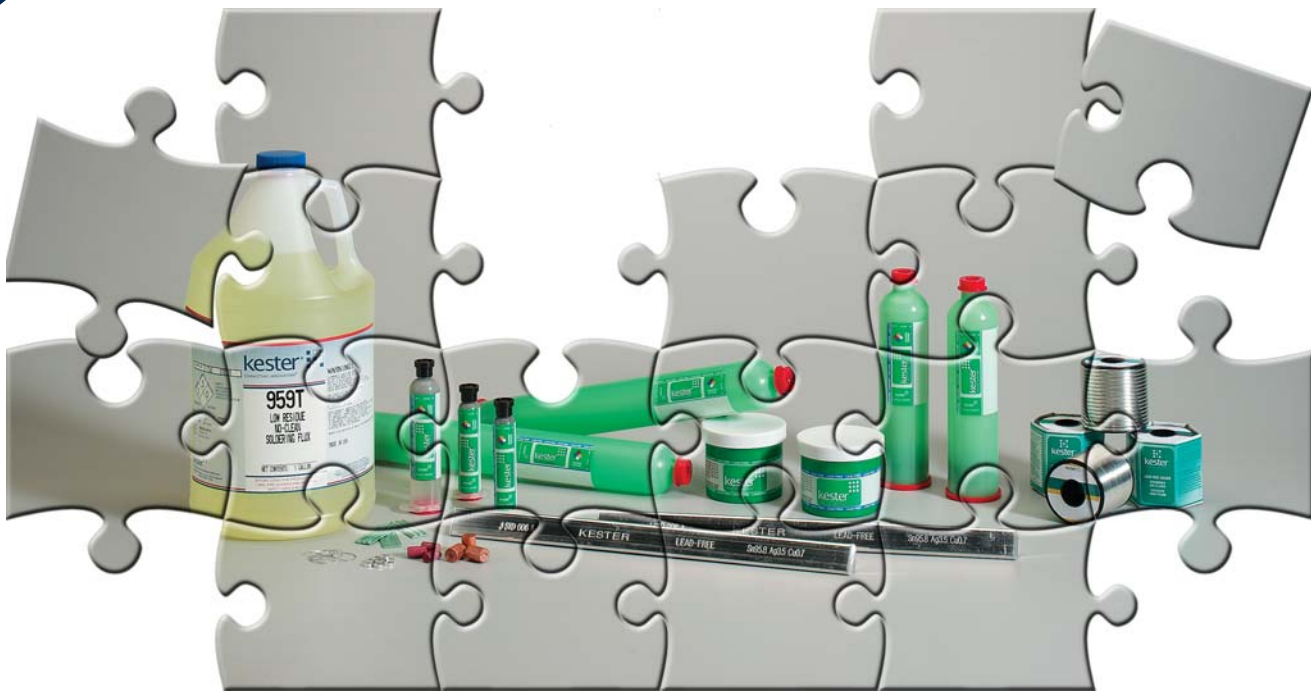


LEAD-FREE Solutions™



Enabling Technologies for Lead-Free Electronics Soldering

With over a hundred years of experience in soldering technology, Kester understands the challenges associated with the transition from leaded to lead-free soldering. Kester's Lead-Free Solutions™ provides assemblers access to the most complete line of lead-free products and chemistries backed by our unsurpassed experience in soldering technology.

Kester Lead-Free Solutions™ comprises of lead-free solder pastes for both no-clean and water soluble assembly; wave solder fluxes, both alcohol and VOC-free, formulated for lead-free soldering; and rework and hand assembly compatible lead-free solders. Lead-Free Solutions™ also includes solder bar, solder preforms, tacky soldering fluxes, solder spheres, and bumping pastes all designed to enable lead-free assembly.

Kester recognizes the many changes required to effectively implement lead-free assembly reliably and without reduction in production output. Lead-Free Solutions™ also includes

Kester's know-how to assist customers wishing to go lead-free. Training courses are offered to train personnel in lead-free SMT, wave soldering and rework. These courses bring practical knowledge and experience to the user, enabling the fulfillment of a company's training requirements and the rapid implementation of reliable lead-free assembly.

Kester RoHS Ready Logo

Kester further continues its promise to a smooth lead-free transition by establishing a RoHS Ready logo. When this logo is included on Kester product data sheets, you can be assured that the product meets the requirements of the RoHS (Restriction of Hazardous Substances) Directive, 2002/95/EC Article 4 for the stated banned substances.



Kester LEAD-FREE Solutions™ - Products, Experience, and Know-How

Solder Pastes

The key variables in lead-free SMT are the higher reflow temperatures, flux activity, residue characteristics, cleanability, and pin testability. The slower wetting speeds associated with lead-free alloys require enhanced flux systems. Kester solder pastes have innovative flux systems that are

specifically designed for lead-free assembly. These new flux systems promote good wetting and excellent solder joint integrity at the higher temperatures commonly seen with most lead-free alloys such as Sn-Ag-Cu (tin-silver-copper).

Formula	EnviroMark™ 918	EnviroMark™ 907	R276 No-Clean
Application	No-Clean Stencil Printing	Water-Soluble Stencil Printing	Syringe Dispensing
Product Characteristics	Kester EM918 is the latest development in Lead-Free No-Clean solder paste. The EM918 guarantees a smooth printing process. The solder joints are bright and uniform, very much comparable to SnPb soldering. EM918 shows excellent reflow properties both in air and nitrogen atmosphere.	Designed to exceed customers' expectations for high yield lead-free manufacturing. EM907 is engineered for the high thermal demands of assembling with lead-free alloys such as the family of SnAgCu (SAC). Joints are as cosmetically bright as SnPb joints. Prints down to 0201 padsites. Designed to be reflowable in air as well as nitrogen.	Provides optimal performance in all types of dispensing applications. R276 is packaged void-free to ensure consistent dispensing in high speed automated processes. Exhibits excellent dispensing characteristics with a wide range of needle diameters.
Residue Characteristics	Light colored	Clear, pin testable	Light colored, pin testable
Copper Mirror Corrosion	Low	Low	Low
Halide Tests	Halide-Free	Halide-Free	Halide-Free
Surface Insulation Resistance	Pass (uncleaned)	Pass (cleaned)	Pass (uncleaned)
Printing Characteristics	Excellent to 16 mils pitch (0.4 mm)	Excellent to 16 mils pitch (0.4 mm)	—
Idle Time	60 minutes at 70°-77°F and 40-60% R.H.	90 minutes at 20°-25°C and 40-60% R.H.	—
Maximum Print Speed	Up to 150 mm/sec	Up to 180 mm/sec	—
Typical Metal Percentage	88.5% Type III Powder for Stencil Printing	88.5% Type III Powder for Stencil Printing	86%, Type III Powder for Dispensing
Expected Stencil Life	12+ hours at 70°-77°F and 40-60% R.H.	12+ hours at 20°-25°C and 40-60% R.H.	—
Reflow Atmosphere	Air or Nitrogen	Air or Nitrogen	Air or Nitrogen
Compliant Specifications	Telcordia Issue 1 GR-78-CORE IPC/J-STD-004 Flux Designator R0L0	Telcordia Issue 1-GR-78-CORE IPC/J-STD-004 Flux Designator R0L0	Telcordia Issue 1 GR-78-CORE IPC/J-STD-004 Flux Designator R0L0

* Kester EnviroMark™ 808, Lead-Free Water Soluble Solder Paste for Stencil Printing

Formula	275	48
	No-Clean	Activated Rosin
Halide Percentage	< 0.05%	1.0%
Flux Content Availability	58 and 66 core (2.2% and 3.3%)	66 core (3.3%)
Compliant Specifications	Telcordia Issue 1 GR-78-CORE & IPC/J-STD-004 Flux designator R0L0	IPC/J-STD-004 Flux Designator R0L1
Alloy/Core	SAC 305/58 K100LD/66	K100LD/66

Solder Wires

To promote rapid and complete wetting of the surfaces to be soldered with lead-free, a flux system with an effective activator package is essential. Kester solder wires have been tested and proved to give good contact angles and shiny joints when using lead-free solders. They are available with all common lead-free alloys.



Liquid Soldering Fluxes

Lead-free wave and selective soldering require exposing the flux to slightly higher soldering temperatures. Lead-free alloys traditionally wet metal surfaces more slowly than tin-lead. Kester liquid fluxes for lead-free assembly have new activator packages to enable rapid wetting and hole-filling, ensuring reliable product output.

*Formula	979 VOC-Free	959T	971 VOC-Free
	No-Clean	No-Clean	No-Clean
Application	Spray or Wave Fluxer	Spray or Foam Fluxer	Foam Fluxer
Halide Content %	Halide - free	Halide - free	Halide - free
Specific Gravity	1.016 ± 0.010	0.794 ± 0.005	1.007 ± 0.010
Solids %	4.5	2.9	3.25
Compliant Specifications	IPC/J-STD-004 Flux Designator ORLO	IPC/J-STD-004 Flux Designator ORLO	IPC/J-STD-004 Flux Designator ORLO

*These products are designed specifically for high performance lead-free applications.



Kester Ultrapure® K100LD Solder Bar

K100LD is a new patent-pending low-cost lead-free solder alloy for use in wave soldering, selective soldering, and tip tinning operations. K100LD has the Lowest Copper Dissolution amongst all common solder alloys, including SN63, SAC305, and other lead-free options. Kester K100LD provides the lowest cost for wave soldering operations. It also provides solder joints with no shrinkage effects, excellent through-hole penetration and topside fillet, and provides a low dross rate. When wave or selective soldering, the solder pot can be replenished with the K100LDA alloy.



SAC305 Bar Solder

SAC305 (Sn96.5Ag3.0Cu0.5) is the industry standard Pb-free alloy for SMT, wave and hand soldering. The SAC305 is a eutectic alloy with a melt temperature of 217°C. When soldering PCB's with a Cu finish, the wave solder pot can be replenished with the SAC300 alloy.

Tacky Soldering Fluxes

Rework and attachment of lead-free BGA, CSP, PGA requires new flux systems able to sustain higher thermal requirements without charring or rendering flux residue removal difficult. These tacky fluxes are formulated for lead-free assembly.



Common Lead-Free Alloys

Alloys	Melt Temperature	Application
K100LD	~227°C/441°F	Wave/Hand soldering
K100LDA	—	Replenishing Alloy
Sn96.5Ag3.0Cu0.5	217°C/423°F	SMT/Wave/Hand
SAC300	—	Replenishing Alloy

Flux-Pens® for Lead-Free Rework

Kester Flux-Pens® are unique tools for rework and touch-up lead-free soldering. This packaging style allows for controlled application of flux, eliminating the mess from flux bottles. Flux-Pens® are ideally suited for SMT repair, wave soldering repair, and other hand soldering applications. The three available formulas for lead-free Flux-Pens® are listed below.

Formula	950E	952-D6
	No-Clean	No-Clean
Description	950E Low Solids Alcohol based No-Clean. Optimal for SnPb soldering. (10 pens/carton)	952-D6 Alcohol based No-Clean. Added activity and thermal stability for Pb-free soldering. (10 pens/carton)

Formula	TSF-6592	TSF-6516
	Lead-Free No-Clean	No-Clean
Application	Designed as a low voiding lead-free solution for an array of lead-free interconnect applications such as flip chip attach, sphere/ball attach and rework/repair of CSPs, BGAs, and SMDs. The optimized rheology is suitable for most application methods such as printing, dispensing, and rotating drum/slide fluxers.	
Product Characteristics	TSF-6592 is compatible with lead-free solder alloys such as SnAg, SnCu, SnAgCu, SnAgBi, and can be reflowed in nitrogen or air with peak temperatures up to 270°C. Aggressive fluxing performance on many surface finishes such as OSP-Cu, ENIG, and Immersion finishes. The residues are clear, non-conductive, and non-corrosive.	TSF-6516 is compatible with leaded solder alloys such as Sn63Pb37 and Sn62Pb36Ag02 and can be reflowed in nitrogen or air with peak temperatures of 235°C. TSF-6516 has an optimum viscosity and tack force for rework applications. The increased activity allows for high first pass yields in chip attach applications.

Solderforms®

Kester Solderforms® are extruded, stamped, compacted or formed pieces of pure soft solder alloys manufactured with strict known tolerances to customer specifications. Kester can create a wide variety of preform shapes such as washers, discs, pellets, and ribbon forms for all your stringent lead-free assembly specifications.

Solderforms® are available in solid or fluxed varieties. Depending on your application, the preform flux may be included internally or externally. Kester has No-Clean, Water-Soluble, RMA and RA flux chemistries suited for all types of soldering applications. These preforms can be color-coded to aid in part identification and can be packed on tape and reel equipment or waffle packs for high volume applications.



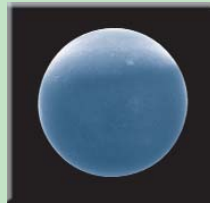
Ultra-Spheres®

Kester's unique proprietary manufacturing process technology produces spheres with smooth, clean surfaces, and tight size distributions. Lead-free solder spheres are available in a variety of diameters and alloys.

Available Alloys

Sn96.5 Ag3.0 Cu0.5	SAC305
Sn95.5 Ag3.8 Cu0.7	SAC387

Contact Kester for additional alloys and sizes



Scanning Electron Microscopy (SEM)
photo of Kester Ultra-Sphere

Available Sizes/Diameters

Kester offers spheres diameters ranging from 6-35 mils (150-889 µm)



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