQ80 is designed for no-clean applications; however, the flux can be removed, if necessary, by using a commercially available flux residue remover.

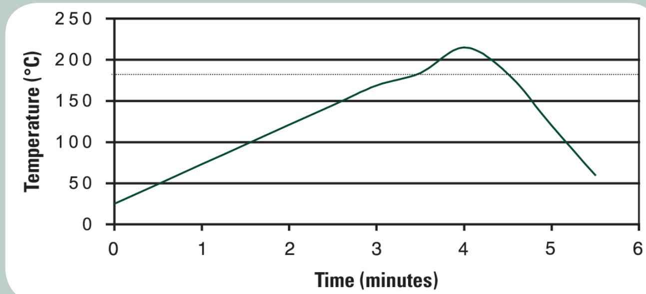
Stencil Cleaning: This is best performed using an automated stencil cleaning system for both stencil and misprint cleaning to prevent extraneous solder balls. Most commercially available stencil cleaning formulations, including isopropyl alcohol (IPA), work well.

Compatible Products

- **Rework Flux**: TACFlux® 012

Reflow

Recommended Profile:



This profile is designed for use with Indalloy®205 (60In/40Pb) MP 181°C and Indalloy®227 (77.2Sn/20In/2.8Ag) MP 187°C. It will serve as a general guideline in establishing a reflow profile for your process. Adjustments to this profile may be necessary based on specific process requirements and the use of alloys with different melting temperatures.

Heating Stage:

A linear ramp rate of 0.5–2.0°C/second allows gradual evaporation of volatile flux constituents and prevents defects such as solder balling/beading and bridging as a result of hot slump. It also prevents unnecessary depletion of fluxing capacity when using higher temperature alloys. A profile with an extended soak above 150°C can be implemented to reduce void formation and minimize tombstoning when required.

Liquidus Stage:

A peak temperature of 25–45°C (215°C shown) above the melting point of the solder alloy is needed to form a quality solder joint and achieve acceptable wetting due to the formation of an intermetallic layer. If the peak temperature is excessive, or the time above liquidus greater than the recommended 30–90 seconds, flux charring, excessive intermetallic formation and damage to the board and components can occur.

Cooling Stage:

A rapid cool down of <4°C/second is desired to form a fine-grain structure. Slow cooling will form a large-grain structure, which typically exhibit poor fatigue resistance. If excessive cooling of >4°C/second is used, both the components and the solder joint can be stressed due to a high CTE mismatch.

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