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01
Solder Paste

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NEW PRODUCT

NP560 Solder Paste

THE ULTRA LOW VOIDING PASTE UNDER QFNS

NP560 IS A NO-CLEAN, LEAD-FREE HALOGEN-FREE, SOLDER PASTE FEATURING:

- Ultra low voiding performance under QFNs
- Wide reflow profile window with good solderability on various PCB surface finish
- Excellent solderability across varied profiles in both air and nitrogen
- Consistent printing performance to 0.50 and 0.5 AR
- Excellent activity and printability
- Very low solder balling and graping
- Extremely stable paste properties
- Colorless residues for ease post-reflow inspection
- Halide and halogen-free

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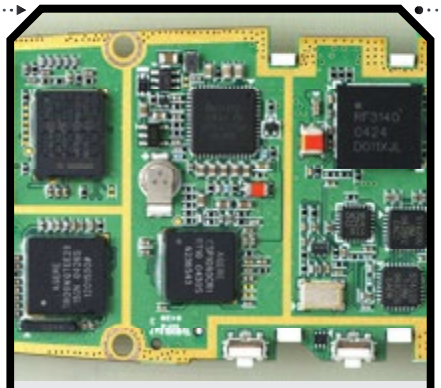
WHY NP560 SOLDER PASTE?

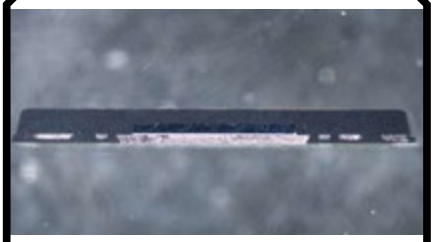
NP560 consistently delivers paste transfer efficiencies of 0.50 to 0.55 AR and is fully capable of printing and reflowing 01005 components, even in air, with minimal graping behavior. In addition to its stable, consistent product performance, NP560 has redefined the voiding standard for PCB assembly and has the potential for low voiding performance.

Voiding in solder joints is caused by entrapped gases during the soldering process. When the solder joint is a QFN (Quad Flat No lead) thermal pad, excessive voiding can lead to poor thermal conductivity. Today's electronics are designed to work at increasingly faster speeds which creates higher operating temperatures. If this heat cannot be dissipated efficiently, these components may burn themselves up. After the device would burn out, it will be defective to the user.

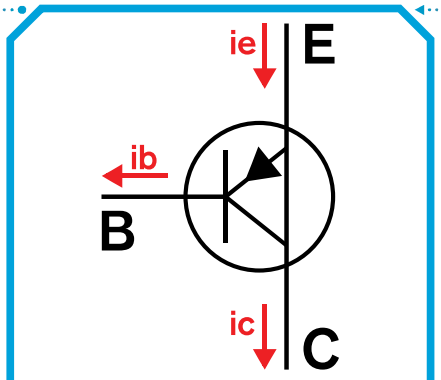


Modern cell phone PCBs contain many QFNs.

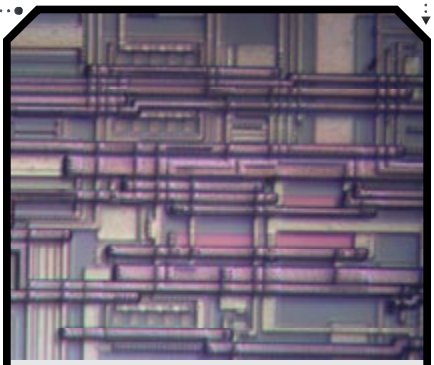
QFNs vary in size and number of pins.



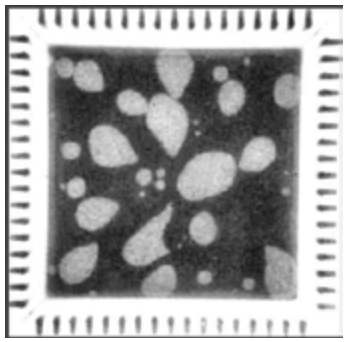
Featured is a cross-sectional view of non NP560 paste used allowing the heat generated by electrons within the transistor lines not to be transferred adequately causing the failure. The integrated circuit within this QFN (center of cross section) is attached to the thermal pad, which conducts heat away from the device.



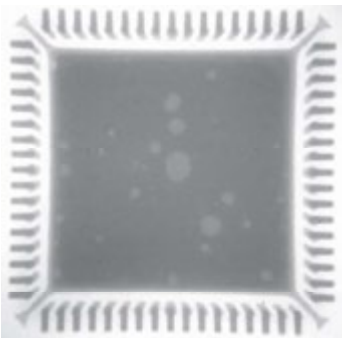
Current flow through each transistor generates heat.



Close-up view of the surface of an integrated circuit and individual transistors. Transistor count of integrated circuits doubles every two years (Moore's Law).



A high voiding rate reduces the ability for heat to dissipate from the QFN.



The low voiding of NP560 will maximize heat transfer from the QFN.

NP560 allows Kester to offer a product that meets customer's low voiding under QFN requirements (<10%) across different QFN sizes. This guarantees that the electronics such as laptops, cell phones and medical equipment will be reliable when you need them to be.

Kester® EP256HA

No-Clean Solder Paste

Designed to provide maximum print performance characteristics and solderability with lead-free parts requiring leaded solder paste

Kester EP256HA is a no-clean, air or nitrogen reflowable solder paste. It is specifically designed to provide optimal print performance and solderability on lead-free parts when leaded solder paste is required. EP256HA has been developed for applications that require the ultimate activity with respect to difficult to solder to components and board surface mentalizations.

Key Features

- Excellent printing characteristics to 0.4 mm (16 mil) pitch with Type 3 powder and is capable of up to 90-minute break times in printing
- High print speeds to 150 mm/s (6 in/s)
- Excellent solderability on difficult to solder to components, i.e., Pd/Ag high activity on all substrates, including OSPs
- Stable tack and stencil life of over 8 hours (process set up dependent)
- Classified as ROL0 per J-STD-004

For more information, contact us at Assembly@MacDermidAlpha.com

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Kester® NP505-HR

High-Reliability, Zero-Halogen, Lead-Free, No-Clean Solder Paste

A Paste for High Reliability Applications

Kester NP505-HR Solder Paste is a high reliability, zero-halogen, lead-free, no-clean solder paste. NP505-HR is specifically designed for challenging applications such as automotive and aerospace where superior SIR performance is required. NP505-HR provides very reliable post-reflow residues and passes the most challenging industry SIR conditions. NP505-HR is available in both SAC305 and the leading high performance Innolot alloy.

Key Features

- Zero-Halogen*
- Reliable post reflow residues passing even the harshest SIR testing
- Reflowable in both air and nitrogen
- Consistent print performance to 0.55AR (SAC305) and 0.57AR (Innolot)
- Low QFN/BGA voiding
- Excellent solderability across wide variety of profiles
- Compatible with most conformal coating materials
- Stable paste properties: 12-month shelf life for SAC305 and 6-month shelf life for Innolot

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*Zero-halogen is defined as no halogen intentionally added to the formulation.

Kester® NP505-HR Solder Paste

High-Reliability, Zero-Halogen, Lead-Free, No-Clean

PERFORMANCE SUMMARY

PROCESS	PERFORMANCE ATTRIBUTE	NP505-HR WITH INNOLOT CAPABILITY
Printing	Print Definition	Consistent fine feature print volumes, reaching area ratio of 0.57 with standard print set-up. Able to reduce AR with advanced printing technology
	Print Durability (Stencil Life)	No significant paste degradation after 6 hours of printing
	Print Relax & Recovery	2 hours relax/recovery remains consistent across full range of viscosity
	Print Temperature Window	Consistent printing performance at the temperature of 22-30 °C/71.6-86 °F and the relative humidity of 30-55% RH
	Print Speed Range	Consistent printing performance from speeds of 1-6 in/s (25-150 mm/s). Slower speeds are beneficial for area ratios at or below 0.55
Reflow	Reflow Process Window	Consistent solderability across all profiles – short, medium or long soak in both air and nitrogen
	Void behavior	Minimum voiding observed across variety of reflow profiles
	Hot/Cold Slump Performance	Meets requirements of IPC J-STD-005B
	Flux Residue Appearance	Light clear residues
	ICT Probability	Consistent hard probable surface, shatter-type residue

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Kester® NP510-LT HRL1

Lead-Free, No-Clean, Low Temperature Application Solder Paste

For assemblies that have temperature sensitive substrates and components

Kester NP510-LT HRL1 is a low temperature, no-clean, lead-free, zero-halogen solder paste specifically designed for assemblies that require temperature sensitive substrates and components or have high thermally induced high warp signatures due to the designs becoming more complex and thinner. This warping can lead to defects such as HiP and non-wet opens. Using NP510-LT HRL1 can essentially eliminate these defects while providing similar thermal cycling and drop shock performance to SAC305, all while maintaining a peak reflow temperature of <200 °C.

Key Features

- Lower reflow peak temperature (185 to 195 °C) compared to traditional SAC-based, lead-free alloys
- Reduction in thermally induced board-to-package warpage
- Good solderability on various PCB surface finishes
- Classified ROL0 per IPC J-STD-004B
- Zero-Halogen*
- Excellent printability above 0.60 area ratio
- Colorless residues for easy post-reflow inspection
- Significantly lower voiding for various packages - BGA, MLG, DPAK, LGA, etc.

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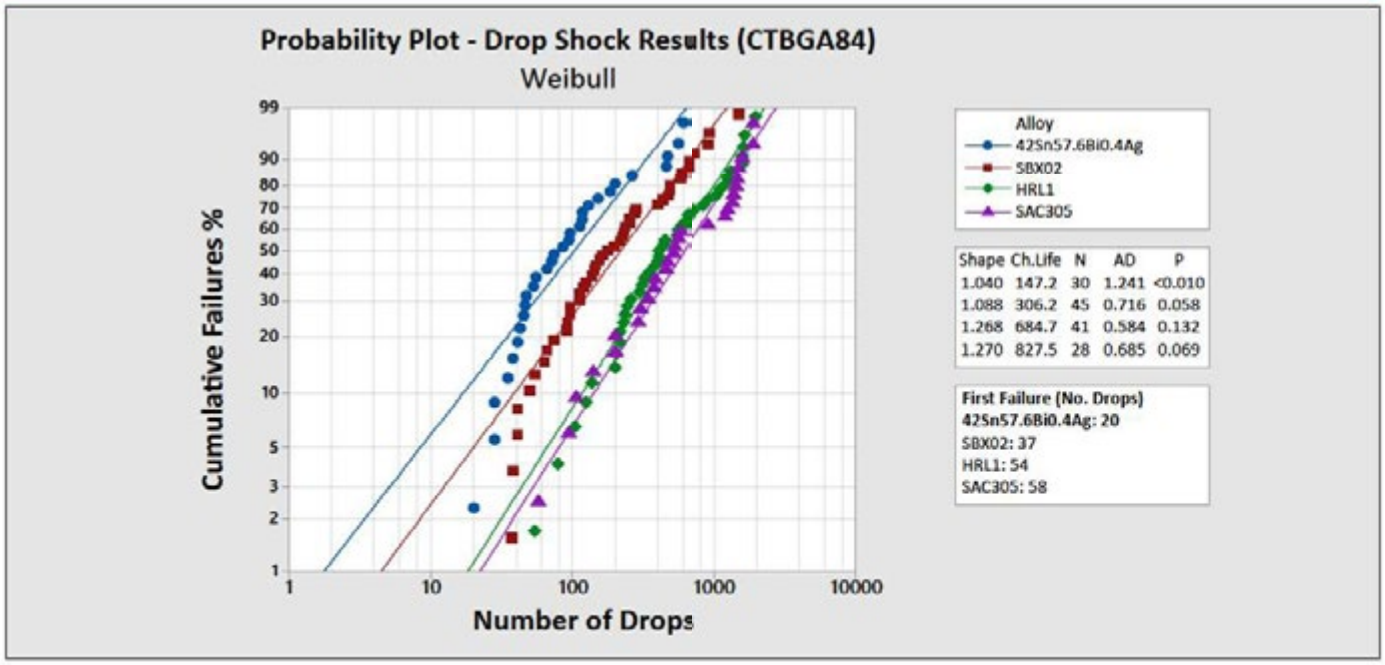
*Zero-halogen is defined as no halogen intentionally added to the formulation.

Kester® NP510-LT HRL1 Solder Paste

Lead-Free, No-Clean, Low Temperature Application Paste



PERFORMANCE SUMMARY

PROCESS	PERFORMANCE ATTRIBUTE	NP510-LT HRL1
Printing	Print Definition	Consistent fine feature print volumes
	Print Durability (Stencil Life)	8-hour stencil life
	Print Temperature Window	Consistent printing performance at the temperature of 20-25 °C (68-77 °F) and the relative humidity of 30-50% RH
	Print Speed Range	Fine pitch release remains consistent from speeds of 4-4.7 in/s (100-120 mm/s)
Reflow	Reflow Process Window	Consistent solderability across all profiles – short, medium or long soak in both air and nitrogen
	Hot/Cold Slump Performance	Meets requirements of IPC J-STD-005B

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Kester® HM531

Water Soluble, Halide-Free Solder Paste

Ideal water soluble paste for any application

Kester HM531 is a halide-free, organic acid, water soluble solder paste that provides the highest level of lot-to-lot, batch-to-batch consistency and performance. HM531 provides hours of stable stencil life, tack time and repeatable print definition. HM531's robust printing characteristics result in consistent solder paste volume regardless of idle time, stencil life and print speed. This high-performance water soluble paste makes HM531 an ideal water soluble solder paste for any application.

Key Features

- Outstanding batch-to-batch consistency
- Excellent anti-slump characteristics minimizing bridging defects
- Capable of 60+ minute idle times in printing
- Capable of print speeds up to 150 mm/s (6 in/s)
- Excellent solderability to difficult lead-free metallization with a leaded paste
- Residues easily removed with hot DI water, even up to 8 hours post reflow
- Minimal foam generation in wash systems
- 8+ hour stencil life
- Classified as ORM0 per J-STD-004
- Produces minimal voiding underneath BGA components
- Compatible with enclosed print head systems

For more information, contact us at Assembly@MacDermidAlpha.com

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NP545 Solder Paste

VERSATILE PASTE FOR PRINT APPLICATION - AVAILABLE IN LEAD AND LEAD-FREE ALLOYS

NP545 IS A ZERO-HALOGEN, LEAD-FREE, NO-CLEAN SOLDER PASTE FEATURING:

- Consistent print performance to 0.5AR
- Wide reflow profile window with good solderability
- Excellent shelf life, 1 year in both refrigerated and room temperature
- Exceptional printing reflow performance across a wide range of print and reflow process conditions
- Room temperature storage stability makes it excellent for a low volume / high mix type of manufacturing
- Low QFN/BGA voiding
- Excellent cosmetics and a clear residue

NP545 IS A ZERO-HALOGEN, LEADED, NO-CLEAN SOLDER PASTE FEATURING:

- Classified as ROL0 under IPC JSTD-004 and ROM0 under IPC JSTD-004B
- Zero-Halogen (none intentionally added)
- Consistent print performance to 0.5AR
- Excellent cosmetics and a clear residue
- Can be used in backward applications
- Fully compatible for soldering complex lead-free components on SnPb assemblies

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▪ Website: www.kester.com ▪

Kester® RF550

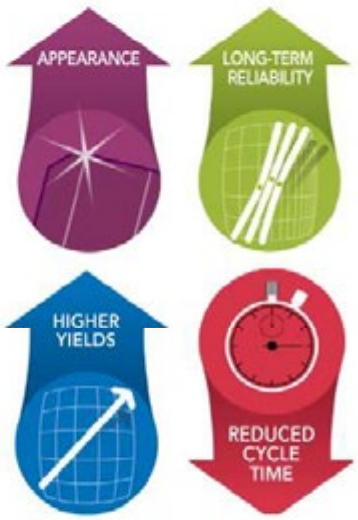
High-Reliability, Zero-Halogen, No-Clean Rework Flux

Rework flux designed for electronic component rework and repair applications

Kester RF550 is a high-reliability, zero-halogen, no-clean rework flux designed specifically for electronic component rework and repair applications. RF550 is the ideal choice for QFP or BGA semi-automated rework applications. It is well suited for use with through-hole repair. RF550 compliments Kester's high reliability line of products which are formulated to leave safe and highly reliable post reflow residues. RF550 can be used in combination with many of Kester's other no-clean flux-cored solder wires, no-clean solder pastes and no-clean liquid fluxes.

Key Features

- Zero-Halogen*
- Classified as ROL0 per J-STD-004B
- Highly reliable post reflow residues
- Cross compatible with multiple Kester products



*Zero-halogen is defined as no halogen intentionally added to the formulation.

For more information, contact us at Assembly@MacDermidAlpha.com

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02

Cored Wire

Kester® 44 Flux-Cored Wire

Activated Rosin Cored Wire for Lead-Free and Leaded Alloys

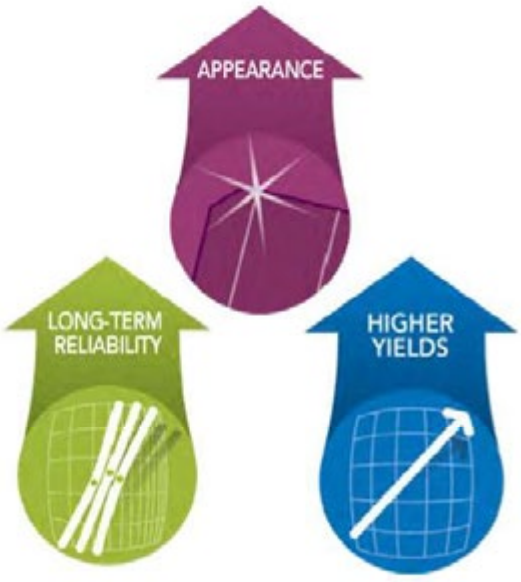
Long-time industry standard activated rosin cored wire for lead-free and leaded solder alloys

Kester 44 is an activated rosin formula for use in flux-cored solder wire. 44 has virtually dominated the field of activated rosin core solders for over five decades. An outstanding performance feature of this flux is the "instant- action" wett ng behavior. The high mobility and fast-spreading action of th s flux results in more reliable production line soldering. Despite the increased activity and soldering performance, 44 passes both 85 °C/85% RH and 40 °C/90% RH SIR test methods.

Kester 44 was developed for more challenging electronics applications with difficult to solder surfaces, such as highly oxidized Cu.

Key Features

- High activity RA formulation
- Passes both 85 °C/85% RH and 40°C/90% RH IPC SIR testing
- Excellent solderability to a wide range of metallizations
- Classified as ROM1 per J-STD-004
- Industry standard RA cored wire



For more information, contact us at
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Kester® 245 Flux-Cored Wire

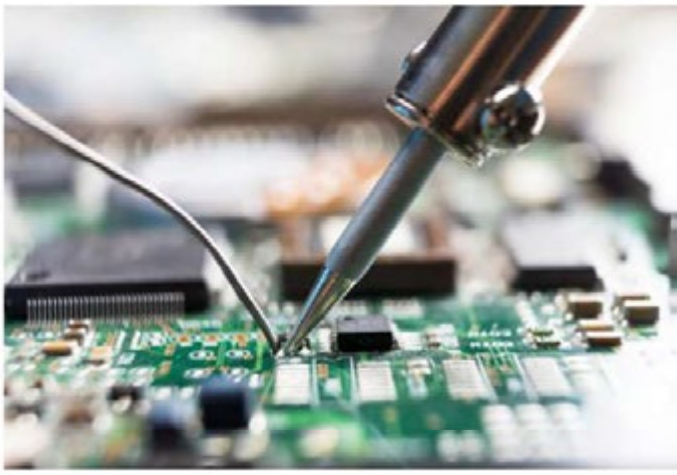
No-Clean Cored Wire for Lead-Free and Leaded Alloys

Complements low residue liquid fluxes being used by the electronics industry

Kester 245 Flux-Cored Wire is designed to complement low residue liquid fluxes being used by the electronics industry. The chemistry is based on some of the same principles that have been safely used for years in mildly activated rosin fluxes. The use of 245 results in visually acceptable assemblies without cleaning, yet soldering quality and efficiency is comparable to that obtained with mildly activated rosin flux. Kester 245 was formerly classified as Type LR per MIL-F-14256.

Key Features

- Highly reliable, low post-soldering residue
- Compatible with leaded and lead-free alloys
- Classified as ROL0 per J-STD-004



For more information, contact us at
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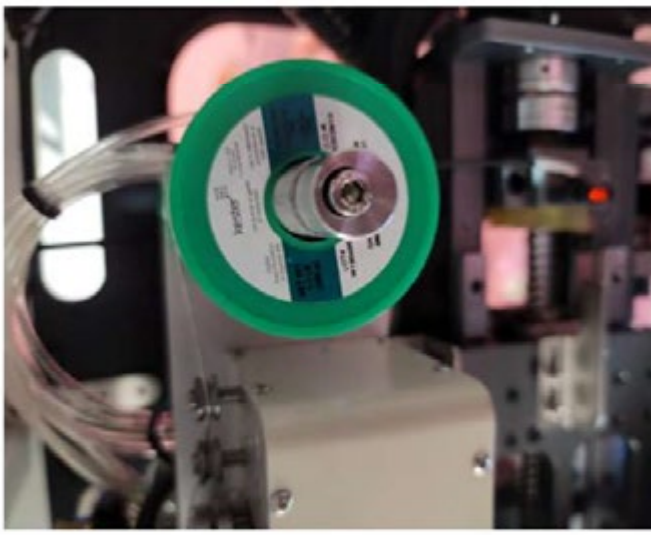
Kester® 268 Flux-Cored Wire

Zero-Halogen, No-Clean Cored Wire for Robotic & Manual Soldering

Flux-Cored Wire Optimized for Robotic Soldering

Kester 268 Flux-Cored Wire is a zero-halogen wire optimized for robotic soldering applications. With its unique chemistry system, 268 provides consistent workability performance for both robotic and manual soldering in the electronics industry, with performance equivalent to conventional halogen/ hal de-based systems.



Key Features

- Low occurrence of solder ball spatter
- Conforms to halogen-free requirement of IEC 61249-2-21, JPCA-ES-01 and IPC-410B specifications with no intentionally added halogens and halides
- Low smoke and odor
- Excellent wetting speed and spread; superior to halogenated materials
- Clear residue, resulting in excellent joint aesthetics after soldering
- Excellent surface wettability and spreading suitable for robotic soldering and manual soldering
- Excellent manufacturing consistency and uniform quality, minimizes defects for all types of soldering
- Classified as ROL0 per J-STD-004B

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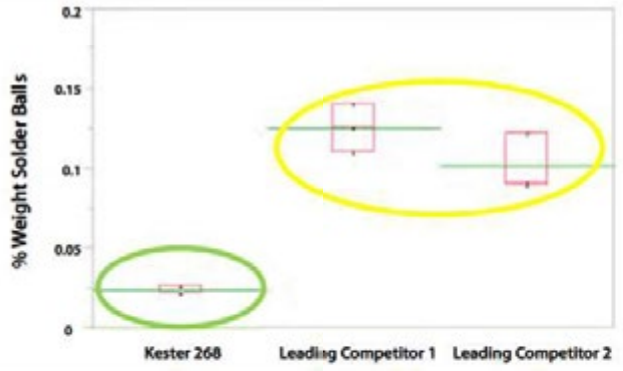
*Zero-halogen is defined as no halogen intentionally added to the formulation.

Kester® 268 Flux-Cored Wire

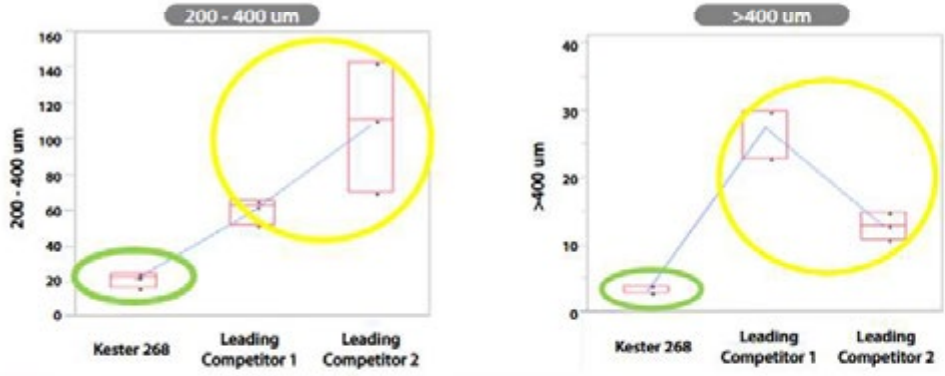
Zero-Halogen, No-Clean Cored Wire for Robotic & Manual Soldering

Comparison of Solder Ball Spatter in Kester 268 vs. Leading Competitors



Kester 268 Zero Halogen exhibits an 80% reduction in solder balls spatter by weight

Comparison of Solder Ball Size Distribution in Kester 268 vs. Leading Competitors



Kester 268 provides an approximate 80% reduction in solderballs of 200 micron (0.2 mm) and greater. These larger particle sizes pose reliability concerns due to ability of shorting fine pitch devices. Each bar represents triplicate testing of 5 m (5000 mm) of wire.

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Kester® 275 Flux-Cored Wire

No-Clean Cored Wire for Lead-Free and Leaded Alloys

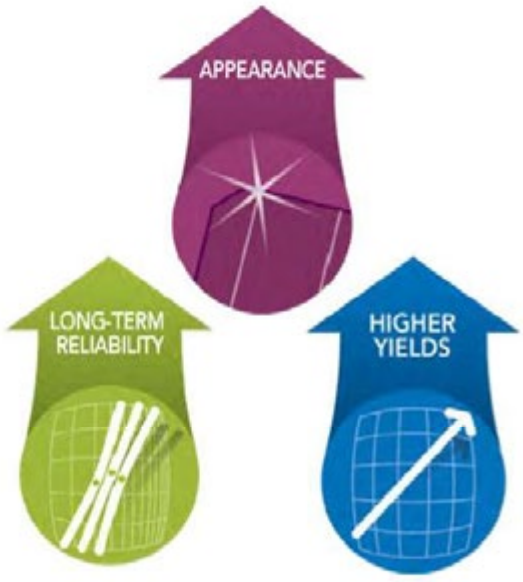
Superior wetting performance for hand soldering applications

Kester 275 Flux-Cored Wire is designed to provide superior wetting performance for hand soldering in the electronics industry. The chemistry is based on some of the same principles that have been safely used for years in mildly activated rosin fluxes. The use of 275 results in an extremely clear post-soldering residue without cleaning.

Kester 275 is optimal for electronics applications that call for the highest levels of reliability, such as in medical or aerospace applications.

Key Features

- Colorless translucent residues
- Low smoke, odor, and spattering
- Compatible with lead-free and leaded alloys
- Classified as ROL0 per J-STD-004
- Compliant to Bellcore GR-78



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Kester® 278 Flux-Cored Wire with Innolot Alloy

Halogen-Free, Halide-Free, No-Clean Cored Wire for High Performance Applications

Halogen-Free, Halide-Free No-Clean Cored Wire for High Performance Applications

Kester 278 Flux-Cored Wire is a high performance, high reliability material incorporating the Innolot alloy designed for challenging applications such as under-the-hood automotive.

This fast wetting, low spattering, halogen/halide-free core wire provides clear post reflow residues. Kester 278 is classified as Type ROL0 flux under J-STD-004B specifications.

Key Features

- Highly reliable performance
- Halogen and Halide-free
- Low spattering, smoke & fume
- Excellent joint cosmetics and wetting performance
- Reflow at temperatures equivalent to SAC305
- Harsh environment applications such as under-the-hood automotive, Advanced Safety Devices (ADAS), high power LED and avionics/aerospace

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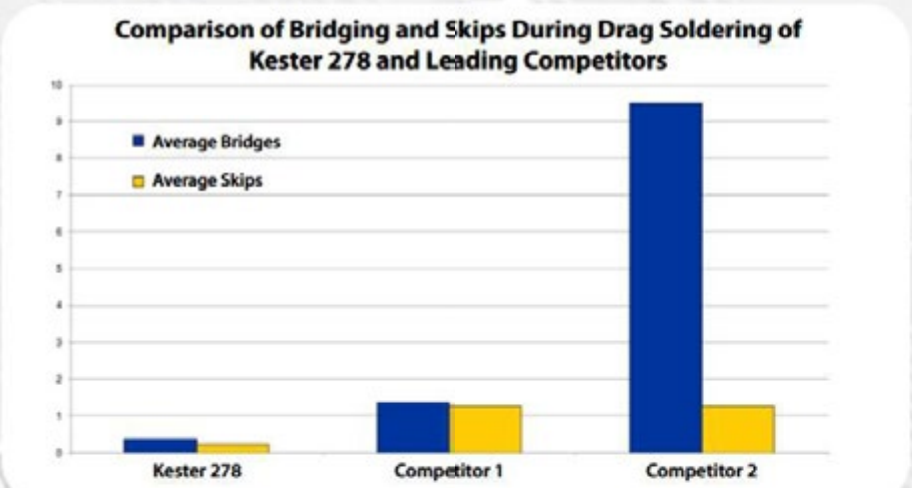
Kester® 278 Flux-Cored Wire with Innolot Alloy

Halogen-Free, Halide-Free, No-Clean Cored Wire for High Performance Applications



ELECTRICAL RELIABILITY OF KESTER 278 FLUX-CORED WIRE

RELIABILITY TEST		REQUIREMENTS	RESULTS
JIS	JIS Z 3197	$\geq 1.0 \times 10^{11}\ \Omega$	Pass
Bellcore	SIR (GR-78-CORE)	$\geq 1.0 \times 10^{11}\ \Omega$	
IPC	SIR (J-STD-004A)	$\geq 1.0 \times 10^{8}\ \Omega$	
	SIR (J-STD-004B)	$\geq 1.0 \times 10^{8}\ \Omega$	
	EM (J-STD-004B)	$SIR_{INITIAL} / SIR_{FINAL} < 10$	

Halogen-free and Halide-free Kester 278 passes all major Surface Insulation Resistance (SIR) tests

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Kester® 331 Flux-Cored Wire

Organic Cored Wire for Lead-Free and Leaded Alloys

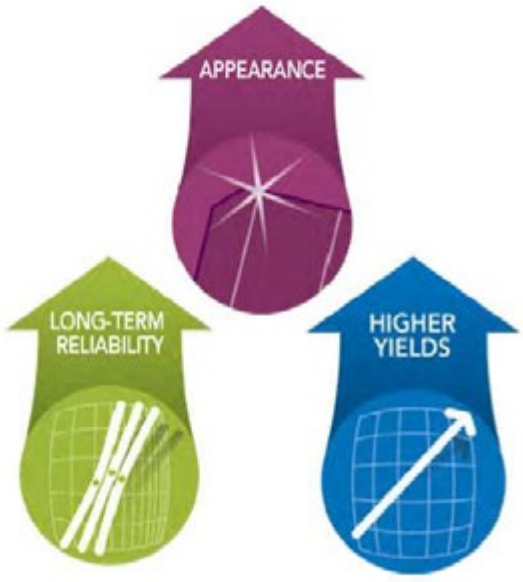
Organic, water soluble cored wire for lead-free and leaded solder alloys

Kester 331 is a water soluble formula for use in flux-cored solder wire. This cored solder version of Kester's popular 2331-ZX soldering flux is more effective than rosin fluxes in soldering difficult metals. The same fast action and mild properties are exhibited with 331 Organic Flux as with the liquid 2331-ZX. 331 is more heat stable than most organic fluxes, resulting in minimal smoke and odor. The residue can be completely removed with a simple heated water rinse. Deionized water is suggested to prevent introduction of chemistries from unknown water sources.

Kester 331 was developed for applications that benefit from easy cleaning with heated DI water and thermal stability required in longer or hotter soldering methods, such as in telecommunications and white goods.

Key Features

- Excellent solderability to a wide variety of metallizations
- Easy removal in hot DI water
- Compatible with leaded and lead-free alloys
- Classified as ORH1 per J-STD-004



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03
Solder Flux

Kester® NF372-TB

Halogen-Free, High Reliability, Alcohol Based, No-Clean Wave Soldering Flux

Wave Soldering Flux for Thick Board Applications in Lead-Free Process

Kester NF372-TB is a low solids alcohol based flux designed for both standard and thicker, high-density PCBs. A leading feature is its ability to withstand long dwell times and higher solder pot temperatures needed in thick board assemblies. NF372-TB delivers sustained activity within the flux for good barrel fill in challenging applications, such as reflowed copper OSP boards or with difficult to solder components. NF372-TB residues are minimal, clear and non-tacky for improved cosmetics, and can be used with both leaded and lead-free PCBs.

Key Features

- Unique activator/rosin package: produces highly reliable assemblies with excellent cosmetics and pin testability
- Thermally stable: excellent soldering in both single and dual wave processes, lead-free alloy capable
- Low surface tension: high through hole penetration rate and uniform SMT pad coverage
- Tack free residue: excellent post-soldering cosmetics with pin testable residue
- Halogen-free: environmentally friendly

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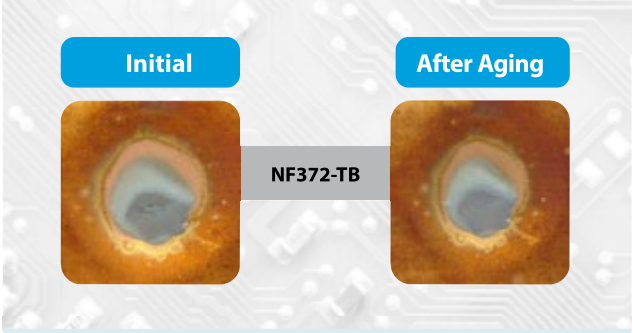
Kester® NF372-TB

Halogen-Free, High Reliability, Alcohol Based, No-Clean Wave Soldering Flux

COPPER CORROSION TEST (IPC-TM-650 2.6.15)



- Initial and after 10 days of exposure to 40 °C and 93% RH
- No evidence of greening or any change is observed
- These fluxes are classified "L" as per IPC J-STD-004B

COPPER MIRROR TEST (IPC-TM-650 2.3.32)

- No copper film was removed from the copper mirror
- "L" category corrosion per J-STD-004B

TECHNICAL DATA	KESTER NF372-TB	PROCESS CONTROL	KESTER NF372-TB
Solids Content, wt/wt	3.9%	Flux Application	Spray
Acid Number (mg KOH/gm)	16.6	Amount of Flux Applied	93-217 µg/cm² of solids
Specific Gravity @ 25 °C	0.793	Top-Side Preheat Temperature	90-140 °C
IPC J-STD-004(B) Designation	ROL0	Bottom-Side Preheat Temperature	0 to +32 °C vs. Topside
Haloge-Free	Yes	Solder Pot	260-270 °C for SnCu or SAC alloy 245-260 °C for Sn63Pb37 alloy
SIR , PC J-STD-004(B)	Passed	Contact Time	3-7 s

MacDermid Alpha ELECTRONICS SOLUTIONS

macdermidalpha.com
October 2021

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For more information, contact us at Assembly@MacDermidAlpha.com

Kester® 952-S & SF800-LR Soldering Flux

Zero Halogen, Low-Solid Liquid Fluxes for Tabbing & Stringing Applications

PV Fluxes that delivers best-in-class reliability and high throughput

Kester 952-S Soldering Flux and Kester SF800-LR Soldering Flux are zero-halogen, non-rosin organic fluxes designed specifically for use in tabber and stringer equipment of photovoltaic assembly (PV) module assembly for soldering tabs to cell contacts. The extremely low solids content (≤ 2%) and nature of the activator system result in cosmetically dry and clean cells as they exit the tabber and stringer machine. This not only maximizes the throughput and yield, but also lowers equipment maintenance time, thereby reducing a manufacturer's total cost of ownership. Both fluxes have a wider operating window varying with temperature range and can be used in SnPb, SnAgPb and Pb-free alloys.

Key Features

- Produce solid interconnects: good conductivity, high peel strength and reliability
- Excellent wetting for high yield and throughput
- Minimal and tack free residues for low equipment maintenance and downtime
- Compatible with different encapsulants
- Wide process window across different cells, equipment and process parameters
- Applicable for dipping or spraying method

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*Zero-halogen is defined as no halogen intentionally added to the formulation.

Kester® 952-S & SF800-LR Soldering Flux

Zero Halogen, Low-Solid Liquid Fluxes for Tabbing & Stringing Applications

AUTOMATED SOLDERING SYSTEMS

TECHNICAL DATA	Kester 952-S	Kester SF800-LR
Solid Content	2.0%	1.5%
Acid Number (mg KOH/gm)	15.0	13.4
Specific Gravity	0.803	0.799
Flux Type, IPC J-STD-004(A)	ORL0	ORL0
Halide & Halogen Content	None	None
SIR, IPC J-STD-004 (A)	Passed	Passed

APPLICATION PROCESS

PROCESS CONTROL	Kester 952-S	Kester SF800-LR
Flux Application	Spray, Dip*	Spray*, Dip
Preheating Temperature	100-160 ° C	
Soldering Method	Contact Soldering, IR, Convection	
Soldering Temperature (SnPb)	200-280 ° C	

**Preferred Method*

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Kester® 979VT

VOC-Free, No-Clean, Wave Soldering Flux

VOC-Free Wave Soldering Flux for Environmentally Friendly Applications

Kester 979VT Soldering Flux is a VOC-free, halide-free, rosin/resin free, no-clean wave soldering flux. Several proprietary additives are formulated into the chemistry which act to reduce the surface tension between the solder mask and the solder. This formulation dramatically reduces the tendency of solderball generation and results in a very clear appearance with exceptional joint and board cosmetics. 979VT is a low residue flux, providing excellent pin testability and minimizing equipment maintenance.

Key Features

- VOC-free for better environmental control
- Thermally stable activators provide low solder bridging
- No surface insulation degradation
- No offensive odor
- Chemically compatible with most solder masks & board laminates
- Low solids content prevents clogging or buildup around flux spray nozzles

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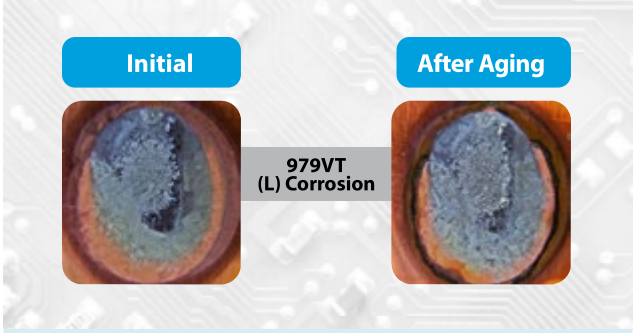
Kester® 979VT

VOC-Free, No-Clean, Wave Soldering Flux

COPPER CORROSION TEST (IPC-TM-650 2.6.15)



- Initial and after 10 days of exposure to 40 °C and 93% RH
- Minor corrosion was observed on the test panels without pitting of the copper, classified under "L" category as per J-STD-004 or "M" category as per J-STD-004B.

COPPER MIRROR TEST (IPC-TM-650 2.3.32)

- There is no removal of the copper film, classified as "L" per J-STD-004B

TECHNICAL DATA	KESTER 979VT	PROCESS CONTROL	KESTER 979VT
Solids Content, wt/wt	5.0%	Flux Application	Spray/Dip
Acid Number (mg KOH/gm)	43.0	Amount of Flux Applied	120-240 µg/cm^2 of solids
Specific Gravity @ 25 °C	1.014	Top-Side Preheat Temperature	110-155 °C
IPC J-STD-004 Designation	ORL0 (per J-STD 004) ORM0 (per J-STD 004B)	Bottom-Side Preheat Temperature	0 to +32 °C vs. Topside
Halogen-Free	No	Solder Pot	260-270 °C for SnCu or SAC alloy 245-260 °C for Sn63Pb37 alloy
SIR , IPC J-STD-004	Passed	Contact Time	3 – 8 s

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Kester® 985M

Low-Solids, Alcohol Based, No-Clean Wave Soldering Flux

Best Broad Spectrum Wave Soldering Flux

Kester 985M is broad spectrum, halide free liquid flux, developed for use in both traditional tin-lead and lead-free solder alloys. The unique activation package of 985M makes it a wide process window flux suitable on both standard and high density assemblies. It exhibits excellent wetting properties to minimize solder bridges and solder ballings during all soldering operations. The residues are minimal and not apparent, excellent for pin testing.

Key Features

- Produces highly reliable assemblies meeting the toughest SIR/ECM requirements
- Exhibits excellent soldering with improved performance in bridging and hole-fill
- Leaves uniform, tack free and pin testable residues
- Broad spectrum liquid flux for standard and high density boards

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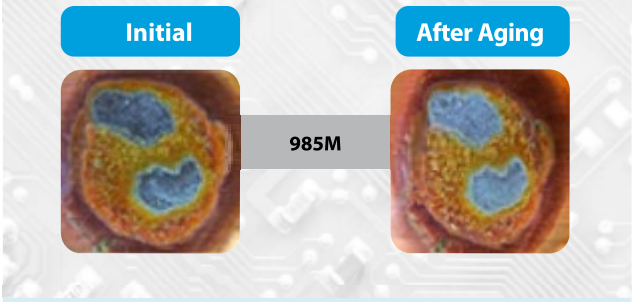
Kester® 985M

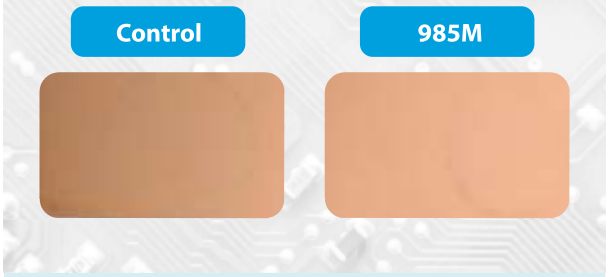
Low-Solids, Alcohol Based, No-Clean Wave Soldering Flux

COPPER CORROSION TEST (IPC-TM-650 2.6.15)



- Initial and after 10 days of exposure to 40 °C and 93% RH
- There was minor discoloration without pitting of the copper for 985M, classified under "M" category of corrosion as per J-STD-004B

COPPER MIRROR TEST (IPC-TM-650 2.3.32)



- No copper film was removed from the copper mirror
- "L" category corrosion per J-STD-004B

TECHNICAL DATA	KESTER 985M	PROCESS CONTROL	KESTER 985M
Solids Content, wt/wt	3.6%	Flux Application	Spray
Acid Number (mg KOH/gm)	20.0	Amount of Flux Applied	600-1200 µg/in² solids
Specific Gravity @ 25 °C	0.805	Top-Side Preheat Temperature	80-115 °C
IPC J-STD-004(B) Designation	ORM0	Bottom-Side Preheat Temperature	0 to +32 °C vs. Topside
Halogen-Free	None	Solder Pot	260-270 °C for SnCu or SAC alloy 245-260 °C for Sn63Pb37 alloy
SIR , PC J-STD-004(B)	Passed	Contact Time	2-5 s

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Kester® SELECT-10™

High Reliability, Zero-Halogen, No-Clean Selective Soldering Flux

Designed specifically for the needs of the selective soldering process

Kester SELECT-10 is a zero-halogen, no-clean, liquid flux designed specifically for the needs of the selective soldering process. Sustained activity within the flux allows for good barrel fill in challenging applications, such as reflowed copper OSP boards or with difficult to solder components. Specific to selective soldering, SELECT-10 does not spread beyond the spray pattern and will not clog the fluxer head. SELECT-10 residues are non-tacky for improved cosmetics.

Key Features

- Designed for selective soldering
- Zero-halogen*
- Controlled flux spread within localized flux spray pattern
- Non-corrosive, non-conductive and non-tacky residues
- Offers good hole-fill with preheat temperatures >135 °C
- High reliability meeting the toughest ECM/SIR IPC J-STD-004B requirements
- ROL0 per IPC J-STD-004B
- Also available as a flux-pen

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*Zero-halogen is defined as no halogen intentionally added to the formulation.

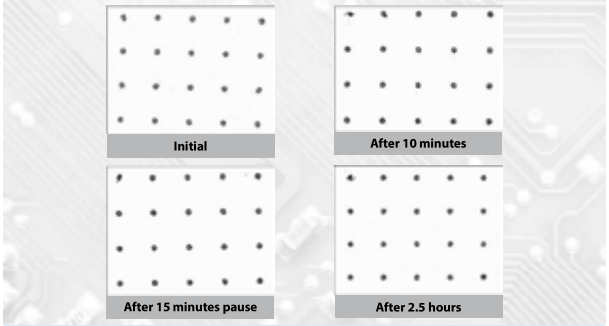
Kester® SELECT-10™

High Reliability, Zero-Halogen, No-Clean Selective Soldering Flux

Flux Spread

Controlled flux spray pattern for board cleanliness by SELECT-10

Clogging Test Results



Excellent control and no clogging in spraying

TECHNICAL DATA	KESTER SELECT-10™	PROCESS CONTROL	KESTER SELECT-10™
Solids Content, wt/wt	10%	Flux Application	Spray
Acid Number (mg KOH/gm)	40	Amount of Flux Applied	186-465 µg/cm² of solids
Specific Gravity @ 25 °C	0.835	Top-Side Preheat Temperature	90-140 °C
IPC J-STD-004(B) Designation	ROL0	Bottom-Side Preheat Temperature	0 to +32 °C vs. Topside
Zero-Halogen	Yes	Solder Pot	280-320 °C for SnCu or SAC alloy 260-300°C for Sn63Pb37 alloy
SIR , IPC J-STD-004(B)	Passed	Contact Time	2.5-6 s

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August 2021

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04
Solder Alloy

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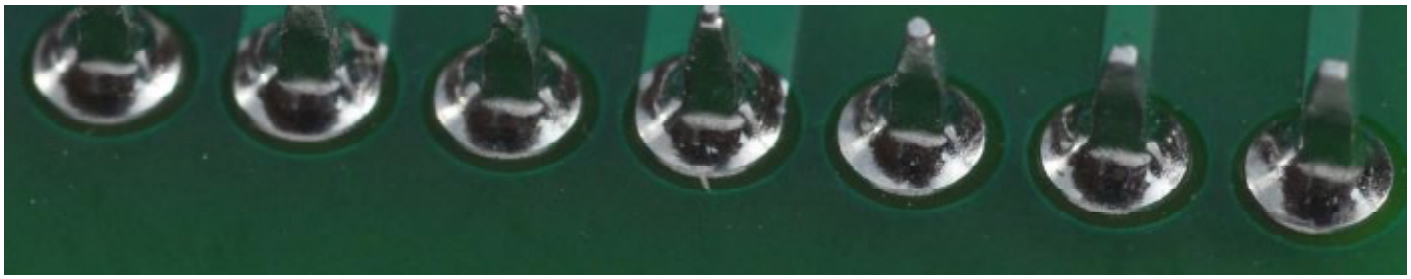
K100LD

THE LOW-COST ALLOY WITH SUPERIOR HOLE-FILL



K100LD: THE HIGH PERFORMANCE AND SILVER-FREE ALLOY

- Lowest Dissolution of Copper
  - Prevents copper erosion and yields consistent soldering results
- Low Defects
  - Designed to give excellent wetting to through-hole and bottom-side SMT components
  - Dopants in K100LD promote fluidity and proper surface tension to yield good hole-fill without bridges
- Low Dross
  - Dross-reducing technology results in 20% lower dross formation
- Low Dollars
  - Lower cost than SAC305
- Low Dullness
  - Produces shiny, smooth solder joints

Alloy Properties Comparing K100LD with SAC305

		K100LD	SAC305
Composition	Tin %	~99.3	96.5
	Silver %	0	3.0
	Copper %	0.7	0.5
	Contains Nickel	Yes	No
	Contains Bismuth	Yes	No
Physical Properties	Melt Point	~227°C	217-220°C
	Pasty Range	0	3°C
	Appearance	Shiny	Dull
	Shrink Holes	No	Yes
Solder Pot	Copper Dissolution (Sn63=1)	0.8	2.1
	Pot Management	Easiest	Difficult
	Reactivity to Equipment	Low	High
	Suggested Pot Temperature	255-270°C	250-260°C
	Approximate Relative Cost (Sn63=1)	1.5	3.0

K100LD Offerings:

Preforms
Cored Wire
Solid Wire
Bar

Global Headquarters: 800 West Thorndale Avenue, Itasca, IL USA 60143 ▪ Phone: +1 800.2.KESTER ▪ Fax: +1 630.616.4044
Asia-Pacific Headquarters: 61 Ubi Avenue 1 #06-01 UB Point, Singapore 408941 ▪ Phone: +65 6.449.1133 ▪ Fax: +65 6.242.9036
European Headquarters: Ganghofer Strasse 45, 82216 Gernlinden, Germany ▪ Phone: +49 (0) 8142 4785 0 ▪ Fax: +49 (0) 8142 4785 61
Asia Manufacturing: Hengqiao Road, Wujiang Economic Development Zone ▪ Suzhou, Jiangsu Province, China 215200 ▪ Phone: +86 512.82060807 ▪ Fax: +86 512.8206 0808
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05
Rework

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NF372-TB FLUX-PEN®

THE ZERO-HALOGEN, NO-CLEAN FLUX-PEN FOR HIGH RELIABILITY APPLICATIONS

NF372-TB FLUX-PEN® IS A ZERO-HALOGEN, NO-CLEAN FLUX-PEN® FOR REWORK OF HIGH-RELIABILITY APPLICATIONS, FEATURING:

- Zero-halogen (none intentionally added)
- Provides good solderability under air atmosphere
- Pass SIR in raw state (unheated boards dried at 25°C/50%RH for 24 hours before test)
- Non-corrosive, non-conductive and non-tacky residues

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RF550 REWORK FLUX

THE HIGH-RELIABILITY, ZERO-HALOGEN, NO-CLEAN REWORK FLUX

RF550 IS A REWORK FLUX DESIGNED FOR ELECTRONIC COMPONENT REWORK AND REPAIR APPLICATIONS, FEATURING:

- Zero-halogen (none intentionally added)
- Compatible with most no-clean chemistries
- Classified as ROL0 per J-STD-004B
- Formulated to compliment Kester's high-reliability, no-clean product line: NP505-HR Solder Paste, NF372-TB Soldering Flux, SELECT-10 Selective Soldering Flux and 296 Flux-Cored Wire

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TSF-6592HF

TSF-6592HF IS A NO-CLEAN TACKY SOLDERING FLUX DESIGNED AS A LEAD-FREE SOLUTION FOR AN ARRAY OF LEAD-FREE INTERCONNECT APPLICATIONS FEATURING:

- Compatible with lead-free alloys such as SnAg, SnCu, SnAgCu, SnAgBi
- Reflowable with peak temperatures up to 270°C
- Reflowable in air and nitrogen
- Low voiding
- Bright shiny soldered joints with clear residues
- Aggressive flux on various substrates such as OSP-Cu, immersion finishes and ENIG
- Clear non-tacky residues
- Classified as ROL0 per J-STD-004A
- High tack to minimize skewing of components
- Stencil life of 8+ hours (process dependent)
- Compliant to Bellcore GR-78

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06

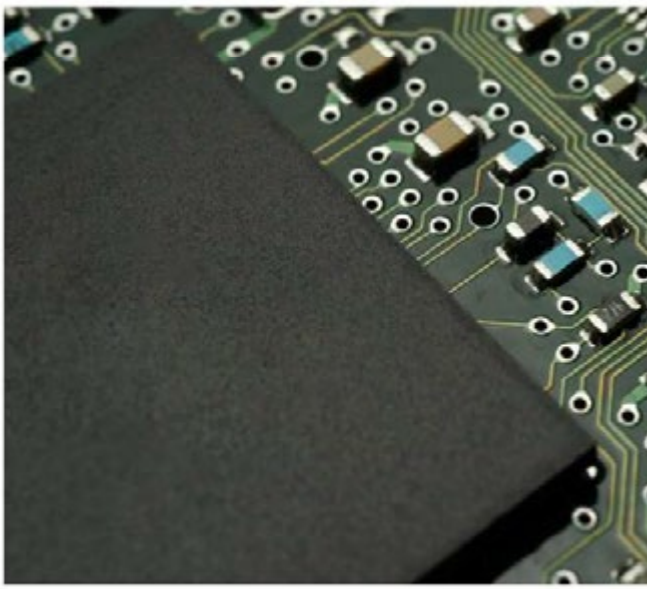
Adhesives

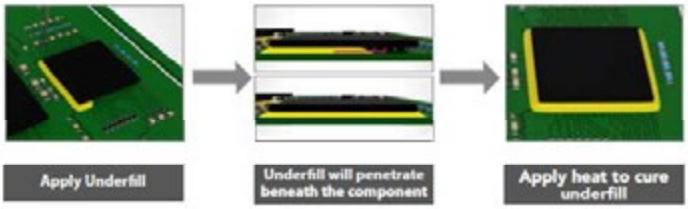
ALPHA® HiTech Underfills

One Component, Heat Curable Materials

Protect Solder Joints in BGA, CSP or Flip Chip

ALPHA HiTech Underfills are epoxy based materials to be dispensed on the edges of the BGA, CSP or Flip Chip devices. The material then flows beneath the component through capillary action. Upon completion of the curing process, the cured underfill helps strengthen the soldered assembled component allowing it to pass reliability tests such as Drop Shock, Impact Bend and Thermal Cycle (TCT). ALPHA HiTech range of Underfills are developed to match different requirements sought by various customers from the different market segments.





KEY FEATURES

- An excellent lower cost option to conventional underfilling process since higher material volume for capillary flow is not required
- Offers an effective process option to conventional underfilling process
- Has excellent adhesion to FR4
- Halogen Free

alpha

ASSEMBLY SOLUTIONS

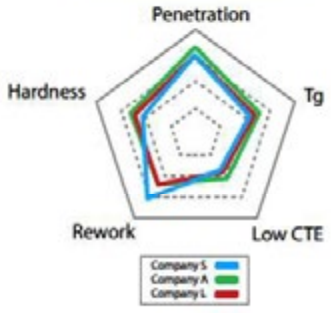
ALPHA® HiTech Underfills

One Component, Heat Curable Materials

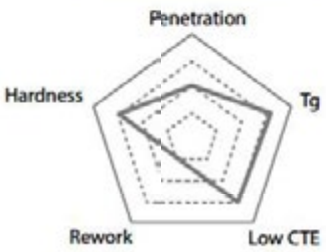
ALPHA HiTech		CU32-380	CU31-2030	CU13-3150	CU31-3100	CU11-3127	CU21-3240
Typical Uncured Material Properties							
Chemical Type		Epoxy	Epoxy	Epoxy	Epoxy	Epoxy	Epoxy
Halogen Status		Halogen Free	Halogen Free	Halogen Free	Halogen Free	Halogen Free	Halogen Free
Color		Black	Black	Black	Black	Black	Black
Viscosity	Spindle/rpm	#4/20	#3/20	#3/20	#5/20	#4/20	#5/20
RVDV-II Brookfield	kcps/25°C	0.3 - 0.8	–	1.0 - 3.0	3.0 - 8.0	1.0 - 4.0	–
RVT Brookfield	kcps/25°C	–	0.2 - 1.0	–	–	–	8.0 - 16.0
Filler Content, SiO2		–	10%	–	≥ 30%	56%	50%
Specific Gravity		1.1 - 1.2	1.1 -1.3	1.1 - 1.2	1.35 - 1.45	1.55 - 1.65	1.5 - 1.6
6 months Storage Temperature, °C		-20	-20	-20	-20	-20	-20
Pot Life, days		3	3	3	3	1	3
Cure Condition, °C/min		130/8	120/20; 130/10; 150/7.5	30/30; 100/10; 110/7; 120/5	150/7	140/20; 150/15; 165/5	140/30; 150/10; 165/5
Typical Cured Materials Properties							
Tg (°C)		89	168	47	120	177	165
CTE, TMA (ppm)	α1	57	56	50	49	29	31
	α2	199	176	200	144	107	105
Shore D Hardness (25°C)		80 - 90	80 - 90	50 - 60	80 - 90	85-95	85 - 95
Reworkable		No	Yes	Yes	No	No	No
Thermal Cycling Test, -40°C - 125°C, 30 min, SAC305		–	Pass 3000 cycles	–	Pass 3000 cycles	Pass 2000 cycles	Pass 5000 cycles
Component		BGA	BGA, CSP	BGA (Low Temperature)	BGA, CSP & Flip Chip	CSP & Flip Chip	BGA, CSP & Flip Chip

End Market

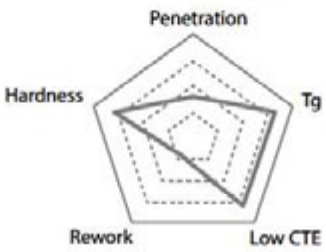
Smartphone



Automotive



CSP/Flip Chip



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December 2020

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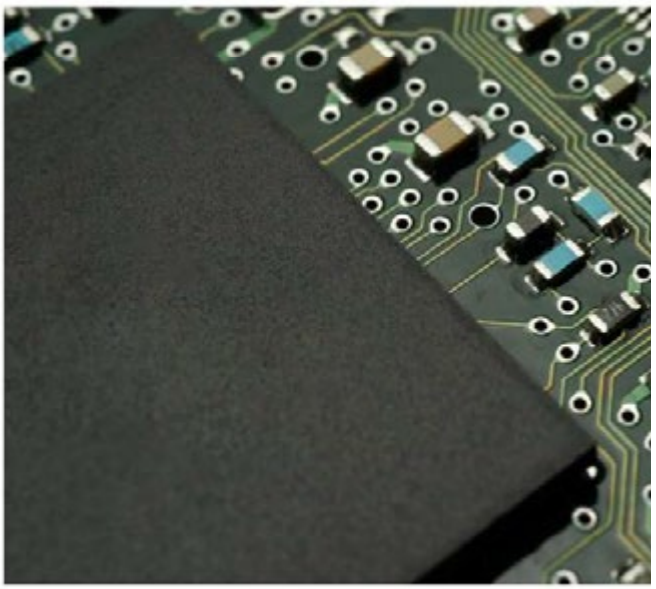
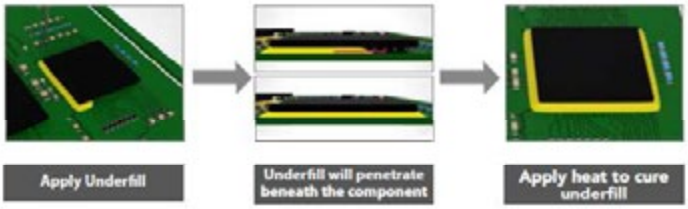
ALPHA® HiTech Underfills

One Component, Heat Curable Materials

Protect Solder Joints in BGA, CSP or Flip Chip

ALPHA HiTech Underfills are epoxy based materials to be dispensed on the edges of the BGA, CSP or Flip Chip devices. The material then flows beneath the component through capillary action. Upon completion of the curing process, the cured underfill helps strengthen the soldered assembled component allowing it to pass reliability tests such as Drop Shock, Impact Bend and Thermal Cycle (TCT). ALPHA HiTech range of Underfills are developed to match different requirements sought by various customers from the different market segments.





KEY FEATURES

- One Component
- Excellent Adhesion to FR4
- Fast Curing Performance
- Excellent Drop Shock
- Excellent Impact Bend
- Availability of Low Temperature UF
- Reworkable Underfill Available
- Execlent TCT Reliability Performance
- Halogen Free

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ASSEMBLY SOLUTIONS

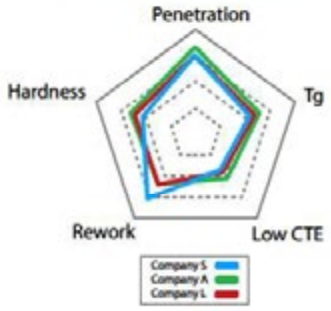
ALPHA® HiTech Underfills

One Component, Heat Curable Materials

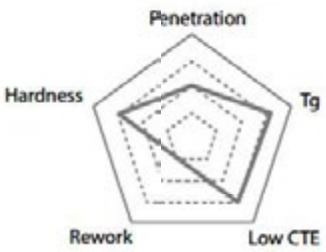
ALPHA HiTech		CU32-380	CU31-2030	CU13-3150	CU31-3100	CU11-3127	CU21-3240
Typical Uncured Material Properties							
Chemical Type		Epoxy	Epoxy	Epoxy	Epoxy	Epoxy	Epoxy
Halogen Status		Halogen Free	Halogen Free	Halogen Free	Halogen Free	Halogen Free	Halogen Free
Color		Black	Black	Black	Black	Black	Black
Viscosity	Spindle/rpm	#4/20	#3/20	#3/20	#5/20	#4/20	#5/20
RVDV-II Brookfield	kcps/25°C	0.3 - 0.8	–	1.0 - 3.0	3.0 - 8.0	1.0 - 4.0	–
RVT Brookfield	kcps/25°C	–	0.2 - 1.0	–	–	–	8.0 - 16.0
Filler Content, SiO2		–	10%	–	≥ 30%	56%	50%
Specific Gravity		1.1 - 1.2	1.1 -1.3	1.1 - 1.2	1.35 - 1.45	1.55 - 1.65	1.5 - 1.6
6 months Storage Temperature, °C		-20	-20	-20	-20	-20	-20
Pot Life, days		3	3	3	3	1	3
Cure Condition, °C/min		130/8	120/20; 130/10; 150/7.5	30/30; 100/10; 110/7; 120/5	150/7	140/20; 150/15; 165/5	140/30; 150/10; 165/5
Typical Cured Materials Properties							
Tg (°C)		89	168	47	120	177	165
CTE, TMA (ppm)	α1	57	56	50	49	29	31
	α2	199	176	200	144	107	105
Shore D Hardness (25°C)		80 - 90	80 - 90	50 - 60	80 - 90	85-95	85 - 95
Reworkable		No	Yes	Yes	No	No	No
Thermal Cycling Test, -40°C - 125°C, 30 min, SAC305		–	Pass 3000 cycles	–	Pass 3000 cycles	Pass 2000 cycles	Pass 5000 cycles
Component		BGA	BGA, CSP	BGA (Low Temperature)	BGA, CSP & Flip Chip	BGA, CSP & Flip Chip	BGA, CSP & Flip Chip

End Market

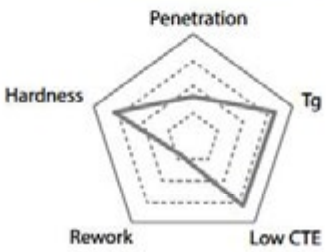
Smartphone



Automotive



CSP/Flip Chip



MacDermid Alpha ELECTRONICS SOLUTIONS

macdermidalpha.com
December 2020

Alpha is a product brand of MacDermid Alpha Electronics Solutions.

For more information, contact us at Assembly@MacDermidAlpha.com

ALPHA HiTech Bonding Materials

Adhesive

Adhesive

Designed for a Wide Range of Applications

ALPHA HiTech SMD Adhesive
is a fast heat curable surface mount adhesive, formulated for use on high-speed dispensers and screen printing applications. These products are designed for holding surface mount components during the wave soldering process.

ALPHA HiTech Low Temperature Adhesive
is designed for bonding temperature sensitive devices to a variety of plastic and metal surfaces, where the materials cannot withstand high curing temperatures. The camera module market is one example of where these adhesives are very applicable.

ALPHA HiTech UV Adhesive
is formulated to be cured at ambient temperature under ultraviolet light. These products can be used in various applications such as coating and fixing of components which require high tensile strength and moisture resistance.

Product Type	Application	Product	CTE, TMA (ppm)	Tg (°C)
SMD Adhesive	Wave soldering	**ALPHA HiTech SM42-1311** • Specially designed for dispensing • Excellent thermal resistant adhesion to FR4, flexible polyimide and chip components	α1: 60 α2: 190	≥90
		ALPHA HiTech SM42-120P • Specially designed for printing • Excellent thermal resistant adhesion to FR4, flexible polyimide and chip components	α1: 65 α2: 190	110
Low Temperature Cure Adhesive	Bonding temperature sensitive parts	**ALPHA HiTech AD13-9620B** • Excellent adhesion & drop shock on Heat Sensitive Substrates, as low as 80 to 85°C curing temperature • Provides good adhesion on LCP and Nylon • Low RBO (Resin Bleed out) performance	α1: 60 α2: 180	40
		ALPHA HiTech AD43-9600W • Low curing temperature at 80 °C for 2 minutes (reflow) • Excellent high temperature adhesion to PMMA and very good on LCP and Nylon	α1: 65 α2: 190	55
UV Cure Adhesive	Bonding temperature sensitive parts	**ALPHA HiTech UP44-5566T** • Curing in seconds under UV at room temperature • Excellent for high throughput manufacturing • Very good adhesion on PC and PMMA	α1: 80 α2: 220	65

ALPHA HiTech Bonding Materials

Underfill and Edgebond

Underfill

Protect Solder Joints in BGA, CSP or Flip Chip

ALPHA HiTech Underfill
is an epoxy based material to be dispensed on the edges of the BGA, CSP or Flip Chip devices. The material then flows beneath the component through capillary action. Upon completion of the curing process, the cured underfill helps strengthen the soldered assembled component, allowing it to pass reliability tests such as Drop Shock, Impact Bend and Thermal Cycle (TCT). ALPHA HiTech has developed Underfill to accommodate variations in customer requirements throughout the industry.

Application	Product	CTE, TMA (ppm)	Tg (°C)	Reworkable
Fast flowing penetration and thermally reliable	**ALPHA HiTech CU31-2030** • Low viscosity, fast flow at room temperature • Pass 3,000 cycles -40 +125 °C, 30 minutes TCT with SAC305 alloy	α1: 56 α2: 176	168	Yes
High thermal reliability automotive	**ALPHA HiTech CU21-3240** • Fast flowing on 70 - 100 °C substrate temperature • Pass 5,000 cycles -40 +125 °C, 30 minutes TCT with SAC305 alloy	α1: 31 α2: 105	165	No
Underfilling temperature sensitive parts	**ALPHA HiTech CU13-3150** • Low viscosity, fast flow at room temperature • Low curing temperature at 80 °C for 30 minutes	α1: 50 α2: 200	47	Yes
Very high Tg, low CTE for high reliability requirements not requiring rework	**ALPHA HiTech CU11-3127** • High glass transition temperature (Tg) • Low coefficient of thermal expansion (CTE)	α1: 29 α2: 107	177	No

Edgebond

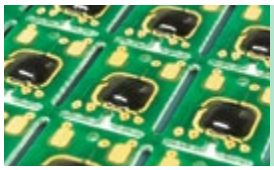
Dispense and Cure on Edges or Corners of BGAs

ALPHA HiTech Edgebond is a one component, heat curable material for edge or corner bonding applications. Upon deposition, it will not flow beneath the BGA. The cured edgebond will help to strengthen the soldered assembled component so it can pass reliability tests such as Drop Shock, Impact Bend and Thermal Cycle (TCT).

Application	Product	CTE, TMA (ppm)	Tg (°C)	Reworkable
Edge Bonding and Corner Bonding	**ALPHA HiTech CF31-4010** • No Flow characteristics • Pass 2,700 cycles -40 +125 °C, 30 minutes TCT with SAC305 alloy • Pass 3,000 cycles -40 +150 °C, 30 minutes TCT with Innolot alloy	α1: 25 α2: 70	170	Yes
	ALPHA HiTech CF12-4485B • 1 to 10°C storage condition • 7 days pot life at 25°C • Pass 1,500 cycles -40 +125 °C, 30 minutes TCT with SAC305 alloy	α1: 56 α2: 191	105	No

ALPHA HiTech Bonding Materials

Encapsulant

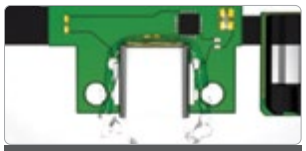


Encapsulant

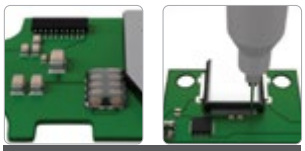
One Component, Intermediate Temperature,
Fast Heat Curable Materials

Encapsulate Assembled Chips and IC Devices

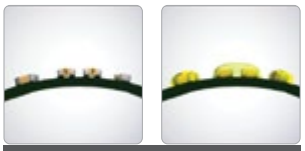
ALPHA HiTech Encapsulant is a one component, intermediate temperature, fast heat curable material which is designed to mechanically protect assembled chips and encapsulated IC devices from dropping off or cracking. These encapsulants are formulated for applications in portable devices requiring extra reliability protection. The smartphone market is one example of where these encapsulants are very applicable.



Prevent Migration & Waterproof



Glob-Top & Coating



Prevent Chip Crack

Product Type	Application	Product	CTE, TMA (ppm)	Tg (°C)	Reworkable
Encapsulant	Protect small components from cracking	**ALPHA HiTech 4210 -Series** • Excellent adhesion property on FR4, flexible polyimide and chip components • Excellent water proofing protection, preventing migration formation	α1: 65 α2: 210	50	No

* All ALPHA HiTech products are halogen-free and are available in a wide variety of packaging options.

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macdermidalpha.com
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For more information, contact us at www.kester.com

Kester is a product brand of MacDermid Alpha Electronics Solutions.

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