

ALPHA[®] EF-10000

High Solids, No-Clean Rosin Flux for Lead-Free & Sn-Pb Wave Soldering

DESCRIPTION

ALPHA EF-10000 is a high-solids, rosin-bearing, no-clean, alcohol-based dulling flux. It possesses the unique attributes of superb electrical reliability and excellent solderability in both Lead-Free and Tin-Lead wave soldering processes. It complies with all major international requirements for Electromigration (EM) and Surface Insulation Resistance (SIR). In addition, **ALPHA EF-10000** is designed for best-in-class top-side hole-fill and superior resistance to micro-solder balling, connector bridging, and bridging of bottom-side SMT components including fine-pitch QFPs.

READ ENTIRE TECHNICAL DATA SHEET BEFORE USING THIS PRODUCT

FEATURES & BENEFITS

- Wide process window for superior performance in both lead-free and tin-lead alloys
- Excellent flux activity for defect-free soldering
- Best-in-class top-side hole-fill attributes
- High level of bridging resistance
- Superior long-term electrical reliability
- Evenly spread, uniform, non-tacky, clear residue on solder mask
- Dulling flux for reduced glare on solder joints during visual inspection
- Can be applied via spraying or foaming

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 (0.77µg/cm²) 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 flux reservoir, flux tank and lines of the spray fluxer assembly should be purged with ALPHA 425 Thinner. Conveyors, fingers and pallets should be cleaned periodically with DI Water, IPA or other commercial Solvent Cleaners to eliminate residues on the assembly edges.

Flux Application – ALPHA EF-10000 can be applied by spray, foam or wave application. A uniform coating of flux is essential to successful soldering. When spray fluxing, the uniformity of the coating can be visually checked by running a piece of pH sensitive paper matching the footprint of the assembly over the spray fluxer. Further process capability can be confirmed by placing pH paper above an unpopulated board to confirm that flux is reaching the top of the plated through-holes.

GENERAL GUIDELINES FOR MACHINE SETTINGS

General Guidelines for Machine Settings		
Operating Parameter	SAC305 / SACX0307	63/37 Sn-Pb
Amount of Flux Single Wave: Applied by Spray	230 to 390 µg/cm ² (1500 to 2500 µg/in ²) of solids	230 to 390 µg/cm ² (1500 to 2500 µg/in ²) of solids
Amount of Flux Dual Wave: Applied by Spray	230 to 1400 µg/cm ² (1500 to 9000 µg/in ²) of solids	230 to 780 µg/cm ² (1500 to 5000 µg/in ²) of solids
Topside Preheat Temperature	100 to 120°C (212 to 248 °F)	85 to 105 °C (185 to 221 °F)
Maximum Ramp Rate of Topside Temperature (to avoid component damage)	2 °C/second maximum	2 °C/second maximum
Conveyor Angle	6 to 7°	6 to 7°
Conveyor Speed	1.0 to 2.0 m/min. (3.3 to 6.5 ft/min.)	1.0 to 2.0 m/min. (3.3 to 6.5 ft/min.)
Contact Time in the Solder (includes Chip Wave and Primary Wave)	1.5 to 3.5 seconds (2.5 to 3 seconds most common)	1.5 to 3.5 seconds (2.5 to 3 seconds most common)
Solder Pot Temperature	250 to 265 °C (482 to 509 °F)	240 to 250 °C (464 to 482 °F)

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. 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).

Specific Gravity Control – If foam fluxing, the consistency of ALPHA EF-10000 should be maintained by the addition of thinner to compensate for evaporation loss. It is recommended that the specific gravity @ 77°F be maintained between 0.815 and 0.825 by the addition of thinner. Only ALPHA 425 thinner should be used for this purpose to ensure consistency of flux foaming and soldering characteristics.

Residue Removal – ALPHA EF-10000 is a no-clean flux and the residues are designed to be left on the board. However, if desired, ALPHA EF-10000 residues can be cleaned with a saponifier cleaner (e.g., Alpha 2110) Saponifier or commercial solvent cleaners.

Touch-Up/Rework – Use of the Cleanline Write Flux Applicator with ALPHA 615-25 flux and Telecore Series cored solder wire is recommended for hand soldering applications .

TECHNICAL DATA

Parameters	Typical Values	Parameters	Typical Values
Appearance	Clear, amber liquid	Pounds Per Gallon	6.83
Specific Gravity @ 25 °C (77 °F)	0.820 ± 0.005	Flash Point (T.C.C.)	52 °F (11 °C)
Acid Number (mg KOH/g)	32.5 ± 2.0	Recommended Thinner	425 Thinner
Solids Content, %, wt/wt	15	Shelf Life	12 Months
pH (5% aqueous solution)	3.2, typical	Container Size Availability	1, 5, and 55 Gal.
		IPC J-STD-004 Designation	ROM1

CORROSION & ELECTRICAL TESTING – IPC & BELLCORE

Copper Corrosion Tests

Test Condition	Requirements	Results
IPC Copper Corrosion Test	No evidence of corrosion	PASS
JIS Copper Plate Corrosion Test	No evidence of green corrosion	PASS

J-STD-004 Surface Insulation Resistance

Test Condition	Requirements	Results
IPC J-STD-004 Comb-Down – Un-cleaned	> 1.0 x 10 ⁸ Ω	1.6 x 10 ⁹ Ω
IPC-J-STD-004 Comb-Up – Un-cleaned	> 1.0 x 10 ⁸ Ω	7.8 x 10 ⁹ Ω
IPC J-STD-004 Control Board	> 1.0 x 10 ⁹ Ω	1.0 x 10 ¹⁰ Ω

IPC Test Condition (per J-STD-004): 85 °C/85%RH/7days/-50V, measurement @ 100V/IPC B-24 board (0.4mm lines,0.5mm spacing). All values in ohms.

Bellcore Surface Insulation Resistance

Test	Conditions	Requirements	Results
"Comb-Down" Un-cleaned	35 °C/85% RH, 5 days	$> 1.0 \times 10^{11} \Omega$	$1.4 \times 10^{11} \Omega$
"Comb-Up" Un-cleaned	35 °C/85% RH, 5 days	$> 1.0 \times 10^{11} \Omega$	$3.4 \times 10^{12} \Omega$
Control Boards	35 °C/85% RH, 5 days	$> 2.0 \times 10^{11} \Omega$	$1.0 \times 10^{12} \Omega$

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

Bellcore Electromigration

Test Condition	SIR (Initial)	SIR (Final)	Requirement	Result	Visual Result
Comb-Up Un-cleaned	$2.0 \times 10^{10} \Omega$	$1.0 \times 10^{11} \Omega$	SIR (Initial)/SIR (Final) < 10	Pass	Pass
Comb-Down Un-cleaned	$1.3 \times 10^{10} \Omega$	$7.6 \times 10^{10} \Omega$	SIR (Initial)/SIR (Final) < 10	Pass	Pass

Bellcore Test Condition (per GR 78-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). All values in ohms.

ELECTRICAL TESTING - JIS
JIS Standard Surface Insulation Resistance

Test	Conditions	Requirements	Controls	Results
Initial	Ambient	$> 1.0 \times 10^{11} \Omega$	$> 1.0 \times 10^{12} \Omega$	$> 1.0 \times 10^{12} \Omega$
After 168 Hours	40 °C / 93% RH	$> 1.0 \times 10^{10} \Omega$	$8.7 \times 10^{11} \Omega$	$9.2 \times 10^{11} \Omega$
Recovered	35 °C/85% RH, 5 days	$> 1.0 \times 10^{11} \Omega$	$> 1.0 \times 10^{12} \Omega$	$> 1.0 \times 10^{12} \Omega$

All Measurements @ 100V, JIS Boards (0.32mm lines, 0.32 mm spacing, same as IPC B25 Boards). All values in ohms

JIS Standard Electrochemical Migration

Electrical and visual requirements of JIS standards: Pass

SIR value: $> 1 \times 10^9 \Omega$ (@85 °C/85%RH/48VDC/1000hrs)

Migration: No evidence of electrochemical migration

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

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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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