

ALPHA[®] EF-4102

Environmentally Friendly, Water-Based, No-Clean Flux

DESCRIPTION

ALPHA EF-4102 is a modified rosin flux with low ionic halide content supplied in a water vehicle. It is formulated for wave soldering of through-hole mixed technology, and surface mount assemblies. **ALPHA EF-4102** has been designed to give complete hole filling when soldering bare copper boards. After soldering, a small amount of clear residue is left which is non-tacky and non-corrosive, making residue removal from the boards unnecessary.

ALPHA EF-4102 is recommended for use in a closed spray flux system.

READ ENTIRE TECHNICAL DATA SHEET BEFORE USING THIS PRODUCT

PRODUCT INFORMATION

Packaging: **Packaging** varies by region. **ALPHA EF-4102** is available in 1, 5, and 55 gallon containers or 5, 20, 200 liter containers. Keep from freezing. If frozen, thaw and mix thoroughly before use.

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 supplier and that suppliers provide Certificates of Analysis with shipments and/or assemblies 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. Bioact SC-10 Solvent Cleaner has been found to be very useful for these cleaning applications.

Flux Application - ALPHA EF-4102 is formulated to be applied by closed spray method. 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.

Residue Removal - ALPHA EF-4102 is a no-clean flux and the residues are designed to be left on the board. However, if desired, ALPHA EF-4102 residues can be removed with commercially available saponifier, such as Alpha 2110, Armakleen or a solvent such as Bioact EC-Ultra.

Touch-Up/Rework - Use of the Guideline Write Flux Applicator with 615 RMA flux and Telecore Plus cored solder is recommended for hand soldering.

General Guidelines for Machine Settings	
Operating Parameter	Typical Level
Maximum Ramp Rate of Topside Temperature in Preheat (to avoid component damage)	2 °C/second (3.5 °F/second) maximum
Topside Preheat Temperature	105 to 115 °C (220 to 240 °F)
Bottomside Preheat Temperature	About 65 °F (35 °C) higher than the topside temperature
Conveyor Speed	1.35 to 1.85 meters/minutes (4.5 to 6ft/min.)
Solder Pot Temperature	465 to 500 °F (240 to 260 °C) the higher end of the temperature range is recommended to reduce bridging and icicles

TECHNICAL DATA

Category	Results
PHYSICAL PROPERTIES	
Appearance	Clear Amber Liquid
Solids, % by wt.	10.0
Specific Gravity @ 25 °C	1.008 ± 0.005
Halides as chlorides, % by wt.	< 50 PPM
Flash Point, T.C.C.	44 °C (111 °F)
Thinner	Deionized Water
pH, as is	9.2 typical
VOC Content, %	9.4

CORROSION & ELECTRICAL TESTING
Bellcore Electromigration

Test	SIR (Initial) ¹	SIR (Final) ¹	Requirement	Result	Visual Report
"Comb-Up" Uncleaned	1.6 x 10 ¹¹	2.2 x 10 ¹¹	SIR (Initial)/SIR (Final) <10	Pass	Pass
"Comb-Down" Cleaned	2.7 x 10 ¹¹	3.1 x 10 ¹¹	SIR (Initial)/SIR (Final) <10	Pass	Pass

Bellcore Test Condition (per GR-78-CORE, Issue 1): 8 5°C/85% RH/500 Hours/10V, measurement @ 100V/IPC B-25B Pattern (12.5 mil lines, 12.5 mil spacing).

Bellcore Surface Insulation Resistance

Test	Conditions	Requirements ¹	Results ¹
"Comb-Down" Uncleaned	35 °C/85% RH, 5 days	1.0 x 10 ¹¹ minimum	7.2 x 10 ¹²
"Comb-Up" Uncleaned	35 °C/85% RH, 5 days	1.0 x 10 ¹¹ minimum	9.4 x 10 ¹¹
Control Boards	35 °C/85% RH, 5 days	2.0 x 10 ¹¹ minimum	2.3 x 10 ¹²

Bellcore Test Condition (per GR-78-CORE, Issue 1): 48 Volts, measurement @ 100V/25 mil lines/50 mil spacing.

J-STD-004 Surface Insulation Resistance

Test	Conditions	Requirements ¹	Results ¹
"Comb-Down" Uncleaned	85 °C/85% RH, 7 days	1.0 x 10 ⁸ , minimum	9.1 x 10 ⁹
"Comb-Up" Uncleaned	85 °C/85% RH, 7 days	1.0 x 10 ⁸ , minimum	6.4 x 10 ⁹
Control Boards	85 °C/85% RH, 7 days	2.0 x 10 ⁸ , minimum	1.2 x 10 ¹⁰

IPC Test Condition (per J-STD-004): -50V, measurement @ 100V/IPC B-24 board (0.4mm lines, 0.5mm spacing).

JIS Standard Surface Insulation Resistance Test

Test	Conditions	Requirements ¹	Results ¹
Initial	Ambient conditions	1.0 x 10 ¹¹ , minimum	7.1 x 10 ¹²
After 96 hours	40 °C /90% RH	1.0 x 10 ¹⁰ , minimum	4.4 x 10 ¹⁰
Recovered	Ambient conditions	1.0 x 10 ¹¹ , minimum	1.2 x 10 ¹³

All measurements @ 100V

Corrosion Testing

Test	Requirements	Results
Silver Chromate Paper ² IPC-TM 650 Test Method 2.3.33	No detection of halide	Pass
Copper Mirror Tests ² (Modified IPC/Bellcore Method)	No complete removal of copper	Pass
Copper Corrosion Test IPC-TM 650 Test Method 2.6.15	No evidence of corrosion	Pass
Classification per IPC J-004 STD		ROLO

¹ All values shown are in ohms.

² **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. ³ All values shown are in ohms.

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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