ALPHA® CL-78

DISPENSING SOLDER PASTE

DESCRIPTION

ALPHA CL-78 is a no-clean, dispensable solder paste compatible with the Alpha UP-78 series of modern, no-clean pastes. It is designed for high speed automated or manual dispensing through a wide range of needle sizes. The post reflow residues are clear and colorless.

PROCESS FEATURES & BENEFITS

- Processed and packaged void-free to assure consistent dispensing results.
- Clear, colorless, tack-free residue for the best board cosmetics.
- Reliable, non-clogging dispensing down to .008" I.D. needles.
- Rheology to provide continuous, high speed dispensing (thousands of dispenses per hour) in modern positive displacement dispenser.

PRODUCT INFORMATION

Alloys:	Sn63/Pb37; Sn62/Pb36/Ag2, SAC 305 alloy
Rheology:	Capable of high speed, non-agglomerating dispensing
Packaging Sizes:	10cc (25g fill), 30cc (75g fill) syringes in stock at most times. 55cc Syringes available upon special request.

APPLICATION

Formulated for both slow and high speed dispensing with manual, time/pressure machines and automatic, positive displacement equipment. This soldering paste will provide universal results for component attachment, prototype building, BGA attachment, general rework, paste-in-hole application and deposition in deep cavities.

SAFETY

While the **ALPHA CL-78** flux system is not considered toxic, its use in typical reflow will generate a small amount of reaction and decomposition vapors. These vapors should be adequately exhausted from the work area. Consult the MSDS for additional safety information, and for toxicity data on alloys containing lead and silver.

STORAGE

ALPHA CL-78 is shipped in thermally controlled boxes and should be stored under refrigeration upon receipt at 32°-50°F (0°-10°C). This will be sufficient to maintain a nominal shelf life of six months although a 30 day, room temperature shelf life can also be achieved. CL-78 should be permitted to reach room temperature (usually two hours) before unsealing tip and end closures prior to use.

.

(TECHNICAL DATA ON PAGE 2 AND 3)

ALPHA Global Headquarters
300 Atrium Drive, Somerset, NJ 08873 USA ♦ 1-800-367-5460 ♦ www.alpha.alent.com

ALPHA® CL-78

DISPENSING SOLDER PASTE

TECHNICAL DATA

CATEGORY	RESULTS	PROCEDURES/REMARKS
FLUXING ABILITY	Reflowed Solder Paste, Hot Solder Dip, Tin Plate, Tin Hot Dip, Silver Plate, Copper/OSP coated, Gold/Ni, Ag/Pd Plate, Sn/Pb alloy Coatings	Good wetting and solderability on these surfaces
CHEMICAL PROPERTIES		
Corrosivity	Copper Mirror Test (L)	IPC J-STD-004 Classification: ROL-1
Halide Content	Silver Chromate Paper Test (Pass)	IPC J-STD-004
ELECTRICAL PROPERTIES		
SIR (IPC)	All readings > 1 x 10^9 ohms	Pass, 7 days uncleaned
SIR (Bellcore GR78)	All readings > 1 x 10^{13} ohms	Pass, 4 days uncleaned
Electromigration (Bellcore)	Initial @ 1.3 x 10^9 ohms; 6.5 x 10^9 @ 500 hr.	Passes visual and electrical
PHYSICAL PROPERTIES		Using 85% Metal
Color Density	Clear, Colorless Flux Residue; Density = 4.67g/cc paste w/63Sn/37Pb alloy	
Tack Force	> 2.4 g/mm^2 at 6 hours @ 72 %RH	J-STD-005
Viscosity	85% metal load, Type 3 powder, designated M04 (Sn/Pb alloy) 86% metal load, Type 2 powder or Type 3 for lead free designated M10 both suitable for a wide range of dispensing applications	Malcom Spiral Viscometer
Reflowed Residues	~5.5% w/w, after normal reflow profile	
Stencil Life	> 4 hours	@ 50%RH, 72°F
Slump	Suitable for fine pitch dispensing applications	IPC TM-650

ALPHA® CL-78

DISPENSING SOLDER PASTE

TECHNICAL DATA

ALPHA CL-78 PROCESSING GUIDELINES

(The following is a review of general application notes and precautions)

STORAGE-HANDLING	DISPENSING	REFLOW	CLEANING
• Refrigerate to guarantee stability @33-45°F (1-7°C) • Shelf life of refrigerated paste is six months. Room temperature shelf life is 30 days. • Warm-up of syringe to room temperature (should be ~ 2 hours). Set up dispenser with room temperature paste. Do not place in sun or on a heated surface to accelerate warming. Check paste temperature with a thermometer.	Before setup, continuously dispense until the paste has filled the needle insides and paste is flowing freely. • Time/pressure dispensers should be set up with manufacturer's guidelines. Pressures of 10-20 lbs are recommended without using vacuum suckback. Read the applications notes following regarding needle gap, stringing, and paste volume. • More sophisticated dispense systems usually have specific setup and running recommendations. The "needle map" contained in the CL-78 Applications Notes recommends dispense volumes scientifically. • The insides of dispense mechanisms and needles can be cleaned and lubricated with "purge compounds" or CL-78 paste flux available also in syringes. CL-78 should be run through the dispense mechanism to wet the walls and exclude any foreign material prior to dispensing.	• Use convection, IR, or combination ovens, hot - plate, vapor phase, hot gun, heat bar or laser equipment • Clean-dry air or nitrogen atmosphere. PROFILE • A straight ramp heating to reflow and straight ramp down to room temperature of all joints being soldered. This is a general statement given the various methods to reflow dispensed paste and the varied equipment used in dispensing processes.	• Although designed as a no-clean flux system, the residue may be cleaned with: BIOACT EC-7R or EC-Ultra™; Alpha 2110 saponifier or SC-22 Aqueous cleaning will not turn CL-78 residues cloudy. • Clean needles with Alpha SC-22 and fine wires. (or use disposable needles). An ultrasonic bath will assist loosening dried residues. Purge paste with a fine wire and flush with solvent in a squeeze bottle. Needles can also be pre-cleaned by dispensing paste flux (available in syringes from Alpha Metals, Inc.) through to purge solder particles and make subsequent cleaning easier.

ALPHA® CL-78

DISPENSING SOLDER PASTE

APPLICATIONS NOTES

ALPHA CL-78 Dispensing Solder Paste

1. What are the variable parameters affecting dispensing?

1.1 Product (paste) Parameters: Viscosity, flow behavior, wetting behavior, temperature stability, homogeneity, and voids.

1.2 Machine Parameters: Nozzle distance to substrate, dwell time between dispenses, "Z" height return, I.D. of needle, dispensed dot diameter, pressure, dispense time.

2. What parameters affect the volume and shape of dispensed paste?

2.1 Surface Tension: The ability of a material to adhere to a surface. For instance, material and needle nozzle; material and substrate. It should be greater between the material and the substrate (board).

2.2 Shot Size: The time a valve or pressure is actuated and as related to the nozzle gap ("Z" height from nozzle tip to substrate).

2.3 Nozzle Gap: Dictates shot size. A rule of thumb is that the nozzle or needle gap = ½ needle I.D.

2.3.1 Footed Nozzles: A fixed distance "foot" is appended to the needle body and extends a distance below the needle tip, allowing the same gap between tip and substrate when the needle "bottoms out" on the substrate at each dispense.

2.3.2 Unfooted Nozzles: Gap is determined manually, with a camera, by touch probe or by laser sensor.

2.3.3 Consequences of gap too high: Insufficient shot size, lowers surface tension, results in intermittent dispenses.

2.3.4 Consequences of gap too low: Shot size is too large resulting nozzle contamination, tailing of material and dot defects.

2.4 Nozzle Gauge: Determines smallest dot (1.5 x Needle I.D.).

2.5 Dwell Time: Set in milliseconds on automated equipment or by trial and error on manual equipment. What happens within these milliseconds of the dispense portion of the cycle? The needle remains in the down position after dispensing to allow the material to wet sufficiently for the proper surface tension. When tension between material and substrate is achieved, the needle lifts up, and the tension allows the material to part from the needle Tip and material within the needle and stay on the substrate. Manipulating the dwell will affect throughput and the dot profile.

2.6 Up Height: The distance the needle moves up after a dispense. Modern dispensers can be adjusted by .001" increments to optimize clean paste snapoff from the needle.

3. Addressing Common Defects:

3.1 Tailing is caused by: Insufficient shot size; Nozzle gap too high; Up-height too low; paste chemistry.

3.2 Bulging Paste Bump: Insufficient nozzle gap; Shot size too large.

ALPHA® CL-78

DISPENSING SOLDER PASTE

APPLICATIONS NOTES

4. What about the Nozzles (needles)?

4.1 Types: Plastic, stainless steel, conical walled, straight walled, chamfered tips, footed and non-footed needles, luer lock and set screw locked**.**

4.2 Nozzle Selection Criteria: Dot size (1.5 x I.D. needle); For larger dots, increase shot size or use a larger needle; Too small a nozzle may result in excessive shot size if pressure is allowed to rule.

5. What are the types of dispensing methods? The 3 most common are : time/pressure, positive displacement piston and positive displacement rotary pump.

5.1 Time/Pressure: Proven technology where you can discard used needles and Syringes. It is difficult to set up, not suitable for reproducing very small volumes, and is subject to volume variation with changes in temperature and syringe volume (bubble effect).

5.2 Positive Displacement (Piston): Consistent dots, low air pressure, but each piston pump is made for a specific dot size and must be removed and recalibrated for a new size.

5.3 Positive Displacement (Rotary): Consistent dots, infinite dot size flexibility ambient temperature dispensing, simple setup and process control. Speed is dependent on needle size, and requires more cleaning than time/pressure equipment.

6. Does the plunger (follower) in the syringe have an effect on dispensing?

6.1 Plungers are available in rubber, compounds, metal and plastic. They are either straight or concave walled. On CL-78, Orange plastic, straight walled followers (plungers) in the syringes provide best results in the widest range of applications. These plungers work best with high speed, automated equipment and require proper setup on time/pressure systems providing optimum results.

7. Summary:

7.1 Surface tension plays a key roll in dispensing. Set up to optimize surface tension.

7.2 Nozzle gap must be balanced with shot size and speed.

7.3 Nozzle gauge and shot size control dot profile.

7.4 Investment in correct method and process optimization ensures success.

7.5 A “needle guide” is attached below (Courtesy Speedline CAMALOT)

ALPHA® CL-78

DISPENSING SOLDER PASTE

APPLICATIONS NOTES