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TECHNICAL BULLETIN

ALPHA® SLS 65

No Clean Flux

DESCRIPTION

ALPHA SLS 65 is an active, low solid, no-clean flux. It is formulated with a proprietary mixture of organic activators. Several proprietary additives are formulated into **ALPHA SLS 65**, which act to reduce the surface tension between the solder resist and the solder, thereby dramatically reducing the tendency of solder ball generation. The formulation of **ALPHA SLS 65** is also designed to be more thermally stable, thereby reducing the occurrence of solder bridging.

ALPHA SLS 65 is specifically developed to eliminate the tendency for solder balling and solder bridging – two defects that are normally associated with the use of the chip wave. Of all low solids (<4% solids), no-clean fluxes, **ALPHA SLS 65** exhibits the lowest tendency for solder ball generation over a wide variety of solder masks. **ALPHA SLS 65** should be considered for use by any assembler who has board designs that are sensitive to solder bridging, performs pin testing, and/or whose specification requires an extremely low frequency of solder balls.

READ ENTIRE TECHNICAL DATA SHEET BEFORE USING THIS PRODUCT

FEATURES & BENEFITS

- Thermally stable activators provide the lowest solder bridging in a low-solids, no-clean flux.
- Reduces the surface tension between solder and resist to provide the lowest solder ball frequency of any low solids, no-clean flux.
- Very low level of non-tacky residue to reduce interference with pin testing and exhibit no visible residue.
- Cleaning is not required which reduces operating costs.
- Bellcore Compliant for long-term electrical reliability.

APPLICATION GUIDELINES

Preparation: In order to maintain consistent soldering performance and electrical reliability, it is important to begin the process with circuit boards and components that meet established requirements for solderability and ionic cleanliness. It is suggested that assemblers establish specifications on these items with their suppliers and that suppliers provide Certificates of Analysis with shipments and/or assemblers perform incoming inspection. A common specification for the ionic cleanliness of incoming boards and components is 0.77 µg/cm^2 (5 µg/in^2) maximum, as measured by an Omegameter with heated solution. Care should be taken in handling the circuit boards throughout the process. Boards should always be held at the

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edges. The use of clean, lint-free gloves is also recommended. When switching from one flux to another, the use of a new foam stone is recommended (for foam fluxing). Conveyors, fingers, and pallets should be cleaned. ALPHA SM110 Solvent Cleaner has been found very useful for these cleaning applications. When foam fluxing, do not use hot fixtures or pallets. Hot fixtures or pallets will deteriorate the foam head.

Flux Application: ALPHA SLS 65 is formulated to be applied by foam, wave, or spray methods. When foam fluxing, the foam fluxer should be supplied with compressed air which is free of oil and water. Keep the flux tank full at all times. The flux level should be maintained 25 to 40 mm (1 to 1½") above the top of the stone. Adjust the air pressure to produce the optimum foam height with a fine, uniform foam head. A uniform coating of flux is essential to successful soldering. When using the foam or wave method of application, an air knife is recommended after the fluxing operation, an air knife will help ensure that the flux is uniformly distributed across the board and will remove the excess flux. When spray fluxing, the uniformity of the coating can be visually checked by running a piece of cardboard over the spray fluxer or by processing a board-sized piece of tempered glass through the spray and then through the preheat section.

Operating Parameter	Recommendation
Amount of flux to be applied	Foam, Wave: 155 to 232 µg/cm^2 of solids Spray: 140 to 250 µg/cm^2 of solids
When foam fluxing: Foam Stone Pore Size Distance that top of stone is submerged below flux Foam Fluxer Chimney Opening	 20 to 50 µm 25 to 38 mm 10 to 13 mm
When foam fluxing, use an air knife: Air knife hole diameter: Distance between holes Distance from Fluxer to Air knife Air knife angle back toward fluxer from perpendicular	 1 to 1.5 mm 4 to 5 mm 10 to 15 cm 3 to 5°
Topside Preheat Temperature	100 to 120 °C
Bottom side Preheat Temperature	about 35 °C higher than topside
Maximum ramp rate of topside temperature (To avoid component damage)	2 °C/second maximum
Conveyor angle	5 to 8 °C (6 °C most common)
Conveyor speed	1.00 to 2.00 meters/minute

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Operating Parameter	Recommendation
Contact time in the solder (Includes chip wave and primary wave)	1.5 to 3.5 seconds (2½ to 3 seconds most common for 63/37 Sn-PB 2 to 7 seconds (2½ to 5 seconds most common for Lead-free)
Solder pot temperature	235 to 260 °C (460 to 500 °F) for 63/37 Sn-Pb 255 to 270 °C (491 to 518 °F) for Lead-free
These are general guidelines, which have proven to yield excellent results; however, depending upon your equipment, components, and circuit boards; your optimal settings may be different. In order to optimize your process, it is recommended to perform a designed experiment, optimizing the most important variables (amount of flux applied, conveyor speed, topside preheat temperature, solder pot temperature, and board orientation).	

Flux Solids Control: If foam, wave, or rotary drums spray fluxing, the flux solids will need to be controlled via thinner addition to replace evaporative losses of the flux solvent. As with any flux with less than 5% solids content, specific gravity is not an effective measurement for assessing and controlling the solids content. Monitoring and controlling the acid number is recommended for maintaining the solids content. The acid number should be controlled between 17 and 19. When operating the foam fluxer continuously, the acid number should be checked every two to four hours.

Over time, debris and contaminants will accumulate in recirculating type flux applicators. After emptying the flux, the reservoir and foam stone should be thoroughly cleaned with flux thinner.

Residue Removal: ALPHA SLS 65 is a no-clean flux and the residues are designed to be left on the board. However, if desired, ALPHA SLS 65 residues can be removed with ALPHA 2110 Saponifier.

Touch-Up/Rework: Use of ALPHA Cleanline Write Flux Applicator with ALPHA NR205 flux, and ALPHA Telecore Plus cored solder wire is recommended for hand soldering applications.

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TECHNICAL DATA

Item	Typical Values	Item	Typical Values
Appearance	Clear, colorless liquid	Flash Point (T.C.C.)	12 °C (53 °F)
Solids Content, wt/wt	2.3%	Recommended Thinner	ALPHA 425
Specific Gravity @ (77±1 °F) (25 °C ±1.8 °C)	0.801 ± 0.003	Bellcore TR-NWT-000078, Issue 3 compliant	Yes
Acid Number (mg KOH/g)	18 +/-1	IPC J-STD-004 Designation	ORL0
pH (5% aqueous solution)	3.36 +/- 0.30	Shelf Life (From date of mfg.)	360 days

CORROSION & ELECTRICAL TESTING

Corrosion Test

Test		Requirement for ROL0	Results
IPC	Silver Chromate Paper IPC-TM 650 Test Method 2.3.33	No detection of halide	PASS
	Copper Mirror Test IPC-TM 650 Test Method 2.3.32	No complete removal of copper	PASS
	Copper Corrosion Test IPC-TM650 Test Method 2.6.15	No evidence of corrosion	PASS

IPC-J-STD-004A Surface Insulation Resistance (All values shown are in ohms)

Test	Conditions	Requirements	Results
"Comb down" – Uncleaned	85 °C/85% RH, 7 days	> 1.0×10^8	2.1×10^9
"Comb up" – Uncleaned	85 °C/85% RH, 7 days	> 1.0×10^8	1.5×10^9
Control Board	85 °C/85% RH, 7 days	>1.0×10^9	1.1×10^{10}
IPC Test Condition (per J-STD-004A): --50V, measurement @ 100V/IPC B-24 board (0.4 mm lines, 0.5 mm spacing).			

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Bellcore Surface Insulation Resistance (All values shown are in ohms)

Test Condition	Requirements	Results
Bellcore “Comb-Down” – uncleaned	> 1.0×10^{11}	4.5×10^{11}
Bellcore “Comb-Up” – Uncleaned	> 1.0×10^{11}	1.4×10^{11}
Bellcore Control Board	> 2.0×10^{11}	9.3×10^{11}
Bellcore Test Condition (per TR NWT-000078, Issue 3): 48 Volts, measurement @ 100V/25 mil lines/50 mil spacing.		

Bellcore Electromigration

Test	SIR (Initial)	SIR (Final)	Requirement	Result	Visual Result
"Comb-Up" Uncleaned	$6.8 \times 10^{9}\ \Omega$	$2.1 \times 10^{9}\ \Omega$	SIR(Initial) / SIR(Final) <10	Pass	Pass
"Comb-Down" Uncleaned	$1.0 \times 10^{11}\ \Omega$	$3.2 \times 10^{11}\ \Omega$	SIR(Initial) / SIR(Final) <10	Pass	Pass
Bellcore Test Condition (per GR 78-CORE, Issue1): 65 °C/85% RH/500 Hours/10V, measurement @ 100V/IPC B-25B Pattern (12.5 mil lines, 12.5 mil spacing).					

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RECYCLING SERVICES

We provide safe and efficient recycling services to help companies meet their environmental and legislative requirements and at the same time, maximize the value of their waste streams.

Our service collects solder dross, solder scrap, and various forms of solder paste waste. Please contact your local sales representative for recycling capabilities in your area or link here.



SAFETY & WARNING

It is recommended that the company/operator read and review the Safety Data Sheets for the appropriate health and safety warnings before use. **Safety Data Sheets are available at MacdermidAlpha.com/assembly-solutions/knowledge-base.**

CONTACT INFORMATION

To confirm this document is the most recent version, please contact Assembly@MacDermidAlpha.com

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Also read carefully warning and safety information on the Safety Data Sheet. This data sheet contains technical information required for safe and economical operation of this product. READ IT THOROUGHLY PRIOR TO PRODUCT USE . Emergency safety directory assistance: US 1 202 464 2554, Europe + 44 1235 239 670, Asia + 65 3158 1074, Brazil 0800 707 7022 and 0800 172 020, Mexico 01800 002 1400 and (55) 5559 1588

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