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TECHNICAL BULLETIN

ALPHA® SLS 65C SERIES

No-Clean Flux

DESCRIPTION

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

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

The standard solids content for **ALPHA SLS 65C** is 2.2%. Where use of a lower solids flux is appropriate, the solids content extends down to 1.6% solids for **ALPHA SLS 65C-1.6**. This provides the user better board cosmetics.

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 mask and solder 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.

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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 5μg/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 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 SM-110 Solvent Cleaner has been found to be very useful for these cleaning applications. When foam fluxing, do not use hot fixtures or pallets. Hot fixtures/pallets will deteriorate the foam head.

FLUX APPLICATION – ALPHA SLS 65C 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 1 inch to 1-½ inches 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	Typical Level
Amount of Flux Applied	Foam, Wave: 300 to 450 μg/cm^2 of solids Spray: 200 to 300 μg/cm^2 of solids
When foam fluxing	20 to 50 μm
Foam Stone Pore Size	
Distance that top of stone is submerged below flux	1 to 1½ inches (25 to 40 mm)
Foam Fluxer Chimney Opening	3/8 to 1/2 inch (10 to 13 mm)

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Operating Parameter	Typical Level
When foam fluxing, use an Air Knife	1 to 1.5 mm
Air Knife Hole Diameter	
Distance Between Holes	4 to 5 mm
Distance from Fluxer to Air Knife	4 to 6 inches (10 to 15 cm)
Air Knife Angle Back toward Fluxer from Perpendicular	3 to 5°
Topside Preheat Temperature	210 to 250 °F (100 to 120 °C)
Bottomside Preheat Temperature	0 to 71.6 °F (0 to 22 °C) higher than topside
Maximum Ramp Rate of Topside Temperature (to avoid component damage)	2 °C/second (3.5 °F/second) maximum
Conveyor Angle	5 to 8° (6° most common)
Conveyor Speed	1.3 to 6.0 feet/minute (0.4 to 1.8 meters/min)
Contact Time in the Solder (includes Chip Wave & Primary Wave)	3 to 10 seconds (5 to 7 seconds most common)
Solder Pot Temperature	460 to 500 °F (235 to 260 °C) for 63Sn/37Pb 491 to 518 °F (255 to 270 °C) 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 drum 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 to between 17 and 19. Alpha's Flux Solids Control Kit #3, a digital titrator, is suggested. Request Alpha's Technical Bulletin SM-458 for details on the kit and titration procedure.

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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. For consistent soldering performance, dispose of spent flux every 40 hours of operation. After emptying the flux, the reservoir and foam stone should be thoroughly cleaned with flux thinner.

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

TOUCH-UP/REWORK - Use of the Cleanline Write Flux Applicator with ALPHA NR205 flux and ALPHA Telecore Plus cored solder is recommended for hand soldering applications.

TECHNICAL DATA

Parameters	Typical Values	Parameters/Test Method	Typical Values
Appearance	Clear, colorless liquid	pH (5% aqueous solution)	3.4
Solids Content, wt/wt	2.2%	Recommended Thinner	425 Thinner
Acid Number (mg KOH/g)	18	Shelf Life (from Mfg. Date)	360 days
Specific Gravity @ 25 °C (77 °F)	0.799 ± 0.003	Container Size Availability	1, 5, and 55 Gal.
Pounds Per Gallon	6.65	Bellcore GR 78-CORE, Issue 1 Compliant	Yes
Flash Point (TCC)	53 °F (12 °C)	IPC J-STD-004 Designation	ORL0

CORROSION & ELECTRICAL TESTING

CORROSION TEST

Test	Requirement	Results
Silver Chromate Paper	No Detection of Halide	PASS
Copper Mirror Test	No Complete Removal of Copper	PASS
IPC Copper Corrosion Test	No Evidence of Corrosion	PASS

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SURFACE INSULATION RESISTANCE(all values in ohms)

Test	Requirement	Results
Bellcore "Comb-Down" – Uncleaned	> 1.0×10^{11}	8.8×10^{12}
Bellcore "Comb-Up" – Uncleaned	> 1.0×10^{11}	1.4×10^{12}
Bellcore Control Board	> 2.0×10^{11}	2.8×10^{13}
IPC J-STD-004 Comb-Down – Uncleaned	> 1.0×10^{8}	5.6×10^{9}
IPC-J-STD-004 Comb-Up – Uncleaned	> 1.0×10^{8}	2.3×10^{9}
IPC J-STD-004 Control Board	> 1.0×10^{9}	2.2×10^{10}
Bellcore Test Condition (per GR78-CORE, Issue 1): 35 °C/85%RH/ 5 days /-48 volts, measurement @ 100V/25 mil lines/ 50 mil spacing. IPC Test Condition (per J-STD-004): 85 °C/85%RH/ 7 days/-50V, measurement @ 100V/IPC B-24 board (0.4mm lines, 0.5mm spacing).		

ELECTROMIGRATION (all values in ohms)

Test Condition	SIR (Initial)	SIR (Final)	Requirement	Result	Visual Result
Bellcore "Comb-Up" Uncleaned	3.4×10^{9}	1.2×10^{11}	SIR (Initial)/SIR (Final) < 10	Pass	Pass
Bellcore "Comb-Down" Uncleaned	2.1×10^{9}	1.3×10^{11}	SIR (Initial)/SIR (Final) < 10	Pass	Pass
Bellcore Test Condition (per GR78-CORE, Issue-1): 65 °C/85%RH/500 Hours/10V, measurement @ 100V/IPC B-25 B Pattern (12.5 mil lines, 12.5 mil spacing).					

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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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