AMTECH
Advanced SMT Solder Products

An ISO 9002 Certified Company

LICO

NC-559AS
Technical Data Sheet

The 559 series is designed to meet requirements for reliable solder joints in SMT PC board assemblies. This cream was formulated to replace RMA and water-soluble creams with the benefits of eliminating the added steps of potentially hazardous and costly solvent cleaning or DI water cleaning. This formula was designed to have a wider process window and better compatibility with OSP's than previous no-clean formulations. This formulation exhibits long print life in continuos printing operations.

1.0 Scope

This specification covers the solder paste NC-559AS; 89.5% for stencil printing and 87% for dispensing in interconnection of surface mount devices

2.0 Performance and Standard:

Stencil Life: 12-18 hours.

Tack Time: 18-24 hours

Solder Alloys: Sn63/Pb37; Sn62/Pb36/Ag2; Sn96.5/Ag3.5; Sn10/Pb88/Ag2; Sn95/Sb5; Sn43/Pb43/Bi14

Melting Temperatures: Sn63/Pb37: 183C; Sn62/Pb36/Ag2: 179C; Sn96.5/Ag3.5: 221C; Sn10/Pb88/Ag2: 268-290C: Sn95/Sb5: 235-240C; Sn43/Pb43/Bi14: 144-163C

Appearance: Homogenous dark gray cream, no separated flux

Flux Content (wt %): Printing Applications 10.5% +/-1%; Dispensing Applications 13% +/-1%
Tested according to IPC-TM-650 2.2.20

Viscosity: Printing Applications, T2,T2A 750Kcps +/-10% T3 800Kcps +/-10% T4 850Kcps +/-10%; Dispensing Applications, T2,T2A 400Kcps +/-10% T3 425Kcps +/-10% T4 450Kcps +/-10%.
Tested according to IPC-TM-650 2.4.34 and 2.4.34.2

Grain Size: T2, -200/+325, 75-45microns; T2A, -270/+400, 53-38microns; T3, -325/+500, 45-25 microns; T4, -400/+500, 38-25 microns, T5, -500/+635, 20-25 microns
Tested according to IPC-TM-650 2.2.14 and 2.2.14.2

Particle Sphericity: 99% of the powder spheres exceed 80% roundness factor.

Chlorine Content in Flux (%): Pass – IPC-TM-650 2.3.33, Less than 2.5 $\mu g/in^2$ via Ion Chromatography.

Copper Mirror: MO as classified by IPC-TM-650 2.3.32

Insulation Resistance: Greater than $1x10^{-11}$ after humidity exposure.
Tested according to IPC-TM-650 2.6.3.3

Reflow Property: The paste shall coalesce into one button with no visible discoloration.

3.0 Test Result Report

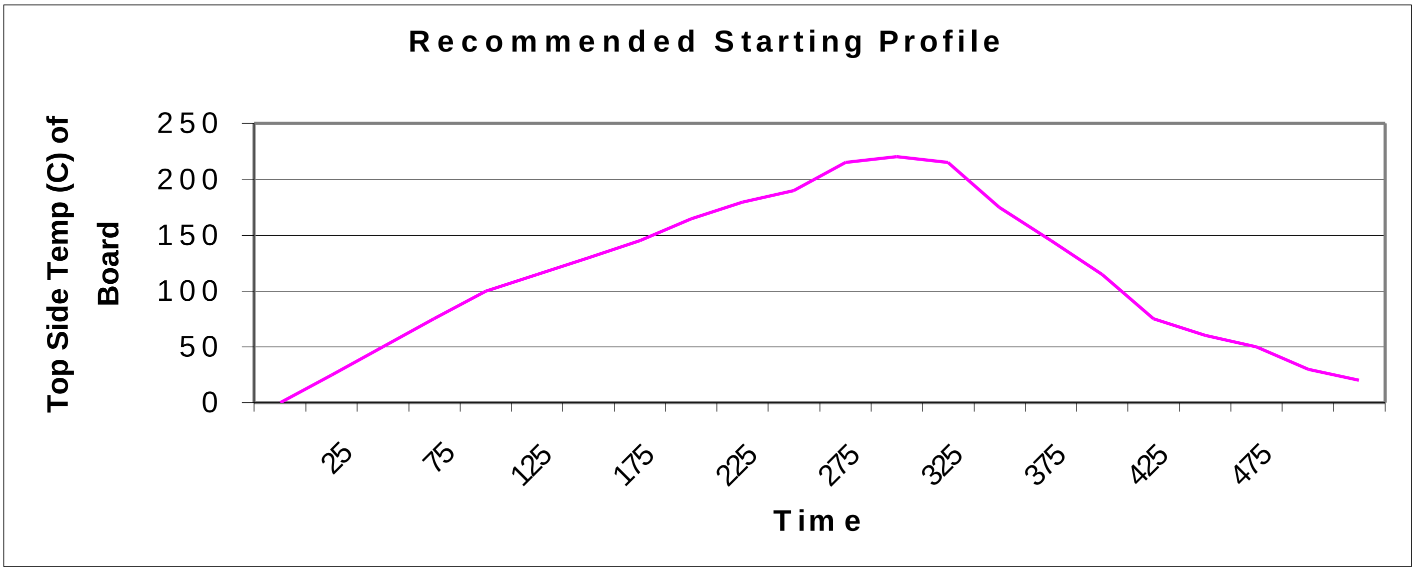
Report contains metal percent, viscosity, wetting and solder ball tests. A detailed chemical analysis of the alloy is also available.

4.0 Packaging

Available in 35, 100 gram syringes; 250,500,600 gram jars; 600, 1200 gram cartridges; and 750 gram DEK Pro-Flow cassettes.

5.0 Guarantee Period

Amtech certifies that when stored properly the material will meet all specifications for 6 months from the date of manufacture. For FreshMix, it will last for 24 months from packaging date. Proper storage: Premix 38-44F, allow material to warm up to ambient temperature before opening; FreshMix, do not store above 75F.



The ultimate goal of the reflow process is to achieve high quality solder joints on all of the component leads of a particular assembly, and to do this consistently. The process involves heating the leads, pads, and cream above the melting point of the alloy so that the solder on the leads, pads, and in the cream reflows into a homogenous fillet. Consistency in the process depends on the ability to control the application of heat and the variation of heat both across the board and from board to board. This controlled heating is called the PROFILE. The typical profile includes a preheat, drying or soak, and reflow or spike zone. The goal of the preheat zone is to bring the assembly up to temperature uniformly, generally at a rate of 2 ^{o}C /second or less. This will minimize the potential for thermal shock on the components due to varying heat capacities. The preheat zone also begins the driving off of some of the solvents added to the cream for printing and releasing. The second zone continues the drying out of solvents to prevent out gassing and possible spattering of the cream. This zone, sometimes called the soak zone, is also where the flux begins to remove the oxides from the surfaces of the leads, pads, and the powder itself. The resins and or higher boiling solvents remain as a cover to prevent the re-oxidation that would readily occur at the elevated temperatures. In the reflow, or spike zone the temperature is quickly raised 20-40 ^{o}C above the melting point of the alloy. It is here that the solder wets the surfaces, and forms the intermetallic bonds. The intermetallics of 63/37 and other high tin alloys with copper are Cu_3Sn on the copper side, and a relatively irregular and rough Cu_6Sn_5 on the solder side. The period of time above reflow is called the dwell time, typically 30- 60 seconds. The dwell should be long enough to allow for all of the joints to reach temperature and form the bonds. Too long of a dwell time can lead to excessive intermetallic formation. Both of the intermetallics are brittle and if they make up a large portion of the fillet can lead to premature failure of the joint.

The Recommended profile is not a line but a zone or band. The width of this band is defined by the upper and lower temperatures that will still give satisfactory results for the particular cream. This band is also refereed to as part of the process window, the larger the band the larger, or more forgiving, the window.

It would be very easy to profile an oven if you only had to reflow one component type on a uniform board. In the real world, almost every assembly has variation across the board due to different components, and/or component densities. Variations in the board itself can lead to large differences in thermal mass. If you were able to plot the profile of each joint, you would get a band corresponding to the variation across the board. A proper profile will have the board's variation band completely inside the process window.

Besides variation across the board, you can also have variation across the oven. This is sometimes caused by the heat sinking of the conveyer system, or air flow variations near the sides, or non-uniformity across the heating element. Another source of variation is from the ability of an oven to hold temperature and recover after a board passes through. This is called the load factor of the oven. This will very from oven to oven, but a starting point would be between one half and one board length between boards.

The actual method of heating is not as important as the ability to control the heating in a repeatable manner.

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