PRODUCT DATA SHEET

NC-SMQ®230
Pb-Free Solder Paste

Benefits
- Minimum peak temperature 229°C
- Wide reflow process window
- Consistent fine pitch print deposition
- Excellent start-up after idle time
- Long stable tack life and open time

Introduction
NC-SMQ®230 is an air reflow, no-clean solder paste specifically formulated to accommodate the higher processing temperatures required by the SnAgCu, SnAgBi, SnAg, and other Pb-free alloy systems favored by the electronics industry to replace conventional Pb-bearing solders. **NC-SMQ®230** offers consistent, repeatable printing performance combined with long stencil and tack times to handle the rigors of today's high-speed as well as high-mix surface mount lines.

Alloys
Indium Corporation manufactures low oxide spherical powder composed of a variety of Pb-free alloys that cover a broad range of melting temperatures. The metal load required is application dependent and will vary with alloy density and mesh size. Type 3 (-325/+500 mesh) powder is standard, but other powder sizes are available. See Standard Product Specifications below for details on metal load and particle size.

Standard Product Specifications

Alloy	Metal Load
96.5Sn/3.0Ag/0.5Cu (SAC305)	89.3% Printing (Type 3)
96.5Sn/3.8Ag/0.7Cu (SAC387)	89.3% Printing (Type 3)
96.5Sn/3.0Ag/0.5Cu (SAC305)	89% Printing (Type 4)

Packaging
Standard packaging for stencil printing applications includes 4 oz. jars and 6 oz. or 12 oz. cartridges. Packaging for enclosed print head systems is also readily available. For dispensing applications, 10cc and 30cc syringes are standard. Other packaging options may be available upon request.

Storage and Handling Procedures
Refrigerated storage will prolong the shelf life of solder paste. The shelf life of **NC-SMQ®230** is 6 months when stored at <10°C. The shelf life at room temperature (<25°C) is 72 hours (3 days). Solder paste packaged in syringes and cartridges 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 two 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.

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

OVER→

BELLCORE AND J-STD TESTS & RESULTS

Test	Result
J-STD-004 (IPC-TM-650)	
• Flux Type Classification	ROL1
• Flux Induced Corrosion (Copper Mirror)	Pass
• Presence of Halide	
Silver Chromate	Pass
Fluoride Spot Test	Pass
• Post Reflow Flux Residue (ICA Test)	42%
• Corrosion	Pass
• SIR	Pass
• Acid Value	99.6

Test	Result
J-STD-005 (IPC-TM-650)	
• Typical Solder Paste Viscosity	
SAC305 (Sn96.5/Ag3/Cu0.5, Type 3, 89.3%)	
SAC387 (Sn95.5/Ag3.8/Cu0.7, Type 3, 89.3%)	
Malcom (10 rpm),	2100 poise
• Thixotropic Index; SSF (ICA Test)	-0.475
• Slump Test	Pass
• Solder Ball Test	Pass
• Typical Tackiness	48 grams
• Wetting Test	Pass
BELLCORE GR-78	
• SIR	Pass
• Electromigration	Pass

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

Form No. 97722 R17

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ISO 9001 REGISTERED

NC-SMQ®230 Pb-Free 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 20 mil 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 aperatures, a minimum aspect ratio of 1.5 is required. The aspect ratio is defined as the width of the aperture divided by the thickness of the stencil.

Printer Operation:

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

- Solder Paste Bead Size: 20-25mm diameter
- Print Speed: 25-50mm/sec.
- Squeegee Pressure: 0.018-0.027kg/mm of blade length
- Squeegee Type/Angle: Metal with appropriate length/ ~60 degrees
- Underside Stencil Wipe: Once every 10-25 prints
- Solder Paste Stencil Life: >8 hrs. @ 30-60% RH & 22°-28°C

Cleaning

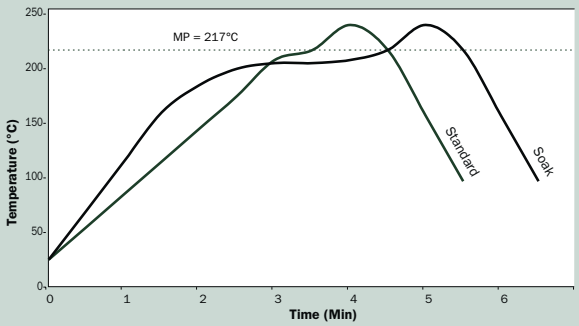
NC-SMQ®230 is designed for no-clean applications, however the flux can be removed if necessary by using a commercially available flux residue remover.

Stencil Cleaning is best performed using isopropyl alcohol (IPA) as a solvent. Most commercially available stencil cleaners work well.

Compatible Products

- Cored Wire: Core 230
- Wave Fluxes: WF-9940 and WF-7745
- Flux Pen: FP-500
- Rework Flux: TACFlux® 023

Reflow



Recommended Profile:

The stated profile recommendations apply to most Pb-Free alloys in the SnAgCu (SAC) alloy system, including SAC 305 (96.5Sn/3.0Ag/0.5Cu). This can be used as a general guideline in establishing a reflow profile when using **NC-SMQ®230** solder paste. Deviations from these recommendations are acceptable, and may be necessary, based on specific process requirements, including board size, thickness, and density.

Heating Stage:

The use of a linear ramp rate or ramp-to-spike (RTS) type profile assists in minimizing the greatest overall number of defects associated with the reflow process. If the ramp rate is too fast, it can cause solder balling, solder beading, and aggravated hot slump which can lead to bridging. The ramp rate in the preheat stage of the profile can range from 0.5°-2.5°C/second (0.5°-1°C/second is ideal). A short soak of 20-30 seconds just below the melting point of the solder alloy can help minimize tombstoning when using a RTS type profile.

If necessary, a ramp-soak-spike (RSS) profile can be implemented to minimize voiding on BGA and CSP type packages. A soak zone between 200°-210°C for up to 2 minutes is acceptable.

Liquidus Stage:

To achieve acceptable wetting and form a quality solder joint, the acceptable temperature range above the melting point of the solder alloy is 12°-50°C (15°-30°C is ideal). The acceptable range for time above liquidus (TAL) is 30-100 seconds (45-60 seconds is ideal). A peak temperature and TAL above these recommendations can result in excessive intermetallic formation that can decrease solder joint reliability.

Cooling Stage:

A rapid cool down is desired to form a fine grain structure. Slow cooling will form a large grain structure, which typically exhibits poor fatigue resistance. The acceptable cooling range is 0.5°C-6.0°C/second (2.0°-6.0°C/second is ideal).

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