

ALPHA® Full-line Selector Guide



Alpha Technologies
Create Value

alpha®

Issue 9



ALPHA's Strategic Value Proposition

We are committed to enhancing your productivity, yield and cost of ownership as you navigate through today's electronic assembly challenges. We do this by developing leading technology materials combined with our world class process knowledge and applications expertise.

ALPHA's Customer Value Propositions:

- Leading technology products
- Sales/Support in every major electronics geographic market
- Local and consistent technical support regionally and globally
- Applications expertise
- Continuity of supply ensured through multiple manufacturing sites
- Consistent product performance globally
- Access to continuous new technology development
- Global OEM approval engagements
- Manufacturing lot trace-ability
- Six Sigma projects for process optimisation
- High-reliability products
- Channel Partner network (distribution)
- Access to application laboratories
- Accelerated technology customisation for key customers
- Delivered lowest cost of ownership
- Solder scrap value recovery

When you commit to ALPHA product technology, we commit to your success.

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ALPHA® European Region

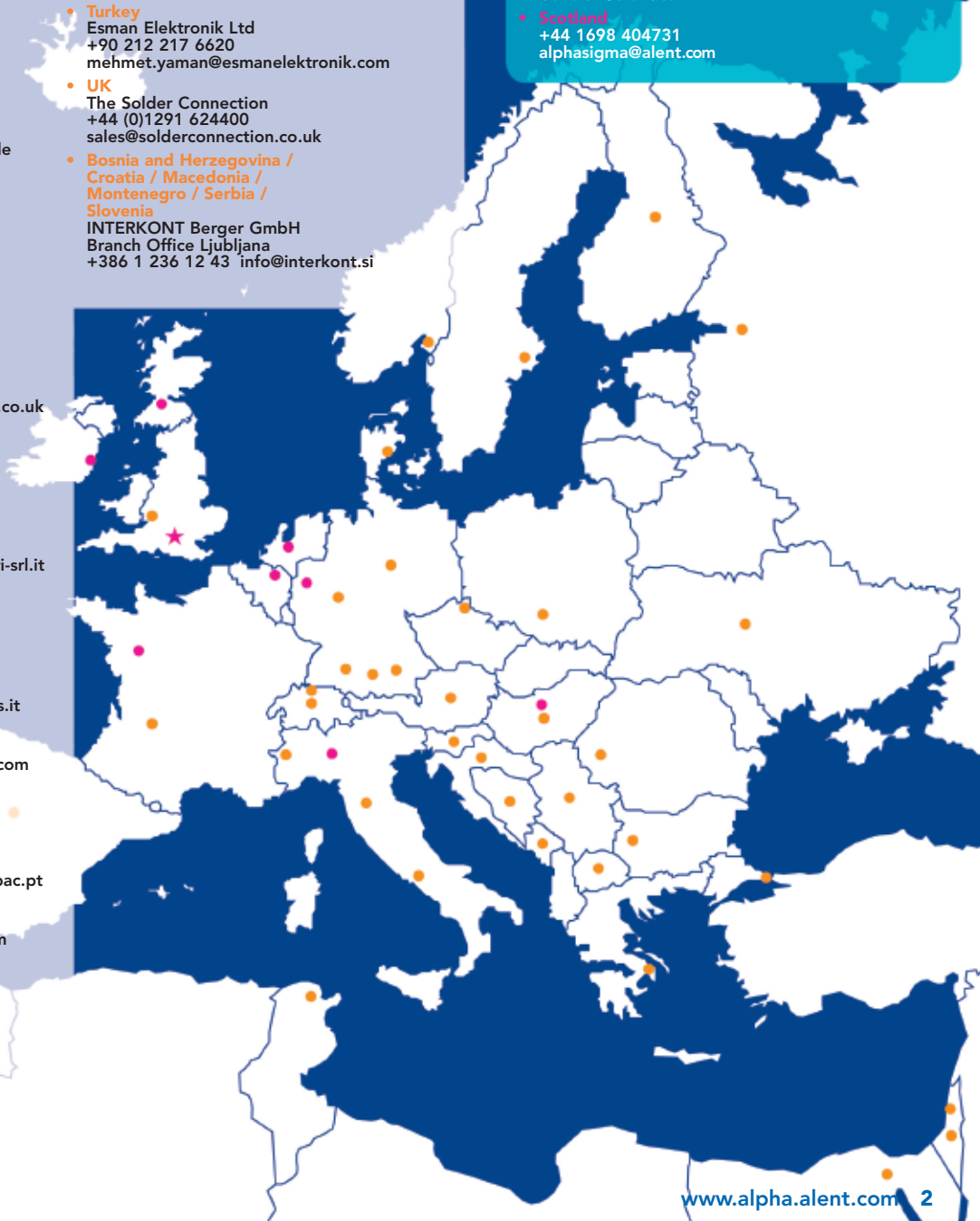
Alpha Sales Offices and Channel Partner Locations

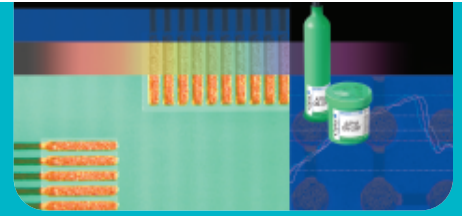
CHANNEL PARTNER LOCATIONS

- Austria**
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ALPHA® Solder Paste

Highest throughput and yield, and lowest cost of ownership for today's challenging electronic assembly processes.

ALPHA® solder pastes are used in the assembly of PCBs for a variety of product applications including; hand-held electronic devices, computer motherboards, consumer electronics, network servers, automotive systems, medical and military equipment and many others.

NO-CLEAN PRODUCTS

ALPHA® CVP-360 (Halogen-free)

- Enables high yield and throughput with lower cost SACX alloys
- Excellent spread and wetting on OSP and other board finishes
- Best in class for minimizing false negative in circuit pin tests

ALPHA® CVP-390 (ZHP)

- Outstanding reflow process window, capable of 175-180°C soak for 60 seconds
- Coalescence on 180µm paste deposit sizes
- Reduced head in pillow defects
- Exceeds IPC 7095 Class III Voids for soak profile and low voiding on large area deposits
- Compatible with both SAC305 and SACX Plus® alloys. Low-Ag alloys provide better drop shock vs high-Ag alloys
- Compatible with Innolot®, SACX Plus® and SAC305 alloys. Low-Ag alloys provide better drop shock vs high Ag alloys

ALPHA® CVP-520 (ZHP)

- Low melting point lead-free alloy
- Excellent pin-in-through-hole performance
- Enables reflow soldering of temperature sensitive through hole components
- Potential to eliminate wave soldering in mixed technology applications

ALPHA® OM-340 (ZHP)

- Broad latitude lead-free, no-clean paste
- Excellent in-circuit pin testability
- Better spread and wetting
- Excellent HIP defect resistance

ALPHA® OM-338T (ZHP)

- Broad latitude, no-clean; appropriate for most lead-free SMT applications
- Wide reflow process window and outstanding voiding resistance
- Fine pitch printing capability at up to 200mm/sec. (8 in./sec) print speed

ALPHA® OM-338 PT (ZHP)

- Excellent in-circuit pin testability
- Superior performance in closed-head printers
- Wide print process window up to 150mm/sec. (6 in./sec.)

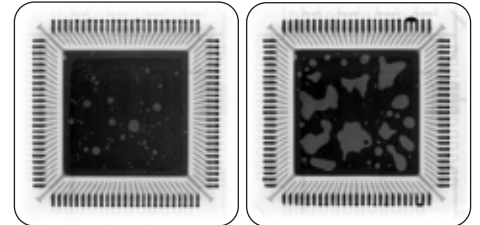
ALPHA® OM-338 CSP (ZHP)

- Broad latitude lead-free, no-clean paste
- 0.4mm pitch BGA enabling technology
- Excellent print capability across various board designs

ALPHA® OM-5100 (ZHP)

- Broad latitude, no-clean; appropriate for most tin-lead SMT applications
- Higher reflow yields with excellent print deposit consistency
- Reduced random and mid-chip solder balls

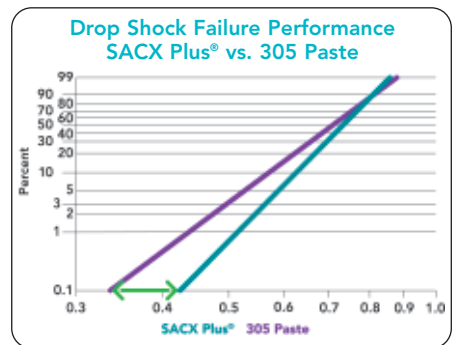
CVP-390 No-Clean Solder Paste



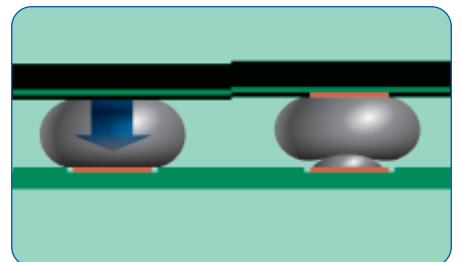
Low voiding with CVP-390 Solder Paste

High voiding with competitor solder paste

Drop shock data for low Ag paste



ALPHA CVP390 and ALPHA OM340 No-Clean Solder Pastes



ALPHA CVP390 and ALPHA OM340 (left) reduce head-in-pillow defects compared to competitor solder pastes (right).



ZHP: ZERO Halogen Product = No halogen intentionally added

Halogen-free, per guidelines published in the following industry standards: IPC-4101B, IEC-61249-2-21 and JPCA-ES-01-1999.

- Leading technology products
- Consistent product performance globally
- Continuity of supply ensured through multiple manufacturing sites

PERFORMANCE INDICATORS	PRODUCT NAME	No-Clean	Water Soluble	Pb-FREE ALLOYS							SnPb ALLOYS			POWDER SIZE			Metal Loading (% by Weight)	Viscosity Designation (Malcolm @ 10 RPM)	Flux J-STD 004 Classification	Dispense Version: Metal Loading & Viscosity	Halogen Content	
				SACX 0307	SACX 0807	SACX plus 0807	InnoLot	SAC 305	SAC 387	SAC 405	Sn/Bi/Ag	Sn63/Pb37	Sn62/Pb36/Ag2	Sn62.8/Pb36.8/Ag0.4	Type 3	Type 4						Type 4.5
LEAD-FREE	Universal, Highest Print Speed	ALPHA® OM-338 T	•						•	•	•				•			88.5%	M13	ROL0	88.3% M04	ND
	Universal, Pin Testable, Enclosed Print Heads	ALPHA® OM-338 PT	•						•	•	•				•			88.5%	M15	ROL0	NA	ND
	Enabling 0.4mm BGA Assembly	ALPHA® OM-338 CSP	•						•							•		88.3%	M11	ROL0	83.5% M04	ND
	High Soak Profile, Paste in Through Hole	ALPHA® CVP-390	•	•	•	•	•	•	•						•	•	•	88.6 - 89.2%	M17 M20	ROL0	TBD	ND
	Increased Spread Wetting	ALPHA® OM-340	•	•			•	•	•						•	•	•	88.5%	M18	ROL0	NA	ND
	Universal Water Soluble	ALPHA® WS-820		•					•	•					•	•		87.6%	M19	ORH0	85% M9	NA
	High Value Pin Testable SACX Alloy	ALPHA® CVP-360	•		•	•									•			88.5%	M15	ROM0	83.3% M04	<900 ppm
	Excellent paste in through hole performance, low melting point alloy	ALPHA® CVP-520	•												•			90%	M21	ROL0	85.3% M04	ND
TIN-LEAD	Universal, Wide Process Window	ALPHA® OM-5100	•									•	•	•	•			90.0%	M13	ROL0	85% M04	ND
	Stencil Life, Joint Cosmetics, Cleanability	ALPHA® WS-809		•								•	•		•			90.0%	M18	ORH0	NA	NA

ND: None Detected

WATER-SOLUBLE PRODUCTS

ALPHA® WS-809

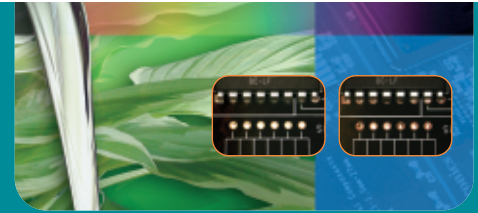
- Broad-latitude, water-soluble tin-lead paste; appropriate for most SMT applications
- Excellent balance of stencil life and cleanability
- Provides excellent voiding resistance
- Delivers excellent throughput and high first pass yield

ALPHA® WS-820

- Delivers excellent Print Volume and Consistency
- High Reflow Yield with IPC Class III Voiding Performance
- Exceptional Post Reflow Cleanability

To fully support SMT printing requirements, ALPHA also offers a complete line of ALPHA® Stencils and Cleaners.





ALPHA® Wave Solder Metals

Industry leading lead-free and tin-lead alloys that meet demanding process requirements.

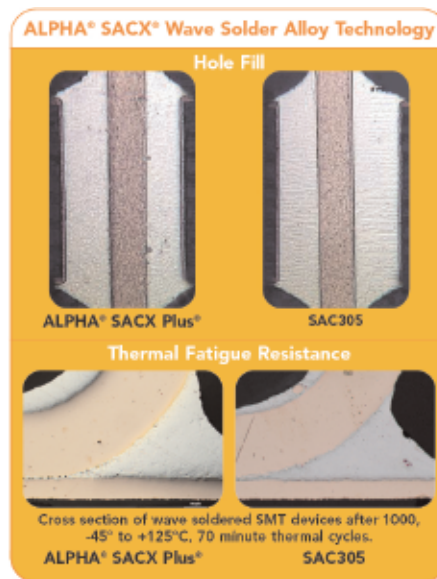
ALPHA® solder metals offer the best value for wave and selective soldering performance – quality products at the lowest cost of ownership. And thanks to a global copy exact product policy, consistency of supply is assured.

- High purity
- Excellent solderability
- High reliability
- Low oxides, low drossing
- Solder bar, chunks, anodes, preforms and solid wires
- Vaculoy alloy conditioning process

ALPHA has been manufacturing soldering alloys for over 125 years. Today, with eight manufacturing locations globally, ALPHA is the largest supplier of solder alloys for the electronics assembly industry.

Our ongoing commitment to research and development has enabled us to understand the complexities of alloy performance. This has resulted in a product line that meets our customers' most demanding lead-free and tin-lead wave soldering processes and is backed by dedicated customer technical support.

ALPHA'S® line of wave soldering alloys consist of specially developed products under our SACX Plus® brand and the more common SAC and Sn/Pb alloys. These include SAC305, SAC405, SAC387, 63/37, SA2515.



Each Pb free alloy is also available in a copper free version (ie SAC300) for solder pot replenishment and rebalancing.



ALPHA® SACX Plus® 0807

- SAC305-like performance on complex, dual sided assemblies
- Low copper dissolution
- Lower silver (.8%) means lower cost



ALPHA® SACX Plus® 0307

- Designed for use in wave, rework or selective solder applications
- Low copper dissolution during long exposure times

ALPHA® SACX Plus® 0107

- Great for single sided or simple dual sided assemblies
- Low copper dissolution

ALPHA® SACX Plus® HASL

- High-value, low-cost pad finish
- Low consumption, uniform, flat coverage

We also manufacture additional Pb-free alloys including the high-performing industry standard SAC305, along with, SAC405, SAC387, SAC380, SA2515, and others. Each Pb-free alloy is also available in a copper-free version (i.e., SAC300) for solder pot replenishment and rebalancing.

- Sales and Engineering Support in every major electronics geographic market
- Continuity of supply ensured through multiple manufacturing sites
- Solder scrap value recovery

PROCESS	BASE ALLOY	ASSEMBLY CHARACTERISTICS	PRODUCT NAME	AVAILABILITY		
				AMERICAS	ASIA	EUROPE
Wave Soldering	Lead-Free Standard (<.1% Pb) and Ultra Low Lead (<0.5% Pb) versions are available	Single sided, paper phenolic laminates, metallised pad finishes, 1.6mm thickness, etc...	ALPHA® SACX Plus® 0107	•	•	•
		Single and dual sided, standard complexity, metallised and OSP pad finishes, 1.6mm thickness, etc...	ALPHA® SACX Plus® 0307	•	•	•
		Dual sided, high complexity, high heat capacity areas and components, <1.6mm thickness, OSP pad finish, etc...	ALPHA® SACX Plus® 0807	•	•	•
			ALPHA® Vaculoy® SAC305, 387 & 405	•	•	•
	Tin-Lead (63/37 and others)	Dual sided, high complexity, high heat capacity areas and components, <1.6mm thickness, OSP pad finish, etc...	ALPHA® HiFlo SMG			•
			ALPHA® HiFlo	•	•	
		Single and dual sided, standard complexity, metallised and OSP pad finishes, 1.6mm thickness, etc...	ALPHA® Vaculoy® SMG	•	•	
			ALPHA® Vaculoy®	•	•	•
		Single sided, paper phenolic laminates, metallised pad finishes, 1.6mm thickness, etc...	ALPHA® Clean Wave		•	•
Mini Pot Rework / Tin Dipping	Lead-Free	All	ALPHA® SACX Plus® 0307	•	•	•
	Tin-Lead		ALPHA® Vaculoy®	•	•	•
Hot Air Solder Level (HASL)	Lead-Free	All	ALPHA® SACX Plus® HASL	•	•	•
	Tin-Lead		ALPHA® Vaculoy® HASL	•	•	•

Availability

ALPHA® quality wave solder metals are available in a choice of options to suit your process requirements. Solder bars (1 & 3.5kg), solid wire for automatic feed, chunks, preforms and anodes.

For best results always use a compatible ALPHA® flux, available in a choice of solids content and activator levels, with water washable, no-clean and VOC-free options.

For details of the full range of ALPHA® Fluxes, Cored Wire, Cleaning Materials and Recycling Services go to www.alpha.alent.com



ALPHA[®] Liquid Soldering Flux

Fluxes that deliver excellent soldering performance and electrical reliability, including options that improve worker safety and are better for the environment.

The ALPHA[®] branded fluxes are the leader in providing wave soldering process solutions. Our latest line of fluxes, including our EF-Series, is designed to provide the highest level of performance and reliability in its class. Specific flux products were formulated to offer a safer and more environmentally friendly alternative.

All ALPHA[®] fluxes have been developed using the latest ALPHA flux technology. ALPHA operates many flux production facilities around the world. Each site follows strict standards that ensure high product quality and consistency.

All ALPHA[®] EF-Series fluxes were developed for SnPb and Pb-free applications.

WATER-BASED

ALPHA[®] EF-2210

- VOC-free
- Excellent soldering performance
- Rosin free formulation results in excellent cosmetics and pin testability
- Bellcore SIR compliant

LOW VOC

ALPHA[®] EF-5601

- High performance, high reliability, reduced VOC content and emissions
- High flash point vs. 100% alcohol fluxes for safer use
- Engineered for alcohol flux like performance

ALCOHOL-BASED

ALPHA[®] EF-6000

- Highly active for exceptional soldering performance
- Low solids (2%) for excellent cosmetics and pin testability
- IPC SIR compliant

ALPHA[®] EF-6103

- High reliability – JIS SIR compliant
- Low solids for excellent cosmetics and pin testability
- High soldering yields

ALPHA[®] RF-800 Rosin No-Clean Flux

- Best selling low-solids (4%) flux in the world
- Excellent soldering on a wide variety of assembly types
- High reliability – JIS SIR compliant

ALPHA[®] EF-6850HF Flux

- **Halogen-free*** wave soldering flux
- Excellent soldering performance
- High reliability - passes IPC 004B and JIS SIR

ALPHA[®] EF-8000

- Excellent solder performance on complex two sided assemblies
- Perfect for selective soldering applications
- High reliability – JIS SIR compliant

ALPHA[®] EF-9301 Flux

- Excellent solder performance on a variety of complex two sided assemblies
- Halide bearing dulling flux
- High reliability – JIS SIR compliant

ALPHA[®] EF-12000

- High-solids (15%) dulling flux
- Maximum wetting on a wide variety of simple and complex assemblies
- High reliability – JIS SIR compliant

ALPHA® Liquid Soldering Flux

- Sales and Engineering Support in every major electronics geographic market
- Continuity of supply ensured through multiple manufacturing sites
- Access to continuous new technology development

Leading No-Clean Liquid Fluxes

Assembly Type	Description	Reliability Requirements			
		IPS SIR (004A)	Bellcore SIR	IPS SIR (004B)	JIS / Custom
I	Simple, single sided, FR2 / CEM-1 laminates				EF-12000 EF-9301(10)
II	Dual sided FR-4 w/PTHs, 1.6mm thick, up to 4 inner copper layers, metallized pad finishes		EF-2210		EF-5601
III	Complex, up to 12 inner copper layers, OSP pad finishes, all processing in air			EF-6100(P)	EF-6103 EF-6850HF
IV	>2.4mm thick, >12 inner copper layers, large high heat capacity components	EF-6000	EF-8300(LR)		EF-8000(GL)

Alcohol Based
Water Based

Other Leading Liquid Fluxes

Solvent System	Technology	Flux Model	Best Used on Assembly Types:	Reliability Requirements				Pin Testability
				IPC SIR (004A)	Bellcore (Telecordia) SIR	IPC SIR (004B)	JIS / Custom	
Water-Based	No-Clean	ALPHA NR-330	II, III	•	•			High
		ALPHA EF-4102	I, II	•	•			Moderate
	Water-Soluble	ALPHA WS-3355VF	II, III, IV	•*	•*	•*	•*	High*
		ALPHA WS-375	II, III, IV	•*	•*	•*	•*	High*
Alcohol-Based	No-Clean	ALPHA SLS 65 (C)	II, III	•	•			High*
		ALPHA RF-800	II, III	•	•	•	•	Moderate
		ALPHA 615-15/25	I, II, III	•	•	•	•	Low
		ALPHA EF-10000	I, II, III	•	•	•	•	Low
	Water-Soluble	ALPHA WS-856	II, III, IV	•*	•*	•*	•*	High*
		ALPHA WS-857	II, III, IV	•*	•*	•*	•*	High*
		ALPHA W-3355-11	II, III, IV	•*	•*	•*	•*	High*

* When properly cleaned





ALPHA® Cored Wire

High-performance, fast wetting cored wires that meet the most demanding reliability criteria.

The ALPHA range of quality solder wires is specifically designed for hand soldering, component attach and touch-up for surface mount technology. All products are manufactured to ISO 12224-1 specification and test methods.

- For all hand and automated soldering, component attach and rework operations
- Minimal, non-corrosive flux residues for high soldering efficiency
- Even core flux distribution
- Good solderability, strong joints
- Rosin/resin and lead-free options

ALPHA cored wires are available in a choice of high-purity alloys, diameters and flux percentages, with the choice of no-clean, rosin/resin free and lead-free options. All alloys conform to ISO 9453.

The comprehensive range of ALPHA wires is designed to give excellent wettability, produce strong joints without spattering and leave minimal non-corrosive residues. **Lead-free**

For soldering of Lead-Free assemblies, there are ALPHA cored wires available in the following alloy specifications: SACX Plus® 0307, SACX Plus® 0807, SAC305, SAC405 and Sn96.5/Ag3.5.

ALPHA Telecore HF-850 **New!**

- Meets highest industry standard for reliability
- Very fast wetting for excellent component touch-up operations and manual assembly
- Halogen-free feature allows use of HF-850 in processes in which other halogen-free soldering materials are used
- Very low flux spatter and low levels of fumes for operator friendly use and a cleaner working environment
- Clear non-tacky residue does not require cleaning
- Good spread characteristics improve first pass yield per JIS (>80%)
- Excellent joint appearance for easy inspection
- Suitable for use in any commercial no-clean soldering application that specifies compliance to the IPC ROL0 standard

ALPHA Telecore XL-825

- Excellent wetting speed and has a very low level of spattering
- Complies with JIS Class AA with <1000ppm halide content
- Meets IPC flux classification, ROL1
- Excellent performance for manual and drag soldering
- Also available in vanilla scented version Fluitin XL-825V

ALPHA SMT Plus (ZHP)

- ALPHA'S "ZERO Halogen" and halide-free cored solder wire
- Low flux content – less residues, good cosmetics
- J-STD-004 ROL0 classification
- Excellent wetting

ALPHA FT 2002 Rosin Free (ZHP)

- ALPHA'S "ZERO Halogen" cored solder wire
- Fully synthetic halide and rosin free, no-clean
- J-STD-004 ORLO
- Drop in replacement for rosin cored solders
- Very good tarnish removing properties and high SIR
- Clear, hard residues can be safely left on the board

ALPHA Pure Core

- Organic activated water soluble flux
- J-STD-004 ORM1
- Washable, even if cleaning is delayed for several days
- Very fast wetting



ZHP: ZERO Halogen Product

- High-reliability products
- Access to continuous new technology development
- Channel Partner network (distribution)

ALPHA® Cored Wire Selector Guide

Fluxes	Flux Type	IPC J-STD-004	ISO 12224	JIS Class	Zero Halogen*	Halogen Free**	Halide Free***	Primary Product Attributes
FT-2002	Rosin-Free No-Clean	ORL0	2.2.3				✓	Very low residue that can be left on the board Colophony-Free
Cleanline 7000	No-Clean	ORM0	2.1.3				✓	Very low residues that are Pin-Testable. Residues can be left on the board or cleaned with hot water
Telecore HF-850		ROL0	1.1.3			✓	✓	ALPHA's leading No-Clean cored wire Halogen-Free**, Very fast wetting, Very low spattering, Residues meet the most demanding electrical reliability specifications
Telecore XL-825		ROL1	1.1.2	AA			<1000 ppm†	Extremely fast wetting, Low spattering Residues meet the most demanding electrical reliability specifications
Reliacore 15		RMA	ROL1	1.1.2				
Energized Plus	RA	ROM1	1.1.2					Military Specification Residues can be left on the board or can be easily cleaned with solvent, semi-aqueous or saponifier cleaning systems
Pure Core	Water Soluble	ORM1	2.1.2					Residues are easy to clean with hot water, even after several days, and without causing corrosion
Aqualine 6000		ORH0	2.1.3				✓	Military Specification Residues are easy to clean with hot water

* No halogen intentionally added

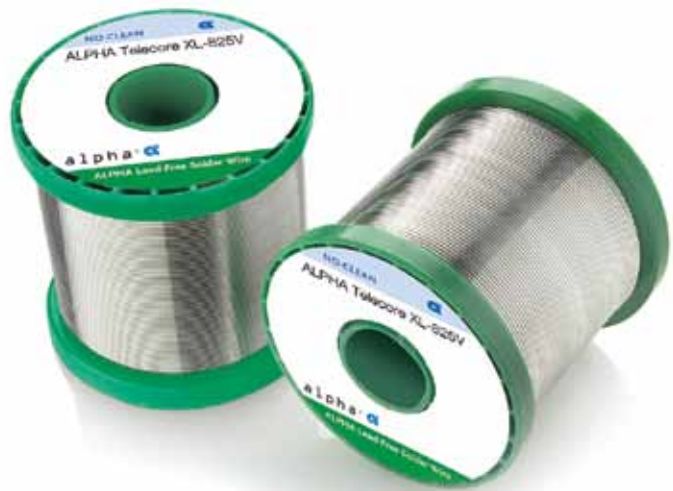
** <900ppm Chlorine, <900ppm Bromine, <1500ppm combined Chlorine and Bromine

*** <500ppm halide according to IPC J-STD-004 L0 classification

† IPC J-STD-004 L1 classification allows up to 5000ppm halide. Telecore XL-825 is less than 1000ppm halide to comply with JIS class AA

ALPHA® alloy melting temperatures

		Melting or Solidus/Liquidus	
Alloy		Temp °C	
LEAD-FREE	SACX 0307	217-228	
	SACX 0807	217-225	
	SAC305	217-219	
	Sn96.5/Ag3.5	221	
	Sn99/Cu1 228	228	
	InnoLot®	206-217	
TIN-LEAD	Sn60/Pb40	183-190	
	Sn60/Pb38/Cu2	183-190	
	Sn63/Pb37	183	
	Sn62/Pb36/Ag2	178-190	



ALPHA® Exactalloy® Preforms



How does your ability to selectively increase solder volume during printed circuit board assembly reduce time to market, increase reliability and improve first pass yield?

ALPHA® Exactalloy® solder preforms set the industry standard for product innovation and utility in the assembly market. ALPHA was the first to introduce preforms in tape and reel packaging, and set the standard for the smallest preforms available with the introduction of the 0402 and then again with the 0201.

Preforms today provide solutions to a wide variety of soldering challenges by providing a precise volume of solder, which can be delivered in numerous methods, including tape and reel packaging for PCB assembly for both high mix - low volume, and low mix - high volume applications.

ALPHA offers optimized product solutions suitable for:

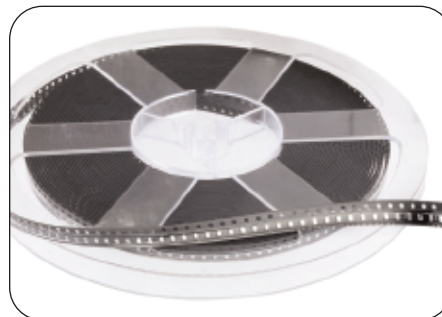
- Automotive sub-assemblies
- Filtered connector assembly
- Electric component assembly
- Die attach
- Power module substrate soldering
- Wire harness integration

Key ALPHA® Exactalloy® Preform Applications

Preforms in Tape and Reel: ALPHA® Exactalloy® Preforms in tape and reel packaging can be used with solder paste to selectively increase solder volume using standard pick and place equipment.

The preform is placed directly into the solder paste prior to assembly reflow. Only a portion of the preform needs to contact the paste. ALPHA® Solder Preform Tape & Reel packaging provides you with a time-to-market advantage, solving your solder volume issues during assembly verification without the need for PCB layout changes or the use of step stencils.

Standard tape and reel packaged sizes are available off the shelf including 0201, 0402, 0603 and 0805 and others.



Tape and reel

Solder Washers for Low Mix - High Volume Assembly: ALPHA® Exactalloy® Preform solder washers provide you with an ideal method of not only delivering the precise solder volume and flux needed for through-hole connections, but they also eliminate the need for secondary solder processes. In high volume applications, cost effective soldering solutions can be found using bulk solder washers and vibratory bowl feeders combined with pick and place equipment.

Solder washers can also be integrated into production using various fixturing methods. Flux can be integrated with the washers,

either as a core or as an external coating, depending on the handling requirements.

ALPHA is a leader in the industry working with customers on innovative soldering methods, such as induction soldering.



Bare pins, washers in place pre-reflow, post-reflow

Solder Sleeves: ALPHA's patented manufacturing methods provide the vast majority of the industry's volume for solder sleeves with integrated flux used in solder based wire harness connectors.

These products are the life blood of aerospace, marine and specialty vehicles. The end products provide vibration resistant and moisture proof interconnection solutions. Ask about plans to support RoHS and ELV compliant offerings.

Solder Ribbon: ALPHA's high purity solder ribbon product offering provides the flexibility to integrate custom solder preforms into your product with your specialised material cutting and handling equipment, ensuring a cost effective approach for high volume production.

Semiconductor Die Attach: Typically provided in high lead alloys, high purity, contaminate free solder materials - combined with ALPHA process knowledge and expertise - offer a highly reliable die attach solution for demanding discrete power devices. Our continuous R&D efforts in this area are providing new capabilities, further enhancing the cost performance of die attach solutions.

- Access to continuous new technology development
- Applications expertise
- Accelerated technology customization for key customers

Power Module Substrate Soldering:

The heart of the power module that drives reliability is the ceramic substrate. MAXREL™ is the highest performance high Sn alloy in the industry for the most demanding, highest reliability substrate to heat spreader soldering.

Fuse Alloys: The combination of the precise solder volume and a specific melt temperature provides a fuse function, such as required in fire suppression systems. In addition to the very precise fuse function enabled by eutectic or near eutectic alloys, the solder can provide mechanical strength for the assembly. ALPHA is leading the industry in cost effective solutions.

Solder-Copper Laminates: For applications that require laminated preforms, we offer solder/copper/solder laminates in washer, square, rectangular and disc shapes. A wide variety of alloys is feasible.

LAMINATION SPECIFICATIONS	
MATERIAL	THICKNESS (mm)
Copper	.075 – .750
Solder	.040 – .225

Consult for specific solder-copper combinations

COMMON ALLOYS BY PRODUCT TYPE									
ASSEMBLY		LAMINATION OVER COPPER		SOLDER RIBBON		SUBSTRATE ATTACH		LOW TEMP FUSE ALLOYS (95-150C)	
SnAg	PbSn	SnAg	PbSn	SnAg	PbSn	SnAg	PbSn	SnPbCd	InAg
SnAgCu	PbSnAg		PbSnAg	SnAgCu	PbSnAg	SnAgCu	PbSnAg	SnPbInCd	SnBi
SnSb	PbInAg		PbInAg	SnSb	PbInAg	SnAgSb	PbInAg	SnPbIn	SnBiAg
SnBi				SnBi		SnSb	PbAg	SnPbBi	SnBiIn
						SnSbCuNi		SnIn	SnInCd
						SnBi		SnZn	

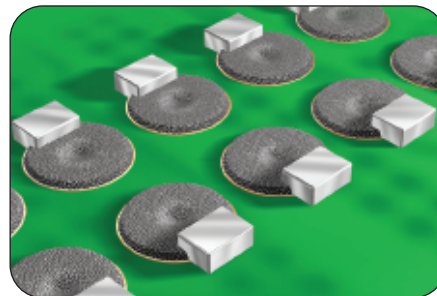
Available Flux Types: Flux is a critical element in the solder system. ALPHA offers the widest variety of flux types to meet the most demanding applications, including color indicators for identification of RoHS versions on the shop floor. Ask us about how our resilient flux is expanding the range of potential solutions available for your application.

ALPHA® Exactalloy® Preform Selection Criteria

Alloy: Selection is based on melting point and compatibility with substrate materials. Exactalloy preforms are produced in a large variety of alloys to meet your specific application requirements.

Size/Shape: Custom designed sizes and shapes provide exact solder volume for specific applications, aiding the assembly process.

Flux Type: Based on the specific materials to be soldered, the heat application method and the reliability requirements of the end product, an appropriate flux can be integrated with an Exactalloy® preform. Color-coding in flux is available for easy product identification on the manufacturing floor.



ALPHA® Exactalloy® Preforms in solder paste.

FLUX TYPE	INTERNAL	EXTERNAL
RMA (ROL1)	yes	yes
RA (ROM1)	yes	yes
NC (ROLO)	yes	yes
RSA* (ROH1)	yes	yes
WS (ORLO)	yes	consult
Resilient (ROLO)	no	yes

* Rosin Superactivated

Flexible Packaging Options:

Packaging options are available to meet a variety of applications and assembly equipment requirements and are designed to maximise customer process efficiency. High speed preform placement can be implemented using preforms packed on tape and reel. ALPHA also offers an assortment of bulk packaging options. Argon packaging is available for specific alloys.

Prototypes and Specialty Shapes:

ALPHA's rapid prototyping ability enhances time to market while minimizing tooling expenses needed to verify acceptable perform performance. ALPHA has a great deal of experience developing specialty shapes. Please contact your sales representative to learn more about how we can support your unique preform shape requirements.

SPECIFICATION GUIDELINES*

Washer

OD
Min = .020" (0.51mm)
Max = 3.00" (76.0mm)

ID
Min = .008" (0.2mm)
Max = OD – .010" (0.25mm)

T (Thickness)
Min = .002" (0.05mm)
Max = .110" (2.80mm)

Rectangle

S (Side)
Min = .020" (0.51mm)
Max = 2.30" (58.00mm)

T (Thickness)
Min = .002" (0.05mm)
Max = .200" (5.00mm)

Disc

D (Diameter)
Min = .020" (0.51mm)
Max = 2.10" (53.00mm)

T (Thickness)
Min = .001" (0.025mm)
Max = .200" (5.08mm)

Sleeve

OD
Min = .057" (1.44mm)
Max = 1.05" (26.60mm)

ID
Min = .049" (1.20mm)
Max = 1.024" (26.00mm)

H (Height)
Min = .024" (0.61mm)
Max = .472" (12.00mm)

* Typical specifications shown, other dimensions available upon request.



ALPHA® Recycling Services

Environmental legislation specifies that certain scrap metal, if not recycled, will be considered hazardous waste and must be disposed of appropriately. Due to these requirements it is now essential for you to have a reliable and efficient recycler.

ALPHA offers a safe and efficient recycling service which helps companies to meet their environmental and legislative requirements and at the same time maximise the financial return on their waste streams.

ALPHA is also one of the largest manufacturers of electronics assembly materials in the world, creating synergies with the recycling service that provide great value to customers.

Contact your local ALPHA partner to learn more about your environmental responsibility for Electronics Waste.

Minimize your environmental liability

- ALPHA is certified ISO 14001, ISO 9001, TS 16949, OHSAS 18001 and certified full recycling provider
- You can visit our facilities and conduct your own audit of our recycling process
- ALPHA has an experienced and dedicated environmental recycling team
- All shipments are lot traceable and certification can be provided on request

ALPHA Recycling is a global full-service

Offering accurate analysis and the highest possible yield from solder waste using a full range of in-house technologies for recycling.

- ALPHA's recycling facilities located in the Netherlands and Hungary increase convenience for customers, enabling logistical costs to be reduced and ensuring regional advice and support is easy to access
- Global organisation with global services, offering greater financial security
- Highest financial return to our recycling customers versus our competitors
- Audit trails help document safe environmental reprocessing of material
- Swift settlements: payment, credit and/or delivery of new bar



LEAD FREE

Lead-free solders have not only created technological challenges but have increased the cost of materials for assembly companies. ALPHA helps customers reduce lead free cost with low silver alloys while maintaining high soldering performance. A further way to offset this cost is with the recycling of your lead-free solder dross.

ALPHA is able to recycle the numerous lead-free alloys being used by companies today. With its refining capabilities, ALPHA is able to help customers maximize the value of their materials. Lead free waste is not considered hazardous and is therefore easier to transport.



MAXIMISE THE VALUE OF YOUR WASTE MATERIALS

1 Packing

ALPHA provides recycling bins that are tough, sealable and disposable.

In order to receive maximum value, all materials must be identified by alloy (SnPb, Lead-Free) and type (paste, dross).

The preferred method is to segregate all materials on separate pallets.



2 Purchase Order

Contact your local ALPHA Partner for a purchase order number. Please provide the following information:

- a. Type of material (Pb-free dross, Sn-Pb paste, etc.)
- b. Approximate weight of each item



3 Logistics

ALPHA and its supply chain partners can support you with the arrangements of logistical processes so that they meet your schedule.



RECYCLING WASTE STREAMS

Wave Solder Dross and Hot Air Solder Level (HASL) Dross - Oxidized particles that form on the surface of molten metal (solder). This material can be skimmed off and recycled.

Contaminated solder bath - Generated primarily by wave soldering or pre-tinning operations. When metallic impurities in the solder reach the critical level problems such as dull or grainy joints appear, the solder bath is then emptied and refilled with the new solder.

Processed Anodes - Portions of anodes remaining after being consumed in an electroplating operation. Since there is little contamination of the alloy, high metallic return can be expected in the recycling process.

Precious Metals - ALPHA has the capability to recycle gold and silver in its state-of-the-art electrolytic refineries.

Circuit Boards - ALPHA works with partners that provide environmentally safe and legal recycling processes for both gold-bearing and solder masked-copper boards.

Solder Paste - Paste that has expired shelf life or been removed from the stencil.

Industrial Metals - Other scrap alloys such as tin/bismuth can also be recycled. ALPHA can recycle a wide range of alloys. Please contact your local ALPHA partner for a quote.

EUROPEAN RECYCLING CONTACTS

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 alpharecycling@alent.com

ALPHA® Cleaners

How does inadequate stencil and pcb cleaning impact your process?

ALPHA offers a range of cleaning products specifically for electronic assembly manufacturing applications, covering all major types of cleaning processes: semi-aqueous, aqueous and manual/non-aqueous cleaning.

Stencil/Misprint Cleaners

The range of stencil/misprint cleaners was developed specifically to replace IPA and other low-flash point, flammable materials in both manual and equipment applications where performance, safety and environmental properties are of primary concern. Some products are applied at ambient temperatures and dry quickly, with or without forced air. There are also products that are recommended for most non-aqueous and aqueous stencil cleaning equipment.

- ALPHA® SM-440
- ALPHA® SM-110
- ALPHA® SM-110E

Board Cleaning

Unlike traditional organic and inorganic saponifiers, ALPHA aqueous defluxers are organic solvent-based products that are either water soluble or make stable emulsions in aqueous process equipment. The products differ from semi-aqueous defluxers in that they can be used in standard aqueous equipment, both metal and plastic.

- ALPHA® SM-110
- ALPHA® SM-110E
- ALPHA® 2110
- ALPHA® BC-2200
- Armakleen E2001P
- Armakleen 2003

Manual Cleaning Range

In addition to replacing CFCs in production defluxing, ALPHA also offers alternative products for manual benchtop defluxing after touch-up and rework. These products are applied at room temperature, rinsed with fresh product, and dried with ambient or forced air. The fluids are more aggressive than CFCs and IPA and remove even the more difficult residues.

- ALPHA® SM-110
- ALPHA® SM-110E

ALPHA® SM-110 Cold/Manual Cleaner (liquid and pre-saturated wipes)

- Dissolves no-clean, water soluble and rosin flux residues
- Fast evaporation, higher flash point; excellent solvency properties outperform IPA
- Excellent compatibility with stencil and PCB materials; approved for use in printer underwipe systems

ALPHA® SM-110 E

- Specially formulated for use in non-aqueous stencil cleaning equipment
- Removes most types of solder paste and epoxy products, such as SMD adhesives

ALPHA® 2110 Aqueous Rosin Cleaner

- Cleaning concentrate designed for efficient removal of rosin flux residues from PCBs using aqueous saponification processing
- Excellent cleaning of PCBs in conveyorised, in-line aqueous machines, even to ionic cleanliness standards in MIL-P-28809

ALPHA® BC-2200

- Aqueous defluxer: VOC-free, high-performance alkaline cleaner with exceptional wetting properties and detergency; ideal for use with lead-free flux formulations
- Well-suited for in-line or batch spray-in-air cleaning; can be used in ultrasonic equipment
- Removes reflowed rosin, no-clean and water-soluble fluxes from PCBs

ARMAKLEEN® 2003

- Environmentally sensible, inorganic-based aqueous cleaner designed for in-line or batch equipment for cleaning PCBs
- Low surface tension allows for penetration of low stand-off heights



Armakleen is a registered trademark of Church & Dwight Co., Inc.

- Sales/support in every major electronics geographic market
- Local and consistent technical support regionally and globally
- Consistent product performance globally

Product Matrix by Cleaning Technology

STENCILS & MISPRINTS	AQUEOUS (SAPONIFIERS & DETERGENTS)		SOLVENT-BASED (WASH/NO RINSE)		SEMI-AQUEOUS (WASH/RINSE OPTIONAL)	
Printed rosin and no clean paste	C		A B		J	
Uncured SMD adhesives	C		A B		J	
Paste on board / understencil wipes	C		A B		J	
PRINTED CIRCUIT BOARDS	AQUEOUS (SAPONIFIERS)		SOLVENT-BASED (WASH/NO RINSE)		SEMI-AQUEOUS (WASH/RINSE)	
	Batch	In line	Batch	In line	Batch	In line
Reflowed rosin based paste residues	G D E F	G D E F	A B	A B	J	J
Reflowed no clean paste residues	FGE	G	-	-	J	J
High temp. reflow residues (Hybrids)	G	G	-	-	J	J
MANUAL CLEANING	AQUEOUS		SOLVENT-BASED		SEMI-AQUEOUS	
Jigs, fixtures	I		A B		J	
Finger cleaning, flux tanks, reflow condensers	I		A B		J	
Adhesive dispense needles	F		A		J	
Bench top, general cleaning	D E I		A B			

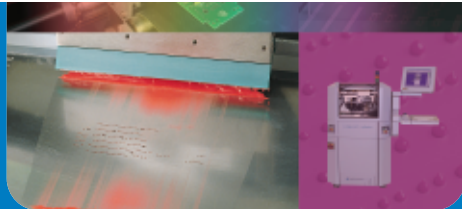


KEY	PRODUCT	FLASH POINT	SOLUTION
A	ALPHA® SM-110	41C+/106F+	Solvent
B	ALPHA® SM-110E	53C/128F	Solvent
C	ALPHA® SM-440	None to boiling	Aqueous
D	ALPHA® 2110	99C+/210F+	Aqueous
E	Armakleen 2003	None to boiling	Aqueous
F	Armakleen E2001P*	None to boiling	Aqueous
G	ALPHA® BC-2200	None to boiling	Aqueous
H	ALPHA® SC-30	65C/149F	Solvent
I	ALPHA® AutoClean 40	100C+/212F+	Aqueous
J	ALPHA® BC-3300	180 (COC)	Semi-aqueous

*Specifically formulated for use with cleaning that utilizes plastic parts.

PCB Cleaning Products

Stencil and Misprints	ALPHA® SM-440	Aqueous. Spray, ultrasonics and head cleaning stencils of raw paste/SMD adhesive. Use 10-15% @ 26-38°C
	ALPHA® SM-110 & SM-110E	Solvent based. Manual or non-aqueous batch cleaner – removes raw paste/adhesive and flux residues. Also available in presaturated wipes. ALPHA SM-110E has higher flash point.
Board Cleaning	ALPHA® 2110	Aqueous saponifier Industry Standard in SnPb applications, Flash point = 99°C, Used at 3-10% @ 65-76°C
	Armakleen 2003 & E2001P	Aqueous inorganic board cleaners. 2003 is the leading Armakleen board cleaner. E2001P is for use on machines with plastic parts. Machine maintenance is very important.
	ALPHA® BC-2200	Aqueous. For SnPb and LF apps, Use in batch, in-line and ultrasonic applications Aggressive, Low VOC, Typically used at 5-30% concentration and temperatures from ambient to 71°C
	ALPHA® BC-3300	Semi-aqueous. High strength, for use in spray under immersion, ultrasonic and hand cleaning operations Flash point = 82°C. Use at 100% concentration from RT to 65°C, Wipe or total immersion, Water rinse, Air dry
	ALPHA® SM-110 & SM-110E	Solvent based. Manual or non-aqueous batch cleaner – removes raw paste/adhesive and flux residues. Also available in presaturated wipes. ALPHA SM-110E has higher flash point
On-board Printer	ALPHA® SC-30	Solvent based. Used for understencil wipe in printer
General Cleaning & Equipment Maintenance	ALPHA® AutoClean 40	Aqueous cleaner for general cleaning of flux spray nozzles, ovens, pallets etc. Suitable for batch immersion cleaning and manual wipe.
	ALPHA® SM-110 & SM-110E	Solvent based. Manual or non-aqueous batch cleaner – removes raw paste/adhesive and flux residues. Also available in presaturated wipes. ALPHA SM-110E has higher flash point



ALPHA[®] Adhesives

Epibond[®] 7275-Series surface mount adhesives offer excellent performance for all print and dispensing applications.

Epibond[®]* 7275-Series Surface Mount Adhesives are designed for holding in place bottom side – and some mixed technology – surface mount components during the wave soldering process. Epibond[®] are high-quality non-slumping and non-stringing adhesives applied by dot dispensing, printing equipment and pin transfer, giving consistent dot profile and fast curing.

Epibond[®] Typical Cure Profile

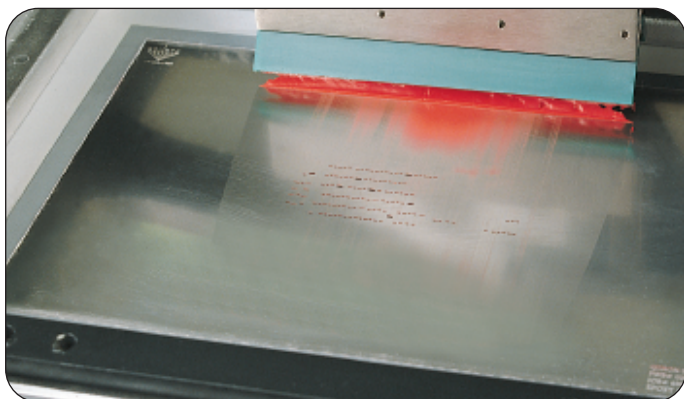
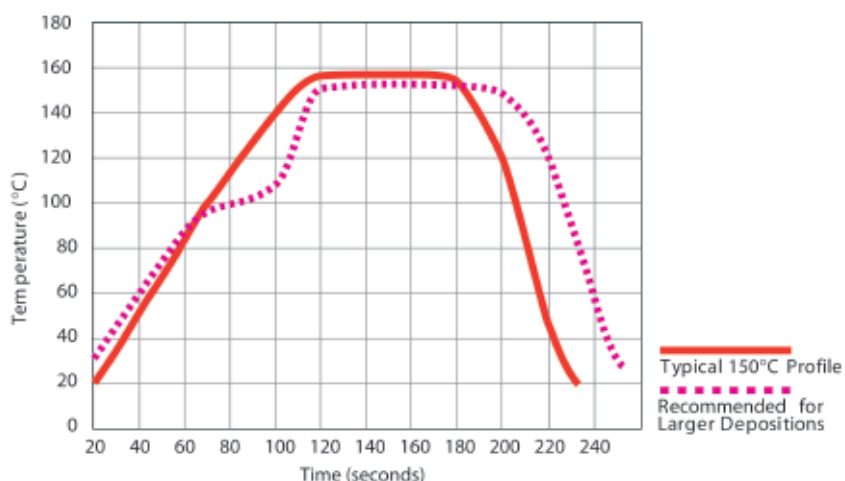
A correct thermal profile is critical to ensure that the adhesive achieves maximum mechanical strength and a homogeneous cure:

- Ensure the material is heated to the correct temperature for the specific time
- The maximum thermal ramp rate is 1.5 to 2.0°C/second to ensure a homogeneous cure



- Non-slumping and non-stringing
- Room temperature stability
- Dispense, print and pin transfer application
- Consistent dot profile and fast curing
- High-visibility red or yellow options
- Screen printable with ALPHA CUT laser stencils to SMD adhesive guidelines

Epibond[®] Typical Cure Profile



Printed adhesive

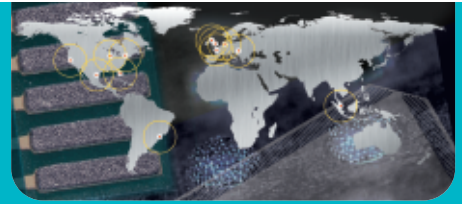


Dispensed adhesive

- Sales/support in every major electronics geographic market
- Local and consistent technical support regionally and globally
- Consistent product performance globally

Typical Properties

UNCURED	EPIBOND 7275	EPIBOND 7275-1
Description	Original formula ideal for each of the deposition methods. Designed specifically for high-speed applications.	Slightly less viscous modification of the 7275. Preferred for certain application equipment.
Composition	Epoxy	Epoxy
Color	Red	Red
S.G. (ASTM-D-793)	1.28g/cc	1.20g/cc
Viscosity (ASTM-D-1824) cps @ 1 rpm (x1000) cps @ 10 rpm (x1000)	2,900 390	2350 290
Shelf Life	9 months @ 5°C 6 months @ 23°C	9 months @ 5°C 6 months @ 23°C
Thixotropic index	>6.0 (ASTM D-1824)	>6.0 (ASTM D-1824)
Dot profile W/H	<2.0	<2.0
Particle size	<25μ	<25μ
Curing time	Ramp rate <2.0°C/sec @150°C 1.5 mins	Ramp rate <2.0°C/sec @150°C 1.5 mins
TYPICAL ELECTRICAL PROPERTIES		
Dielectric strength (ASTM-149)	420 v/mil	420 v/mil
Dielectric constant (ASTM D-150)	3.87 @ 1 MHz	3.87 @ 1 MHz
Dissipation factor (ASTM D-150)	.025 @ 1 MHz	.025 @ 1 MHz
Surface resistivity (ASTM D-257)	$1.1 \times 10^{15} > \text{cm}^2$	$1.1 \times 10^{15} > \text{cm}^2$
Volume resistivity (ASTM D-257)	$2.1 \times 10^{15} > \text{cm}^2$	$2.1 \times 10^{15} > \text{cm}^2$
TYPICAL CURED PROPERTIES		
Lap shear strength (ASTM D-1002)	2000 psi @ 25°C	2000 psi @ 25°C
Glass transition T _g (ASTM D-696)	66°C	65°C
Thermal conductivity Cal/sec.cm.°C	6.5×10^{-4}	6.4×10^{-4}
Viscosity, ASTM-D-1824 (RVT Spindle #7)	cps @ 1 rpm: 3,200,000 cps @ 10 rpm: 420,000	cps @ 1 rpm: 2,500,000 cps @ 10 rpm: 320,000



ALPHA® Stencils

Helping you get first-time-right paste deposits through advanced stencil services and technology.

The Complete Stencil Solution - ALPHA® Stencil products are based on unique blends of advanced technology, the experience gained from having made over half a million solder paste stencils, the specialist knowledge that could only be accumulated by a company privileged to produce both solder pastes and printing stencils, all combined with a genuine will to meet your most stringent delivery expectations.

With over 250 man-years of CAD experience and 400 man-years of manufacturing experience globally, ALPHA has the power to “know what works” and the global, multi-site manufacturing and quality systems to deliver it.

ALPHA® Stencils are available as framed or frameless foils to suit all printers and formats.



Knowledge

ALPHA has an intimate knowledge of the stencil printing process, based on its global experience as the leading producer of stencils as well as advanced solder paste products worldwide.

Expertise through Experience

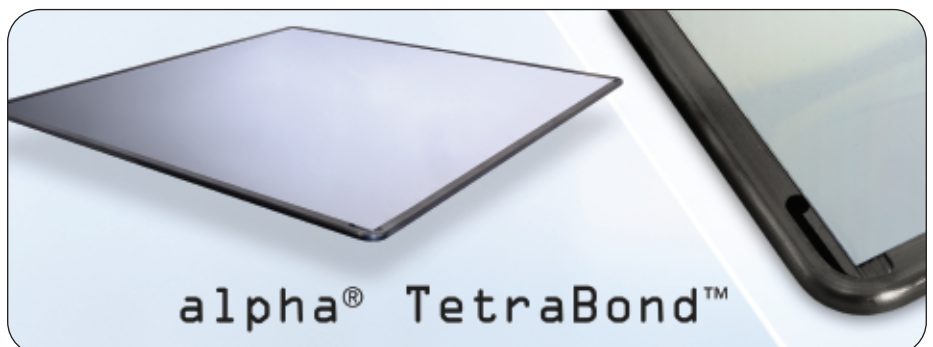
ALPHA has a wealth of design and manufacturing expertise. Our CAD technicians combine ALPHA® design and modification rules, honed by customer feedback and experimental development with your own specific design requirements and preferences to produce stencils that are “first time right”.

Service

If you need it tomorrow, order it today and we'll do everything humanly possible to meet your needs and we'll keep you informed all the way down the line.

To ensure that your stencil is 'right first time' we analyse the data you provide to ensure its print capability. We calculate the area ratio and transfer efficiency for each aperture, allowing us to highlight potential problems at the pre-production stage.

Meeting today's challenging printing requirements with fast response, high accuracy, excellent printing performance and worldwide availability.



ALPHA® TETRABOND™ Frameless Stencil Foils



- **Leading technology products**
- **Continuity of supply ensured through multiple manufacturing sites**
- **Delivered lowest cost of ownership**

ALPHA® CUT™ Laser Cut Stainless Steel Stencils

The highly repeatable, accurate printing performance you require from the company that pioneered stainless steel, laser stencil-manufacturing technology.

ALPHA® CUT™ The original laser cut stencil and still the best

ALPHA® FORM™ Electroformed Nickel Stencils

State-of-the-art ALPHA® FORM™ electro-formed stencils provide high accuracy, durability, and long life for high volume printing applications.

ALPHA® FORM™ Long life stencil technology with enhanced fine pitch capabilities

ALPHA® NICKEL-CUT™ Laser Cut Nickel Stencils

State-of-the-art ALPHA® NICKEL-CUT™ stencils are hybrids, combining the durability of electroformed nickel stencils with the fast availability of laser cut stencils.

ALPHA® NICKEL-CUT™ Combining the speed of laser cutting with the durability of electroformed nickel

ALPHA® TETRABOND™ Frameless Stencil Foils

ALPHA® TetraBond™ is the culmination of "frameless" stencil development; an elegantly simple system designed to enhance the rigidity of the foil, making safe mounting and demounting an easier proposition.

Innovatively encompassed in a thin, one piece aluminium extrusion, TetraBond™ stencil foils are designed for use with Tetra and Tetra VG foil tensioning frames and are backward compatible with the majority of frames currently in the market. They are available with all ALPHA Stencil technologies (ALPHA® Cut™, ALPHA® Form™ and ALPHA® Nickel-Cut™) to suit the majority of printer size requirements.

ALPHA® TETRABOND™ Taking frameless stencil foil technology to a new level



ALPHA® REPAIR™ Mini and Micro Stencils

ALPHA® Repair™ are mini and micro rework stencils, for the controlled, localised printing of solder pastes for reattaching single components, particularly BGAs, µBGAs, PLCCs, QFNs and QFPs to circuit boards. Available for 'board print', 'print on component' and 'component repair'.

ALPHA® REPAIR™ Practical rework solutions



ALPHA® SQUEEGEE™ Blades

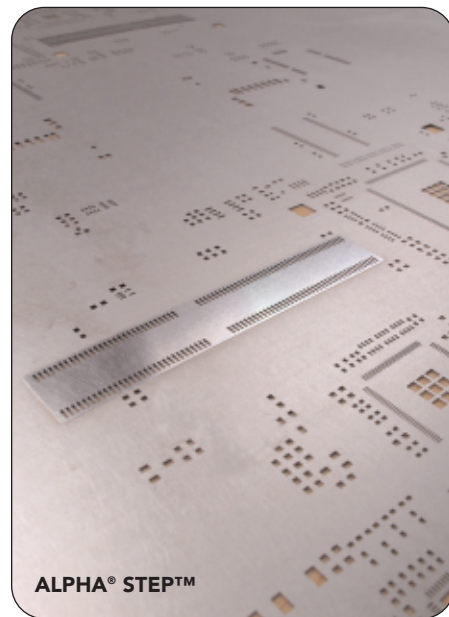
A range of high precision, metal squeegees to suit all popular print machines and squeegee holders. ALPHA® Squeegees™ are designed to ensure optimum aperture fill by encouraging 'paste roll', while minimising topside paste smearing on the stencil.

ALPHA® SQUEEGEE™ Helping to optimise print performance

ALPHA® INSPECT™ Optical Inspection Masks

ALPHA® Inspect™ cover stencils are laser cut masks, designed to fit over populated boards to assist manual inspection and may be used to enhance AOI efficiency.

ALPHA® INSPECT™ Enhancing optical inspection efficiency



ALPHA® STEP™ Multi-level, Step Stencil Technology

ALPHA® Step™ Multi-level, Step Stencil Technology is available on all ALPHA® stencils and offers the SMT engineer significant flexibility in achieving the right solder paste volume deposit for devices with markedly diverse paste requirement. They can provide additional paste height in selected areas of the PCB (step-up stencils) or reduced height deposits in other areas (step down stencils).

ALPHA® STEP™ Tailoring stencil technology for optimum print performance

For more information on ALPHA Stencils please visit:
www.alpha.alent.com

ALPHA® Conflict-Free Minerals

About the Conflict-Free Tin Initiative

An industry initiative was created in September 2012 by the Dutch government which announced the intention to start a conflict-free tin sourcing program in South Kivu, an eastern province of the Democratic Republic of Congo (DRC).

Alpha's Conflict Minerals Policy

Alpha understands the seriousness of the possibility that tin mined in conflict areas of the Democratic Republic of Congo (DRC) may become part of the electronics supply chain.

Moreover we understand that profits from such tin mining in conflict areas may be encouraging certain unfair labour practices or other human rights violations in DRC.

We are committed to ensuring that minerals from conflict mines do not enter Alpha's supply chain.



We are collaborating closely with several industry groups and have developed and published our Corporate policy on this topic which is available on the Alpha website www.alpha.alent.com in the environmental and Regulatory Corner (Industry Issues tab). The policy is based on the Organization for the Cooperation and Development (OCED), Five Step Framework for Risk Based Due Diligence in the Minerals Supply Chain.



Knowledge, Experience and Service
at the forefront of soldering technology

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