PRODUCT DATA SHEET

# NC-SMQ®75

## Die-Attach Solder Paste

## Introduction

**NC-SMQ®75** is a halogen-free, no-clean solder paste formulated to leave a completely benign, invisible residue of 0.4% of paste or <5% of flux vehicle. It is designed for reflow in a nitrogen atmosphere of 100ppm oxygen or less. This product has superior wetting capabilities compared to most low-residue formulations, offers trouble-free probe testing and a "no-residue" appearance. **NC-SMQ®75** meets or surpasses all ANSI/J-STD-004, -005 specifications and Bellcore Electromigration test criteria.

## Features

- Ultra-low voiding with minimal profiling
- Halogen-free
- Vacuum packed, bubble-free
- Reliable miss-free, clog-free dispensing
- Consistent dispensing deposit level
- Superior wetting
- Compatible with all common metal finishes
- Very low-residue


## Standard Product Specifications

| Alloy | Metal Content | Mesh Size | Particle Size | Recommended Needle Size[1] |
|---|---|---|---|---|
| Sn10/Pb88/Ag2<br>Sn5/Pb92.5/Ag2.5<br>Sn5/Pb95<br>Sn5/Pb85/Sb10 | 88% | Type 3 | 25 to 45 microns (Type 3) | 20 gauge* |

Note: (1) 20 gauge needle - 0.58mm or 0.023 in.

## Alloys

Indium Corporation manufactures low-oxide spherical powder in a standard Type 3 or 4 mesh size. Typical alloys with this flux are composed of SnPb, SnSb, SnPbAg, AuSn, SnAgCu. Other non-standard mesh sizes and solder alloys are available upon request. The weight ratio of the solder powder to the solder paste (%w/w) is referred to as the "metal load" and is typically 86 to 94% for standard alloy compositions depending on the alloy density and the application: dispensing or printing.

## Packaging

Standard packaging for dispensing applications includes 25g fill and 40g fill 10cc, and 100g fill 30cc EFD syringes (Semco® syringes also available). Other packaging options may be available upon request.

## Safety Data Sheets

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

## Bellcore and J-STD Tests and Results

| Test | Result |
|---|---|
| **J-STD-004 (IPC-TM-650)** | |
| Flux Type Classification | ORL0 |
| Presence of Halide Fluoride Spot Test | Pass |
| Elemental Analysis | Halide-Free |
| Post-Reflow Flux Residue (ICA Test) | 0.4% of solder paste |
| Corrosion | Pass |
| SIR (Post-Clean) | Pass |
| Acid Value (Typical) | 31.5 |

| Test | Result |
|---|---|
| **J-STD-005 (IPC-TM-650)** | |
| Typical Solder Paste Viscosity (Pb92.5/Sn5/Ag2.5, Type 3, 88%)<br>Brookfield (TF 5rpm)<br>Brookfield (R7 10rpm) | <br>230kcps<br>170kcps |
| Slump Test | Pass |
| Solder Ball Test | Pass |
| Wetting Test | Pass |
| Standard Metal Load | 88% |

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

From One Engineer To Another®

INDIUM CORPORATION®

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## Storage and Handling Procedures

Refrigerated storage will prolong the shelf life of solder paste. The shelf life of **NC-SMQ®75** is 6 months at storage temperatures of -20 to +5°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. No heating should be employed.

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. Cartridges or syringes should be labeled with date and time of opening.

## Dispensing

**NC-SMQ®75** is formulated to be applied using automated high-speed, high-reliability, single-point or multi-point dispensing equipment, but will also function in hand-held applications. Highly accurate volumes can be dispensed using either pneumatic or positive displacement devices. Optimal dispensing performance is dependent upon storage conditions, equipment type and setup.

## Atmosphere

**NC-SMQ®75** is designed for use in a nitrogen (100ppm oxygen or less) atmosphere. The use of forming gas (hydrogen/nitrogen mix) may help to remove oxides on copper surfaces and will help to stabilize flux residues against carbonization at higher temperatures.

## Cleaning or Residue Removal

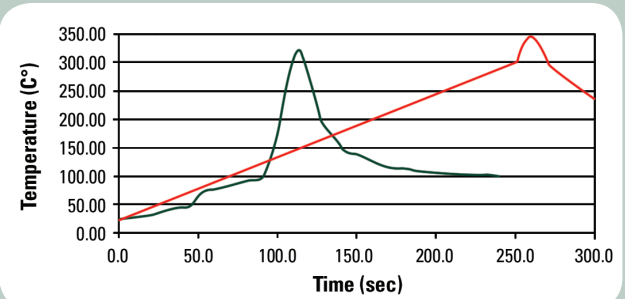
The post reflow residue of **NC-SMQ®75** can be removed with commercially available solvents. The vehicle is capable of high-temperature alloy reflow without charring but in case of overheating, any charred residue can be removed with the aid of ultrasonic or mechanical agitation.

## Quality

Indium Corporation is dedicated to producing the highest quality die-attach solder paste. **NC-SMQ®75** is vacuum packaged by highly-trained operators under controlled conditions in unique, specially designed equipment to minimize air bubbles in every syringe and cartridge. Rheology and reflow characteristics, as well as metal content and identity, are carefully confirmed for each lot. Also, evaluations are performed on each lot to verify dispensing performance.

## Reflow

**Recommended Profile:**




The typical profile above is designed for use with high lead-containing alloys or above 300°C reflow temperatures in a nitrogen or forming gas atmosphere (100ppm oxygen or less). It can serve as a general guideline for establishing a profile for your process and should be regarded as a typical example. Adjustments to this profile may be required based on reflow oven type, assembly size, thermal density, and other factors. Use of other alloys with lower or higher liquidus temperatures will also necessitate changes.

**Heating and Liquidus Stage:**

Establish a profile which provides a rapid heating of the assembly to the solder's liquidus temperature.

A slow linear, fast-ramp or soak type profile can be used to optimize the reflow; however, nature of the assembly and the capabilities of the reflow oven should govern the actual rate. To achieve acceptable wetting, and to minimize voiding and intermetallics formation, the profile must include a period of 15 to 90 seconds above the solder liquidus, and a peak temperature of 20 to 80°C above liquidus. However, excessive time above liquidus (and/or excessively high temperatures above liquidus) can produce negative consequences including: charred residue, difficulty in residue removal, excessive intermetallic formation (tin-containing alloys), voiding, and more.

**Cooling Stage:**

This stage refers to the temperature from the peak to approximately 50°C below the liquidus temperature where the cooling rate has negligible effect. A rapid cool down of <6°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 is used, both the components and the solder joint can be stressed due to a high TCE mismatch.

This product data sheet is provided for general information only. It is not intended, and shall not be construed, to warrant or guarantee the performance of the products described which are sold subject exclusively to written warranties and limitations thereon included in product packaging and invoices. All Indium Corporation's products and solutions are designed to be commercially available unless specifically stated otherwise.

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