

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 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, **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 which 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 $0.77\mu\text{g}/\text{cm}^2$ ($5\mu\text{g}/\text{in}^2$) 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 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 40mm (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: 70 to 125 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 50µm 25 to 38mm 10 to 13mm
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 1.5mm 4 to 5mm 10 to 15cm 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)

Operating Parameter	Recommendation
Conveyor speed	1.00 to 2.00 meters/minute
Contact time in the solder (includes chip wave and primary wave)	1.5 to 3.5 seconds (2½ to 3 seconds most common)
Solder pot temperature	235 to 260°C
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.

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

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

Test Condition	Requirements	Results
Bellcore "Comb-Down" – uncleaned	$> 1.0 \times 10^{11}$	4.5×10^{11}
Bellcore "Comb-Up" – Uncleaned	$> 1.0 \times 10^{11}$	1.4×10^{11}
Bellcore Control Board	$> 2.0 \times 10^{11}$	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	$6.8 \times 10^9 \Omega$	$2.1 \times 10^9 \Omega$	$SIR(\text{Initial}) / SIR(\text{Final}) < 10$	Pass	Pass
"Comb-Down" Uncleaned	$1.0 \times 10^{11} \Omega$	$3.2 \times 10^{11} \Omega$	$SIR(\text{Initial}) / SIR(\text{Final}) < 10$	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).					

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
www.macdermidalpha.com

<p>North America 109 Corporate Blvd. South Plainfield, NJ 07080, USA 800.367.5460</p>	<p>Europe Unit 2, Genesis Business Park Albert Drive Woking, Surrey, GU21 5RW, UK 01483.758400</p>	<p>Asia 8/F., Paul Y. Centre 51 Hung To Road Kwun Tong, Kowloon, Hong Kong 852.3190.3100</p>
-------------------------------------------------------------------------------------------------------------------------------------	---------------------------------------------------------------------------------------------------------------------------------------------------------------	---------------------------------------------------------------------------------------------------------------------------------------------------------

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

DISCLAIMER: All statements, technical information and recommendations contained herein are based on tests we believe to be reliable, but the accuracy or completeness thereof is not guaranteed. No statement or recommendation shall constitute a representation unless set forth in an agreement signed by officers of seller and manufacturer. NO WARRANTY OF MERCHANTABILITY, WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE OR ANY IMPLIED WARRANTY IS MADE. The following warranty is made in lieu of such warranties and all other warranties, express, implied, or statutory. Products are warranted to be free from defects in material and workmanship at the time sold. The sole obligation of seller and manufacturer under this warranty shall be to replace any noncompliant product at the time sold. Under no circumstances shall manufacturer or seller be liable for any loss, damage or expense, direct, indirect, incidental or consequential, arising out of the inability to use the product. Notwithstanding the foregoing, if products are supplied in response to a customer request that specifies operating parameters beyond those stated above, or if products are used under conditions exceeding said parameters, the customer by acceptance or use thereof assumes all risk of product failure and of all direct, indirect, incidental and consequential damages that may result from use of the products under such conditions, and agrees to exonerate, indemnify, defend and hold harmless MacDermid, Incorporated and its affiliates therefrom. No suggestion for product use nor anything contained herein shall be construed as a recommendation to use any product in a manner that infringes any patent or other intellectual property rights, and seller and manufacturer assume no responsibility or liability for any such infringement.

© 2019 MacDermid, Inc. and its group of companies. All rights reserved. "(R)" and "TM" are registered trademarks or trademarks of MacDermid, Inc. and its group of companies in the United States and/or other countries.