

ALPHA[®] NR310

VOC-Free No-Clean Flux

DESCRIPTION

ALPHA NR310 was specifically developed to eliminate the tendency for solderballing and solder bridging - the two defects which are normally associated with the use of the chip wave. **ALPHA NR310** exhibits an extremely low tendency for solderball generation over a wide variety of solder masks. **ALPHA NR310** 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 NR310 is a VOC-free, halide-free, rosin/resin-free, low solids, no-clean flux. It is formulated with a proprietary mixture of organic activators which deliver excellent wetting and top-side hole fill. Several proprietary additives are also formulated into **ALPHA NR310** which act to reduce the surface tension between the solder mask and the solder; thereby, dramatically reducing the tendency of solderball generation. The formulation of **ALPHA NR310** is also designed to be more thermally stable; thereby, reducing the occurrence of solder bridging. **ALPHA NR310** meets the requirements of Bellcore SIR and EM.

READ ENTIRE TECHNICAL DATA SHEET BEFORE USING THIS PRODUCT

FEATURES & BENEFITS

- VOC-free to help meet air quality regulations
- Excellent wetting for exceptional hole-fill even with organically coated bare copper boards
- 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 one of the lowest solderball 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

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/in² 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.

Conveyors, fingers and pallets should be cleaned. ALPHA SM-110 Solvent Cleaner has been found to be very useful for these cleaning applications.

Flux Application: ALPHA NR310 is formulated to be applied by spray or by wave methods. 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
Flux application	Wave, Spray
Amount of Flux Applied	Wave: 1,250 to 2,000 µg/in ² of solids; Spray: 750 to 1,500 µg/in ² of solids
Top-Side Preheat Temperature	225 to 245 °F (107 to 118 °C)
Bottom side Preheat Temperature	about 65 °F (35 °C) higher than topside
Maximum Ramp Rate of Topside Temperature (to avoid component damage)	2 °C/second (3.5 °F/second) maximum
Conveyor Speed	3.5 to 6.5 feet/minute (1.0 to 1.8 meters/minute)
Contact Angle	5 to 8° (6° most common)
Contact Time in the Solder (includes Chip Wave and Primary Wave)	1.5 to 4.0 seconds (2½ to 3 seconds most common)
Solder Pot Temperature	460 to 500 °F (235 to 260 °C)
<p>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 design experiment, optimizing the most important variables (amount of flux applied, conveyor speed, topside preheat temperature, solder pot temperature and board orientation).</p>	

Flux Solids Control: If 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. The acid number should be controlled to between 26.7 and 29.7. Alpha's Flux Solids Control Kit #3, a digital titrator, is suggested. Request Alpha's

Reference Bulletin for details on the kit and titration procedure. When operating the wave or rotary drum fluxer continuously, the acid number should be checked every eight 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 should be thoroughly cleaned with flux thinner.

Residue Removal: ALPHA NR310 is a no-clean flux and the residues are designed to be left on the board. However, if desired, ALPHA NR310 residues can be removed with hot water.

Touch-Up/Rework: Use of the ALPHA Cleanline Write Flux Applicator with ALPHA NR205 flux and ALPHA Telecore Series or ALPHA Cleanline 7000 cored wire is recommended for hand soldering applications.

TECHNICAL DATA

Item	Typical Values	Item	Typical Values
Appearance	Clear, Colorless Liquid	Flash Point (T.C.C.)	NONE
Solids Content, wt/wt	3.0	Recommended Thinner	DI Water
Specific Gravity @ 25 °C (77 °F)	1.011 ± 0.003	Shelf Life (from Date of Mfg.)	540 days
Acid Number (mg KOH/g)	28.2 ± 1.5	IPC J-STD-004 Designation	ORM0
pH	2.4	Packaging Size	1, 5 & 55 Gallons

CORROSION & ELECTRICAL TESTING

Corrosion Test

TEST	REQUIREMENT	RESULTS
Silver Chromate Paper ¹ IPC-TM 650 Test Method 2.3.33	No detection of halide	Passes
Copper Mirror Tests ¹ (Modified IPC/Bellcore Method)	Breakthrough in <50% of test area	Breakthrough in <5% of test area (limited to perimeter of test drop area)
Copper Corrosion Test IPC-TM 650 Test Method 2.6.15	Minor corrosion acceptable	Green-blue discoloration present without any pitting of the copper panel

¹ **Copper Mirror** and **Silver Chromate Paper** tests were performed using flux sample prepared by reconstituting with isopropyl alcohol after evaporation of its water vehicle at 80 °C for one hour as per footnote 1 of table 5, page 8 of J-STD-004.

J-STD-004 Surface Insulation Resistance

Test	Conditions	Requirements (in Ohms)	Results (in Ohms)
"Comb-Down" Uncleaned	85°C/85% RH, 7 days	1.0 x 10 ⁸ min.	2.6 x 10 ⁹
"Comb-Up" Uncleaned	85°C/85% RH, 7 days	1.0 x 10 ⁸ min.	1.1 x 10 ⁹
Control Boards	85°C/85% RH, 7 days	2.0 x 10 ⁸ min.	7.2 x 10 ⁹
IPC Test Condition (per J-STD-004): -50V, measurement @ 100V/IPC B-24 board (0.4mm lines, 0.5mm spacing).			

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

Test	Conditions	Requirements	Results
"Comb-Down" Uncleaned	35 °C/85% RH, 5 days	1.0 x 10 ¹¹ minimum	3.5 x 10 ¹¹
"Comb-Up" Uncleaned	35 °C/85% RH, 5 days	1.0 x 10 ¹¹ minimum	4.1 x 10 ¹¹
Control Boards	35 °C/85% RH, 5 days	2.0 x 10 ¹¹ minimum	2.2 x 10 ¹²
Bellcore Test Condition (per TR-NWT-000078, Issue 3): 48 Volts, measurement @ 100V/25 mil lines/50 mil spacing.			

Bellcore Electromigration (All values shown are in ohms)

Test	SIR (Initial)	SIR (Final)	Requirement	Result	Visual Result
"Comb-Up" Uncleaned	2.3 x 10 ⁹	4.5 x 10 ¹⁰	SIR (Initial)/SIR (Final) <10	Passes	No dendrites or corrosion
"Comb-Down" Uncleaned	3.1 x 10 ⁹	2.5 x 10 ¹⁰	SIR (Initial)/SIR (Final) <10	Passes	No dendrites or corrosion
Bellcore Test Condition (per NWT-000078, Issue 3): 85 °C/85% RH/500 Hours/10V, measurement @ 100V/IPC B-25B Pattern (12.5 mil lines, 12.5 mil spacing).					

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
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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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