Electronic Assembly Materials Asia Pacific

KESTER VISION STATEMENT

Smart Products. Great Service. No Boundaries.

Kester will be *the* leading global supplier of high performance interconnecting materials and related services for the electronic assembly and component assembly markets.

To achieve this we will focus on customer-driven innovation and exceptional service worldwide.

Connecting Innovation™

Kester is committed to our core strategy of delivering innovative materials and services to the global electronic assembly and component assembly markets. Kester believes its leadership position can only be maintained through state-of-the-art product development that stays ahead of industry needs. Our four strategically positioned R&D centers in the U.S., Germany, Singapore, and Japan are developing new products to meet your needs. Kester's core strategy of Innovation delivers competitive and innovative materials and services to the global electronics assembly and component assembly markets.

Kester Online www.kester.com

- Kester's Complete Lead-Free Solutions℠
- Multilingual Global Website
- Information on Products and Services
- Product Technical Data Sheets
- Product Material Data Safety Sheets (MSDS)
- Global Sales Locations and Contact Information

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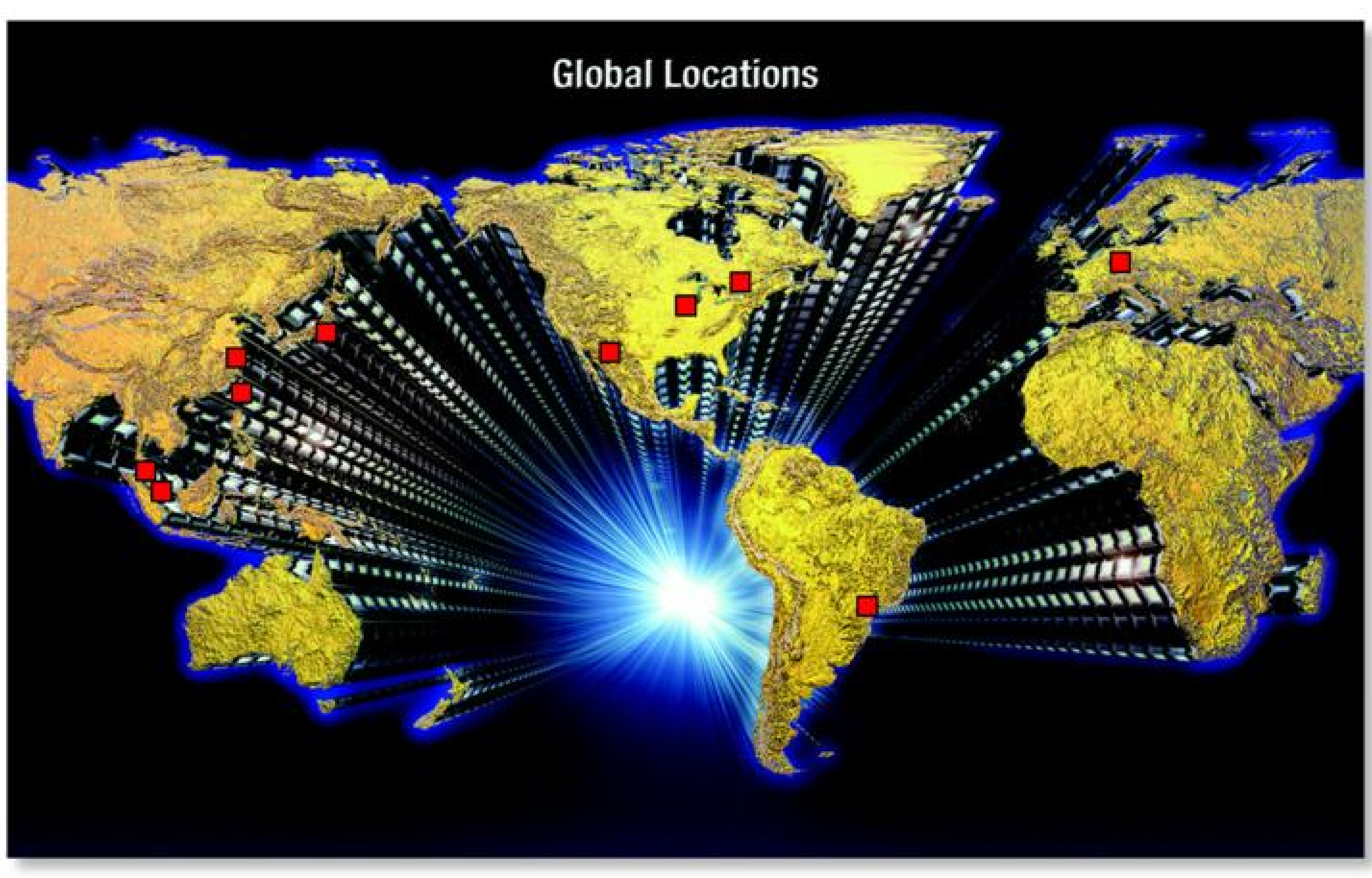

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Technical Service Department

Kester's technical support team can help you with the following:

- Product recommendations
- Technical product data
- Process solutions
- Technical field support
- Future product development
- Lead-Free Solutions™

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Customer Service Department

Kester's customer service team is ready to support you with any of the following:

- Order placement & expediting
- Price quotes
- Literature requests
- Product sample requests
- Part number information
- Shipping dates & schedules

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Information Necessary for Ordering Kester Products.

Solder Paste	Cored Solder Wire
1. Paste flux type	1. Alloy type
2. Solder powder alloy	2. Wire diameter
3. Powder mesh type	3. Spool size
4. Metal/flux weight ratio	4. Core flux type
5. Package type and size	5. Core flux size
6. Quantity required	6. Quantity required

Bar Solder	Liquid Flux
1. Alloy type	1. Formula number
2. Bar type and size	2. Unit size
3. Quantity required	3. Thinner number (if required)
	4. Quantity required

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Kester Lead-Free Solutions™

With over 100 years of soldering technology experience, Kester understands the challenges associated with the transition from leaded to lead-free soldering. Kester's Lead-Free Solutions™ offers the following:

- Complete line of lead-free materials
- Kester's know-how to implement lead-free
- Consulting and training courses in lead-free SMT, wave soldering, and rework
- Unique lead-free product packaging
- Test services

Kester RoHS Ready Logo

Kester's commitment to a smooth lead-free transition is demonstrated by its "green packaging", the development of uniquely shaped lead-free triangular bar solders for easy identification, and the lead-free knowledge available in *Kester University training courses, lead-free seminars, and its quarterly Lead-Free Connection™ newsletter. Now Kester has gone one step further by developing a RoHS Ready logo.

- Logo identifies Kester products to be in compliance with RoHS Directive 2002/95/EC Article 4 for banned substances
- Can be seen on technical literature such as data sheets

Lead-Free Solder Paste

The key variables when converting to Lead-Free SMT processes 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 novel 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 SnAgCu.

Flux Type	**No-Clean**			
Formula	**EnviroMark 907**	**EnviroMark 917**	**EnviroMark 918**	**TCS-502**
Application	**Stencil Printing**	**Stencil Printing**	**Stencil Printing**	**Stencil Printing**
Product characteristics	EM907 is designed to exceed customers' expectations for high yield lead-free manufacturing. It is engineered for the high thermal demands of assembling with lead-free alloys such as the family of SnAgCu (SAC). Joints are cosmetically bright as SnPb joints. Prints down to 0201 pad sites. Exhibits excellent continual printability for fine pitch (0.4mm/16 mils) and is able to print at high speeds up to 150mm/s (6"/s).	EM917 paste is specifically designed for thermal requirements of lead-free alloys. It is pin probeable and capable of stencil printing downtimes of up to 60 minutes with effective first print down to 20mils without kneading. Exhibits excellent continual printability for fine pitch (0.4mm/16mils) at high speed of 200mm/s (8"/s). EM917 provides clean cosmetic aesthetics after reflow.	EM918 is a halide-free, ICT pin probeable solder paste designed for thermal requirements of lead-free alloys including Sn96.5Ag3.0Cu0.5. EM918 withstands downtime of up to 60 minutes with effective first print down to 20mils without kneading. Exhibits excellent continual printability for fine pitch (0.4mm/16mils) at high speed of 150mm/s (6"/s). EM918 offers excellent cosmetic appearance closely assembling SnPb joints.	A highly reliable paste with high insulation resistance flux residue. Exhibits great viscosity stability and excellent wettability. A robust paste that can be re-use even after printing.
Residue removal method	Not normally required.	Not normally required.	Not normally required.	Not normally required.
Atmosphere required for reflow	Air or Nitrogen	Air or Nitrogen	Air or Nitrogen	Air or Nitrogen
Compliant specifications	Telcordia Issue 1 GR-78-CORE IPC ANSI/J-STD-004 Flux designator ROL0	IPC ANSI/J-STD-004A Flux designator ROL1	IPC ANSI/J-STD-004A Flux designator ROL0	JIS-Z-3197 JIS-Z-3284

* Kester University training courses are only available in USA.

Lead-Free Solder Paste

Flux Type	No-Clean			
Formula	**TCS-552**	**TCS-602**	**R276**	**EnviroMark 900**
Application	**Stencil Printing**	**Stencil Printing**	**Syringe Dispensing**	**Syringe Dispensing**
Product characteristics	Designed for fine pitch printing. Possesses good printing characteristics that do not promote bridging or smearing. The flux system is capable of controlling deactivation during pre-heating in order to achieve superior wettability and solder joints. A very stable paste suitable for long time printing.	TCS-602 paste is specifically designed for MDS printing. This solder paste has superior tackiness with no drip properties and carries good dispensing properties.	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 charac-teristics with a wide range of needle diameters.	EM900 is specifically designed for optimal characteristics in all types of dispensing applications. EM900 is packaged void free to insure consistent dispensing in high speed automated processes with excellent solderability and joints' closely resembling SnPb. EM900 exhibits stable tack over 8+ hours and is suitable for use on a wide range of needle diameters.
Residue removal method	Not normally required.	Not normally required.	Not normally required.	Not normally required.
Atmosphere required for reflow	Air or Nitrogen	Air or Nitrogen	Air or Nitrogen	Air or Nitrogen
Compliant specifications	JIS-Z-3197 JIS-Z-3284	JIS-Z-3197 JIS-Z-3284	Bellcore Issue 1 GR-78-CORE, IPC ANSI/J-STD-004 Flux designator ROL0	Bellcore Issue 1 GR-78-CORE, IPC ANSI/J-STD-004 Flux designator ROL0

Flux Type	Water-Soluble			
Formula	**R520A**	**EnviroMark 808**	**EnviroMark 814**	**R505**
Application	**Stencil Printing**	**Stencil Printing**	**Stencil Printing**	**Syringe Dispensing**
Product characteristics	R520A is designed to solder effectively difficult metal surfaces in air or nitrogen reflow atmosphere. The activator package is able to withstand the higher temperatures without slump. The flux system is non-hygroscopic, reducing paste waste at the printer. It is available in all common lead-free alloys.	EM808 provides hours of stable stencil life, tack time and repeatable brick definition. EM808 robust printing characteristics result in consistent solder paste volume regardless of idle time, stencil like and print speed. The activator package is very aggressive and provides superior wetting to OSP coated and Immersion Silver boards.	EM814 is an organic acid formula specifically designed for use with higher temperature, lead-free soldering alloys such as Sn96.5Ag3.0Cu0.5 as well as other similar SAC alloy com-positions. EM814 is capable of stencil printing downtimes of up to 120 minutes with an effective first print down to 20 mils without any kneading. It offers good solderability and excellent wetting on various metallization in air reflow environment. EM814 is an extremely stable water soluble formula.	Specifically designed as a consistent dot dispensing paste for automated dispense equipment. The activator package in this formula is extremely aggressive; to remove tenacious oxide layers or to solder to OSP coated boards. Excellent dispensing characteristics with a capability to dispense 4 dots per second.
Residue removal method	Its residue can be easily removed using automated cleaning equipment (in-line or batch). Use de-ionized water at 49-60°C (120-140°F) or with 2% solution of Kester 5768 Bio-Kleen® saponifier.	Its residue can be easily removed using automated cleaning equipment (in-line or batch). Use de-ionized water at 49-60°C (120-140°F) or with 2% solution of Kester 5768 Bio-Kleen® saponifier.	Its residue can be easily removed using automated cleaning equipment (in-line or batch). Use de-ionized water at 40-60°C (104-140°F).	Its residue can be easily removed using automated cleaning equipment (in-line or batch). Use de-ionized water at 49-60°C (120-140°F) or with 2% solution of Kester 5768 Bio-Kleen® saponifier.
Atmosphere required for reflow	Air or Nitrogen	Air or Nitrogen	Air or Nitrogen	Air or Nitrogen
Compliant specifications	IPC ANSI/J-STD-004 Flux designator ORH0	IPC ANSI/J-STD-004 Flux designator ORM0	Bellcore Issue 1 GR-78-CORE, IPC ANSI/J-STD-004 Flux designator ORH0	IPC ANSI/J-STD-004 Flux designator ORH0

Lead-Free Solder Wire

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.

Flux Type	**No-Clean**					**Water-Soluble**
	No-Clean	**Rosin Activated**	**Rosin Activated**	**Rosin Activated**	**No-Clean**	**Organic**
Formula	**275**	**48**	**TK0730**	**TK1030**	**TK1230**	**331**
Product characteristics	Superior wetting performance leaving an extremely clear post-soldering residue. Designed to be a low splattering core flux.	Very high activity rosin flux used for difficult to solder metals.	Designed for lead-free soldering where fast wetting is required. Provides high solder joints reliability with low flux splatter.	Designed to provide excellent solderability. Workability enhanced by its superior wettability. Low flux splattering.	A newly developed lead-free core flux. Superior wetting performance with lower flux splatter. Provides fast-spreading soldering.	Industry standard water washable core for most electrical and electronic hand soldering.
Residue removal method	Not normally required. May be removed by solvent or Kester's 5768 Bio-Kleen® saponifier.	Not normally required. May be removed by solvent or Kester's 5768 Bio-Kleen® saponifier.	Not normally required. May be removed by solvent such as IPA, acetone, etc.	Not normally required. May be removed by solvent such as IPA, acetone, etc.	Not normally required. May be removed by solvent such as IPA, acetone, etc.	Residue removal is required. Use soft or de-ionized water at temperatures of 49-65°C (120-150°F).
Compliant specifications	Bellcore Issue 1 GR-78-CORE, IPC ANSI/J-STD-004 Flux designator ROLO	IPC ANSI/J-STD 004 Flux designator ROL1	JIS-Z-3197 JIS-Z-3283	JIS-Z-3197 JIS-Z-3283	JIS-Z-3197 JIS-Z-3283	IPC ANSI/J-STD-004 Flux designator ORH1

Flux-Pens® for Lead-Free

Flux Type	**No-Clean**			**Water-Soluble**
	Low Solids	**Rosin Mildly Activated (RMA)**		**Neutral pH**
Formula	**952-D6**	**186**	**186-18**	**2331-ZX**
Product characteristics	A non-corrosive, halide free liquid flux that is specifically designed for the wave soldering and rework of conventional and surface mount circuit board assemblies. This comprehensive formulation exhibits excellent wetting characteristics and has superior corrosion inhibiting properties. Provides a non-tacky residue. Suitable for foam or spray fluxing applications.	Designed for high thermal stability and superior solderability. Military approved formula for add-on and rework applications. Percent solids (typical): 36	Designed for high thermal stability and superior solderability. Military approved formula for add-on and rework applications. Percent solids (typical): 18	Neutral pH for wave solder flux user who has additional add-on and rework applications.
Residue removal method	Not normally required.	Not normally required. May be removed with solvent or with Kester's 5768 Bio-Kleen® saponifier at 7-10% solution in de-ionized or soft water at 49-60°C (120-140°F).	Not normally required. May be removed with solvent or with Kester's 5768 Bio-Kleen® saponifier at 7-10% solution in de-ionized or soft water at 49-60°C (120-140°F).	Residue removal is required. Use soft or de-ionized water at temperatures of 49-65°C (120-150°F).
Compliant specifications	Bellcore Issue 1 GR-78-CORE, IPC ANSI/J-STD-004 Flux designator ORLO	IPC ANSI/J-STD-004 Flux designator ROLO	IPC ANSI/J-STD-004 Flux designator ROLO	IPC ANSI/J-STD-004 Flux designator ORH1

Liquid Fluxes for Lead-Free Wave Soldering

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 wetting and hole-filling, ensuring reliable product output.

Flux Type	No-Clean			Water-Soluble	
	Alcohol Based		VOC-Free	Neutral pH Alcohol Based	VOC-Free
Formula	**985M**	**959T**	**979VT**	**2331-ZX**	**2220VF**
Product characteristics	985M is specially designed to improve effectiveness in the wave soldering of conventional circuit board assemblies. Was developed for excellent solderability and through-hole fill in lead-free wave soldering process. 985M minimizes micro-solderballing at connectors and CPU. Its residue left behind is non-tacky, non-corrosive and non-conductive.	Designed for lead-free wave soldering. Developed to minimize the formation of micro-solder balls during wave soldering operations. Compatible with spray and foam applications.	979VT is a formulation for high quality, low-defect soldering of lead-free electronic circuit board assemblies. 979VT reduces micro-solderballing on glossy and matt laminates and between connector pins. It will not attack properly cured solder masks or FR-4 Epoxy-Glass laminate. 979VT leaves no haze or visible residue behind.	Original pH neutral organic flux for automated wave and drag soldering processes.	A high activity organic flux that provides maximum capillary wetting action up plated through-holes, making it ideal for use on multi-layer boards. Minimizes icicling and bridging and produces bright, shiny solder joints. It is chemically compatible with most solder masks and board laminates and does not emit offensive odors during soldering. Suitable for spray, dip or foam applications.
Percent solids (typical)	3.6	2.9	5.0	33	7.0
Specific gravity (gm/cc) at 25°C (77°F) (typical)	0.805	0.794	1.014	0.899	1.058
Residue removal method	Not normally required.	Not normally required. However removal is possible with hot de-ionized water at 60-71°C (140-160°F) with 1% solution of Kester 5768 Bio-Kleen® saponifier.	Not normally required. However removal is possible with hot de-ionized water at 43-54°C (110-130°F).	Residue removal is required. Use soft or de-ionized water at temperatures of 49-65°C (120-150°F).	Residue removal is required. Use soft or de-ionized water at temperatures of 43-60°C (110-140°F) with 2% solution of Kester 5768 Bio-Kleen® saponifier.
Compliant specifications	Bellcore Issue 1 GR-78-CORE, IPC ANSI/J-STD-004A Flux designator ROL0	Bellcore Issue 1 GR-78-CORE, IPC ANSI/J-STD-004 Flux designator ORL0	Bellcore Issue 1 GR-78-CORE, IPC ANSI/J-STD-004 Flux designator ORL0	IPC ANSI/J-STD-004 Flux designator ORH1	IPC ANSI/J-STD-004 Flux designator ORH1
Thinner no.	108-S	4662-SM	De-ionized Water	4662	De-ionized Water
Flux test kit	PS-20	PS-20	PS-20	N.A	N.A

Lead-Free Solder Bar

Ultrapure® K100

Kester has developed Ultrapure® K100, a low cost lead-free bar solder. Kester K100 is a near eutectic SnCu alloy with controlled metallic dopants to control the grain structure within the solder joint. This improves reliability of the joint and virtually eliminates the occurrence of common defects such as icicling and bridging. The improved grain structure also results in shinier solder joints than traditional lead-free alloy alternatives. Kester K100 compares favorably to low-cost, lead-free alloys of Sn and Cu in terms of wetting and flow characteristics. Kester K100 provides the lowest delivered price to the global market for wave soldering operations. Kester K100 also provides solder joints with no visible shrinkage effects, excellent through-hole penetration and topside fillet, low dissolution of Cu from boards and components into solder pot and low dross rate.

Peace Solder

Peace Solder is a lead-free solder alloy which was developed to keep equal reliability with existent eutectic solder systems. Please refer to the Alloy Temperature Chart on page 17 for a full range of Peace Solder alloys and forms.

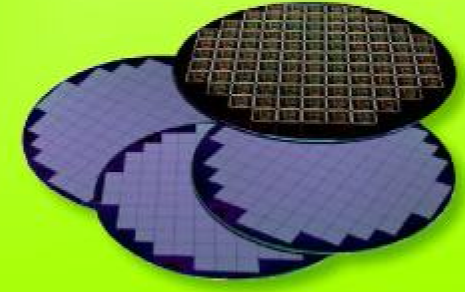
Kester Lead-Free Triangle Bar

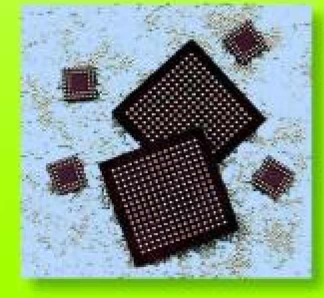
Lead-Free Wafer Bumping Solder Paste

Flux Type	No-Clean	Water-Soluble
Formula	**Se-Cure® 7601**	**Se-Cure® 7101**
Application	**Metal Foils and Organic In-Situ Stencils**	**Metal Foil Stencils (4mils/~100µm)**
Product characteristics	Designed for substrate, wafer-bumping and ultra-low pitch printing operations. Se-Cure® 7601 thermally stable fluxing system is compatible with both eutectic SnPb and lead-free (SnCu, SnAg, and SnAgCu) alloys. This high activity paste exhibits long stencil life while still delivering exceptional solderability and low voiding.	Designed for wafer bumping and ultra-low pitch bumping applications, Se-Cure® 7101 is a thermally stable flux system that reduces voiding in FC and CSP. When using Se-Cure® 7101, the voiding level of FC and CSP's has been reduced from 25% to less than 10%. It releases cleanly from stencil apertures up to area ratio of 1.5 (mesh size dependant) without slumping or flux bleed out and with optimal deposit definition. The activator package has been formulated to exhibit exceptional wetting characteristics to many different Under Bump Metallurgies (UBM) and is available in Sn63Pb37, lead-free alloys, low alpha (<0.02cph/cm²), and ultra-low alpha (<0.002cph/cm²) solder alloys.
Residue removal method	Not normally required. May be removed by using Kester 5252M solvent cleaner or 5260 aqueous cleaner.	Use de-ionized water at 40-60°C (104-140°F).
Compliant specifications	Bellcore Issue 1 GR-78-CORE, IPC ANSI/J-STD-004 Flux designator ROL0	Bellcore Issue 1 GR-78-CORE, IPC ANSI/J-STD-004 Flux designator ORM1

Tacky Soldering Fluxes for Lead-Free Assembly

Flux Type	No-Clean		Water-Soluble	
Formula	**TSF-6502**	**TSF-6592**	**TSF-6850**	**TSF-6805L**
Product characteristics	Low viscosity. Ideal for sphere and pin attachment (BGA, CSP,PGA), flip chip mounting (FCAP and FCOB) and no-clean rework operations. High activity no-clean soldering for more difficult metallization. Compatible with air or nitrogen reflow. Residue interacts well with many capillary underfill materials.	Meant for ball and flip chip application with peak temperatures up to 270°C (518°F) in both air and nitrogen. Heat stable and robust activator for OSP-Cu, ENIG and immersion surface finishes.	Meant for ball and flip chip application with peak temperatures up to 270°C (518°F) in both air and nitrogen. The innovative activator package is very aggressive on a variety of lead-free surface finishes.	For high speed dot dispensing, BGA/PGA or rework application. Stencil print processing window. Solid solder deposit (SSD) or precision pad technology (PPT) boards surfaces.
Typical application methods	• Stencil or screen printing • Pin transfer • Rotating drum/doctor blade applicator • Thin film applicator	• Stencil or screen printing • Pin transfer • Syringe applications • Dip	• Stencil or screen printing • Pin transfer • Syringe applications • Dip	• Stencil or screen printing • Pin transfer • Dot dispensing • Syringe applications
Viscosity (typical)	110 poise at 10rpm (Malcom at 25°C (77°F))	135 poise at 10rpm (Malcom at 25°C (77°F))	193 poise at 10rpm (Malcom at 25°C (77°F))	125 poise at 10rpm (Malcom at 25°C (77°F))
Tack (grams-force)	115	153	189	80
Residue removal method	Not normally required. May be done with Kester's 5768 Bio-Kleen® saponifier in a 10 to 12% solution with 60-71°C (140-160°F) de-ionized automated water wash system.	Not normally required.	Remove residue by using de-ionized water in automated cleaning equipment with water temperature at 38-65°C (100-150°F).	Remove residue by using de-ionized water in automated cleaning equipment with water temperature at 49-65°C (120-150°F).
Compliant specifications	Bellcore Issue 1 GR-78-CORE, IPC ANSI/J-STD-004 Flux designator ROL1	IPC ANSI/J-STD-004 Flux designator ROL0	IPC ANSI/J-STD-004 Flux designator ORH0	Bellcore Issue 1 GR-78-CORE, IPC ANSI/J-STD-004 Flux designator ORH0





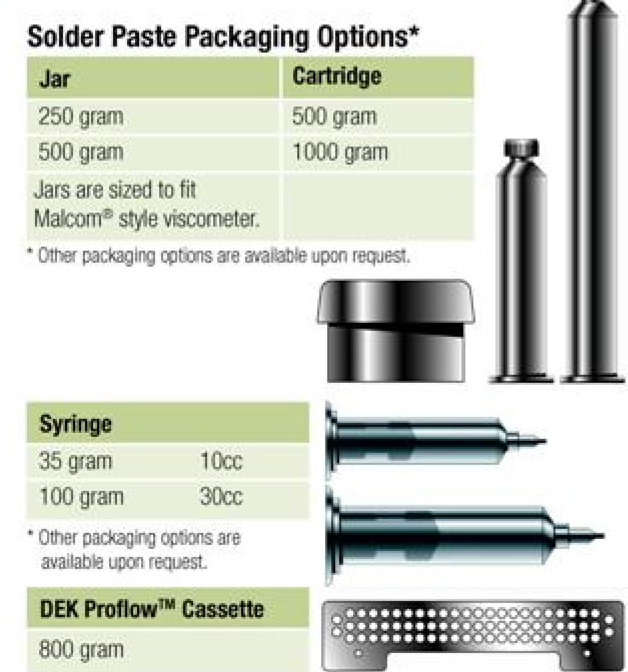
Solder Paste Formulas for Surface Mount and General Electronic Assemblies

All Kester solder paste formulas are manufactured using the highest quality raw materials available. Kester's worldwide research facilities work together to design solder paste formulas which bring the latest technological developments to electronic manufacturers around the globe. The solder paste products listed represent the current product recommendations at the time of printing. Please contact Kester's Customer Service Team for a specific product recommendation for your applications. Specific product information that will be needed at the time of ordering is listed on Page 3.

Standard Alloys For Solder Paste Products

Application	Alloy
Leaded	Sn63Pb37
Leaded	Sn62Pb36Ag02
Low Temperature (Leaded)	Sn43Pb43Bi14
Lead-Free	Sn96.5Ag3.0Cu0.5
Lead-Free	Sn95.8Ag3.5Cu0.7
Low Temperature (Lead-Free)	Sn42Bi58

Solder Paste Packaging Options*



Jar	Cartridge
250 gram	500 gram
500 gram	1000 gram
Jars are sized to fit Malcom® style viscometer.	

* Other packaging options are available upon request.

Syringe	
35 gram	10cc
100 gram	30cc

* Other packaging options are available upon request.

DEK Proflow™ Cassette
800 gram

Standard Solder Powder Distributions* for Solder Paste

Powder Type	Mesh Designation	Typical Particle Diameter	Recommended Surface Mount Application (Pitch)
Type 3	-325+500	25 to 45 micron	Down to 16 mil
Type 4	-400+500	25 to 38 micron	Down to 12 mil

* Other distributions are available upon request.

No-Clean Solder Pastes

Flux Type	No-Clean			
Formula	**R902E**	**PureMark 202**	**TCS-001**	**TCS-104**
Application	**Stencil Printing**	**Stencil Printing**	**Stencil Printing**	**Stencil Printing**
Product characteristics	R902E is specifically designed to have excellent continual printability for fine pitch 0.5mm (20mil) and even super fine pitch 0.4mm (16mil) application. Its flux system is specially formulated to ensure excellent slump resistance during printing and preheating, thus reducing the occurrences of bridging and solder beading. R902E is specially modified for improved solderability in normal air reflow. It ensures highly reliable solder joints with difficult-to-solder components eliminating the need for nitrogen environment.	Engineered to provide the print and reflow flexibility required by today's advanced electronics assemblies. Consistent print volume regardless of process parameters and 0201 application capable. Wide reflow process window and soft probe-friendly residue for ICT in all applications. Capable of printing after downtimes of over 2 hours with an effective first print down to 20 mils. Achieves print speeds of up to 200mm/sec. Compatible with enclosed print head systems.	TCS-001 is a RMA type paste that possesses excellent printing and high slump resistance characteristics. Capable of printing 0.3mm pitch and allows printing on a stencil for as long as 4 to 6 hours.	RA type, for applications that require high activity and reliable residue without the need for cleaning. Excellent printing and slump resistance characteristics. Shows little rheological change in viscosity even after continuous printing for 4 to 6 hours.
Residue removal method	Not normally required. May be easily removed using automated cleaning equipment (in-line or batch) with a variety of available cleaning agents. Call Kester Customer Service Team for available cleaning agents.	Not normally required. May be easily removed using automated cleaning equipment (in-line or batch) with a variety of available cleaning agents. Call Kester Customer Service Team for available cleaning agents.	Not normally required.	Not normally required.
Atmosphere required for reflow	Air or Nitrogen	Air or Nitrogen	Air or Nitrogen	Air or Nitrogen
Compliant specifications	JIS-Z-3284	Bellcore Issue 1 GR-78-CORE, IPC ANSI/J-STD-004 Flux designator ROL0	JIS-Z-3197 JIS-Z-3284 IPC ANSI/J-STD-004 Flux designator ROL1	JIS-Z-3197 JIS-Z-3284

No-Clean and Water-Soluble Solder Pastes

Flux Type	No-Clean	Water-Soluble		
Formula	**R276**	**HydroMark 531**	**R562**	**R500**
Application	**Syringe Dispensing**	**Stencil Printing**	**Stencil Printing**	**Syringe Dispensing**
Product characteristics	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.	This highly-active, anti-slump paste is produced consistently so that every batch results in high yield manufacturing. HM531 offers extremely robust printing, even with an idle time of up to 1 hour and/or with print speeds of 150mm/sec. This very active formula is effective on a wide variety of metallization, including palladium. Compatible with enclosed print head systems. HM531 is also suitable for use on low temperature soldering alloys such as Sn43Pb43Bi14.	Designed to withstand harsh processing environment with minimal void production. R562 has a stencil life of over 8 hours and exhibits excellent print characteristics and activity in a wide range of humidity (10-85% RH). R562 can withstand multiple reflow profiles before cleaning operation is required. Compatible with enclosed print head systems.	The activator package in this formula is aggressive enough to remove tenacious oxide layers or solder to OSP coated boards. R500 delivers excellent wetting characteristics.
Residue removal method	Not normally required.	Use de-ionized water at 49-60°C (120-140°F).	Use de-ionized water at 49-60°C (120-140°F).	Use de-ionized water at 49-60°C (120-140°F).
Atmosphere required for reflow	Air or Nitrogen	Air or Nitrogen	Air or Nitrogen	Air or Nitrogen
Compliant specifications	Bellcore Issue 1 GR-78-CORE, IPC ANSI/J-STD-004 Flux designator ROL0	IPC ANSI/J-STD-004 Flux designator ORM0	IPC ANSI/J-STD-004 Flux designator ORH0	IPC ANSI/J-STD-004 Flux designator ORH0

Wafer and Substrate Bumping Pastes

Kester has leveraged decades of experience in solder paste product development in engineering an extensive selection of wafer and substrate bumping pastes. Bumping of wafers and substrates with solder paste is a growing technology that is low-cost with high yields and competitive quality. Kester's array of bumping pastes supports flexible, high volume applications. Contact Kester for assistance in finding an optimized solution.

SE-CURE® 7101 Wafer Bumping Solder Paste

Flux Type	No-Clean	Water-Soluble
Formula	**Se-Cure® 7501**	**Se-Cure® 7101**
Application	**Organic In-Situ Stencils**	**Metal Foil Stencils (4mils/~100µm)**
Product characteristics	Se-Cure® 7501 is specifically designed for organic in-situ wafer bumping applications. The printing performance of 7501 has been engineered to be best in class and prints easily on wafers of bump pitches down to 135µm (bump heights of 70 µm). Its voiding occurrence rate is consistently below 10% threshold. Se-Cure® 7501 bumping paste is available in Sn63Pb37and also low alpha (<0.02cph/cm²) and ultra-low alpha (<0.002cph/cm²) emitting Sn63Pb37.	Designed for wafer bumping and ultra-low pitch bumping applications, Se-cure® 7101 is a thermally stable flux system that reduces voiding in FC and CSP. When using Se-Cure® 7101, the voiding level of FC and CSP's has been reduced from 25% to less than 10%. It releases cleanly from stencil apertures up to area ratio of 1.5 (mesh size dependant) without slumping or flux bleed out and with optimal deposit definition. The activator package has been formulated to exhibit exceptional wetting characteristics to many different Under Bump Metallurgies (UBM) and is available in Sn63Pb37, lead-free alloys, low alpha (<0.02cph/cm²), and ultra-low alpha (<0.002cph/cm²) solder alloys.

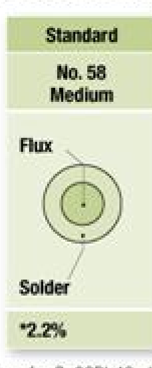
* Available in Low Alpha Emissions (<0.02cph/cm²) and Ultra Low Alpha (<0.002 cph/cm²)

Standard Core Wire Solders

Flux Type	No-Clean			
	Rosin Activated	Rosin Activated	No-Clean	No-Clean
Formula	**44**	**48**	**245**	**275**
Product characteristics	Activated rosin core with excellent wetting action. Industry standard for most electrical and electronic hand soldering.	Very high activity rosin flux used for difficult to solder metals.	Performance similar to mildly activated rosin core, but leaves a visually cleaner appearance after soldering.	Superior wetting performance leaving an extremely clear post-soldering residue. Designed to be a low splattering core flux.
Residue removal method	Not normally required. May be removed by solvent or Kester's 5768 Bio-Kleen® saponifier.	Not normally required. May be removed by solvent or Kester's 5768 Bio-Kleen® saponifier.	Not normally required. May be removed by solvent or Kester's 5768 Bio-Kleen® saponifier.	Not normally required. May be removed by solvent or Kester's 5768 Bio-Kleen® saponifier.
Compliant specifications	IPC ANSI/J-STD-004 Flux designator ROM1	IPC ANSI/J-STD-004 Flux designator ROL1	Bellcore Issue 1 GR-78-CORE, IPC ANSI/J-STD-004 Flux designator ROL0	Bellcore Issue 1 GR-78-CORE, IPC ANSI/J-STD-004 Flux designator ROL0

Flux Type	No-Clean			Water-Soluble
	Rosin Mildly Activated	No-Clean	No-Clean	Organic
Formula	**285**	**S-702**	**K-201**	**331**
Product characteristics	Mildly activated rosin cored wire for sensitive electronic and military applications.	High activity flux with reliable residue designed for manual and robotic soldering on high-density packaging.	High activity rosin core with excellent wetting action. Designed for superior solderability on high-density packaging.	Industry standard water washable core for most electrical and electronic hand soldering.
Residue removal method	Not normally required. May be removed by solvent or Kester's 5768 Bio-Kleen® saponifier.	Not required for most applications. May be removed by solvent such as IPA, acetone, etc	Not required for most applications. May be removed by solvent such as IPA, acetone, etc	Residue removal is required. Use soft or de-ionized water at temperatures of 49-65°C (120-150°F)
Compliant specifications	Bellcore Issue 1 GR-78-CORE, IPC ANSI/J-STD-004A Flux designator ROL0	JIS-Z-3197 JIS-Z-3283	JIS-Z-3197 JIS-Z-3283	IPC ANSI/J-STD-004 Flux designator ORH1

Standard Flux-Core Sizes

Standard	Standard	Standard
No. 50 Small	No. 58 Medium	No. 66 Regular
		
*1.1%	*2.2%	*3.3%

* Average weight percentage for Sn60Pb40 alloy. The average weight percentage will vary slightly depending on the density of the alloy.

Standard Wire Diameters

Inch	Metric	Standard Wire Gauge
0.010	0.25mm	30
0.015	0.40mm	28
0.020	0.50mm	25
0.025	0.64mm	23
0.031	0.80mm	21
0.040	1.00mm	19
0.050	1.30mm	18
0.062	1.50mm	16
0.093	2.50mm	13
0.125	3.20mm	10

Kester's flux cored and solid wire solders are produced in many alloys including those conforming to IPC ANSI/J-STD-006 and ASTM B32.

* Availability of wire diameter is subjected to different solder alloy, core flux and core sizes.

No-Clean Liquid Fluxes

Flux Type	Alcohol Based		VOC-Free	
	No-Clean Low solids	No-Clean Low solids	No-Clean VOC-Free	No-Clean VOC-Free
Formula	**984**	**959T**	**979***	**977***
Product characteristics	A significant technological development, Kester 984 provides exceptionally bright and shiny solder connections with minimum micro-solder-balling at connectors and CPU. Residues left behind are non-conductive, non-corrosive and non-tacky.	Designed for lead-free wave soldering. Developed to minimize the formation of micro-solder balls during wave soldering operations. Compatible with spray and foam applications.	Most active VOC-Free flux for optimal top-side wetting and solderballs reduction. May be applied by spray or dip process. Kester 979 is also designed for lead-free application.	Developed to reduce bottom side micro-solderballing and survive SMT dual wave soldering systems. May be applied by spray or wave.
Percent solids (typical)	2.20	2.90	4.50	3.25
Specific gravity (gm/cc) at 25°C (77°F) (typical)	0.792	0.794	1.020	1.012
Residue removal method	Not normally required.	Not normally required. However removal is possible with hot de-ionized water at 60-71°C (140-160°F) with 1% solution of Kester 5768 Bio-Kleen® saponifier.	Not normally required.	Not normally required.
Compliant specifications	Bellcore Issue 1 GR-78-CORE, IPC ANSI/J-STD-004 Flux designator ORL0	Bellcore Issue 1 GR-78-CORE, IPC ANSI/J-STD-004 Flux designator ORL0	Bellcore Issue 1 GR-78-CORE, IPC ANSI/J-STD-004 Flux designator ORL0	Bellcore Issue 1 GR-78-CORE, IPC ANSI/J-STD-004 Flux designator ORL0
Thinner no.	108-S	4662-SM	De-ionized Water	De-ionized Water
Flux test kit	PS-22	PS-20	PS-20	PS-20

* Products subjected to U.S. patent #5,281,281 and #5,334,260.

Kester Flux-Pens®

The Kester Flux-Pen® is a unique tool for rework and touch-up soldering. It allows controlled applications of flux, eliminating the mess from flux bottles. The Flux-Pen® is ideally suited for surface mount rework, component add-on applications, and TAB assembly operations. The available formulas are listed in the chart below.

Flux Type	No-Clean			Water-Soluble
	Low Solids	Rosin Mildly Activated (RMA)		Neutral pH
Formula	**951**	**186**	**186-18**	**2331-ZX**
Product characteristics	Very low solids, resin free, practically no residue after the soldering process.	Designed for high thermal stability and superior solderability. Military approved formula for add-on and rework applications. Percent solids (typical): 36	Designed for high thermal stability and superior solderability. Military approved formula for add-on and rework applications. Percent solids (typical): 18	Neutral pH for ware solder flux user who has additional add-on and rework applications.
Residue removal method	Not normally required. May be removed with hot de-ionized water at 60-71°C (140-160°F) with 1% solution of Kester's 5768 Bio-Kleen®.	Not normally required. May be removed with solvent or with Kester's 5768 Bio-Kleen® saponifier at 7-10% solution in de-ionized or soft water at 49-60°C (120-140°F).	Not normally required. May be removed with solvent or with Kester's 5768 Bio-Kleen® saponifier at 7-10% solution in de-ionized or soft water at 49-60°C (120-140°F).	Residue removal is required. Use soft or de-ionized water at temperatures of 49-65°C (120-150°F).
Compliant specifications	Bellcore Issue 1 GR-78-CORE, IPC ANSI/J-STD-004 Flux designator ORL0	IPC ANSI/J-STD-004 Flux designator ROL0	IPC ANSI/J-STD-004 Flux designator ROL0	IPC ANSI/J-STD-004 Flux designator ORH1

Rosin Based Liquid Fluxes

Flux Type	Rosin Non-Activated (R)	Rosin Mildly Activated		Rosin Activated (RA)
Formula	**145**	**186 Series**	**182**	**1544**
Product characteristics	Excellent for solderability test procedures specified by military and commercial industries.	Designed for high thermal stability and superior solderability. Kester 186 is available in 18, 25, or 36 percent solids formulations.	IPC designated formulation for solderability testing.	Kester's active, non-corrosive rosin type flux. It is used on surfaces which are more difficult to solder.
Percent solids (typical)	25	18 to 36	25	50
Specific gravity (gm/cc) at 25°C (77°F) (typical)	0.844	0.879 (186) 0.848 (186-25) 0.831 (186-18)	0.843	0.928
Residue removal method	Residue is non-corrosive, but may be removed with solvent or with Kester's 5768 Bio-Kleen® saponifier at 7-10% solution in de-ionized or soft water at 49-60°C (120-140°F).	Residue is non-corrosive, but may be removed with solvent or with Kester's 5768 Bio-Kleen® saponifier at 7-10% solution in de-ionized or soft water at 49-60°C (120-140°F).	Residue is non-corrosive, but may be removed with solvent or with Kester's 5768 Bio-Kleen® saponifier at 7-10% solution in de-ionized or soft water at 49-60°C (120-140°F).	Residue is non-corrosive, but may be removed with solvent or with Kester's 5768 Bio-Kleen® saponifier at 7-10% solution in de-ionized or soft water at 49-60°C (120-140°F).
Compliant specifications	IPC ANSI/J-STD-004 Flux designator ROL0	IPC ANSI/J-STD-004 Flux designator ROL0	IPC ANSI/J-STD-004 Flux designator ROL1	IPC ANSI/J-STD-004 Flux designator ROM1
Thinner no.	4662	120	4662	104

Water-Soluble Liquid Fluxes

Flux Type	Alcohol Based		VOC-Free	
	Organic Neutral pH	**Organic Water-Soluble**	**Organic Halide-Free**	**Organic Water-Soluble**
Formula	**2331-ZX**	**2224-25**	**2120**	**2220VF**
Product characteristics	Original pH neutral organic flux for automated wave and drag soldering processes.	Highly active organic flux designed for automated wave soldering applications.	Low solids flux for surface mount assemblies. Provides optimal board cleanliness.	A high activity organic flux that provides maximum capillary wetting action up plated through-holes, making it ideal for use on multi-layer boards. Minimizes icicling and bridging and produces bright, shiny solder joints. It is chemically compatible with most solder masks and board laminates and does not emit offensive odors during soldering. Suitable for spray, dip or foam applications.
Percent solids (typical)	33	24	14	7.0
Specific gravity (gm/cc) at 25°C (77°F) (typical)	0.899	0.882	0.862	1.058
Residue removal method	Residue removal is required. Use soft or de-ionized water at temperatures of 49-65°C (120-150°F).	Residue removal is required. Use soft or de-ionized water at temperatures of 54-66°C (130-150°F).	Residue removal is required. Use soft or de-ionized water at temperatures of 49-65°C (120-150°F).	Residue removal is required. Use soft or de-ionized water at temperatures of 43-60°C (110-140°F) with 2% solution of Kester 5768 Bio-Kleen® saponifier
Compliant specifications	IPC ANSI/J-STD-004 Flux designator ORH1	IPC ANSI/J-STD-004 Flux designator ORH1	IPC ANSI/J-STD-004 Flux designator ORH0	IPC ANSI/J-STD-004 Flux designator ORH1
Thinner no.	4662	4662	4240	De-ionized Water

Component Lead Tinning Fluxes

Flux Type	Halide Activated	Halide-Free	Halide-Free
Formula	1429	2166-BN	2169
Product characteristics	Halide activated, water based and self neutralizing flux originally developed by the Battelle Institute.	Highly active, water-based flux designed for wave soldering and dipping applications for semiconductor component lead tinning.	These active formulations are designed for high-speed wave soldering applications. Varied solids content and halide activity available.
Percent solids (typical)	18	31	27
Specific gravity (gm/cc) at 25°C (77°F) (typical)	1.061	1.144	0.919
Residue removal method	Residue is removed with hot de-ionized or soft waters at 45-65°C (113-140°F).	Residue is removed with hot de-ionized or soft waters at 49-60°C (120-140°F).	Residue is removed with hot de-ionized or soft waters at 49-60°C (120-140°F).
Compliant specifications	IPC ANSI/J-STD-004 Flux designator ORH1	IPC ANSI/J-STD-004 Flux designator ORH0	IPC ANSI/J-STD-004 Flux designator ORH0
Thinner no.	De-Ionized Water	De-ionized Water	4169

Flux Residue Remover

Flux Type	Aqueous Saponifier	Halogen-Free Stencil Cleaner	Halogen-Free solvent
Formula	5768 Bio-Kleen®	5252	5252M
Product characteristics	Rosin residues can be easily removed in an aqueous solution through saponification. Designed for difficult to remove solder paste residues. It is non-reactive with most metals present on electronic assemblies.	Multi-purpose ozone depletion potential free solvent cleaner developed for the cleaning of stencil, misprinted circuit board and mechanical devices.	Not ozone depleting. Suitable substitute for chlorinated solvents. Fast air drying, non-ionic, non-corrosive and non-carcinogenic.
Application	This concentrated formula is intended to be use at a 5-15% concentration for removing rosin-based residues. A concentration of 1-4% Bio-Kleen® can assist in removing additional no-clean flux residues. Can be heated to 71°C (160°F) to further facilitate residue removal. Designed to be used in a batch or in-line cleaning system. Not recommended for use in manual or ultrasonic cleaning operations.	Designed for use in dipping, spraying or localized cleaning. Sufficient solvent should be used to remove the dissolved residue from the parts being cleaned.	For removal of residues from rosin and other flux residues on stencils and circuit boards. Designed for immersion cleansing method where the residue is completely immersed in the solvent.
Flammability	Concentrate, Combustible	Flammable	Flammable

Chemical Products

Chemical Type	Copper-Nu®	Nickel-Nu®	Solder-Nu®
Formula	5520	5530	5560
Product characteristics	Non-fuming acidic solution provides a controlled amount of etching to copper surfaces prior to plating or coating.	Non-fuming acidic solution provides a controlled amount of etching to surfaces made from nickel and nickel alloys.	Non-fuming acidic solution provides a controlled amount of etching to solder, tin or silver plated surfaces.

Chemical Type	Dross Inhibiting Fluid	Dross Eliminator®	Neutralizer
Formula	5751	5744	5760
Product characteristics	A highly refined synthetic fluid composition primarily designed for use in automatic soldering machines to minimize solder oxidation and drossing. Eliminates icicling and bridging by reducing both surface tension and interfacial tension between the solder and the metal surfaces being soldered. Reduces solder usage and facilitates solder flow. Kester 5751 is soluble in water, solvents (e.g. chlorinated / fluorinated solvents) and alcohol.	For the reduction of dross scrap. Chloride-free, inorganic white powder formulated to remove dross from still solder pots and wave soldering machines. Does not decompose to sticky residues. Low fuming and stable at molten solder temperature below 260°C (500°F).	Effective in completely solubilizing chloride complex residues that result when soldering with organic or inorganic fluxes.

Tacky Soldering Fluxes

Kester is the industry leader for Tacky Soldering Fluxes (TSFs) used in ball/sphere attach of BGAs or CSPs, BGA/CSP rework, flip chip attach, or whenever a tacky flux is needed as an interconnect solution for SMDs.

Flux Type	No-Clean		Water-Soluble	
Formula	TSF-6502	TSF-6592	TSF-6850	TSF-6805L

Please refer to page 8 for full product descriptions.

Ultra-Spheres®

Kester's unique, proprietary manufacturing technology produces spheres with smooth, clean surfaces and tight size distributions. Process characteristics include free flow in placement equipment, resistance to fretting damage (darkening), and exceptional solderability.

Size (mil)	2 oz. Jar	6 oz. Jar
35 ± 1	—	210,000
31.5 ± 1	—	290,000
30 ± 1	—	335,000
28 ± 1	—	410,000
25 ± 1	325,000	—
20 ± 1	650,000	—
18 ± 1	875,000	—
16 ± 0.5	1,250,000	—
14 ± 0.5	1,900,000	—
12 ± 0.5	3,000,000	

Available Alloys
Sn63Pb37
Sn10Pb90
Sn95.5Ag4.0Cu0.5
Sn95.5Ag3.8Cu0.7
Sn96.5Ag3.0Cu0.5

Contact Kester for additional alloys and sizes.

Kester Solderforms®

Kester Solderforms® are extruded, stamped, compacted or formed pieces of pure soft solder alloys manufactured with strict known tolerances to customer specifications. Kester also creates other preforms such as collars, ribbon forms, rings, and wireforms that 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 for high volume applications. Try Kester Solderforms® today to reduce your rework and realize improved first-pass yields.

Solderforms®

		Minimum (in.)	Maximum (in.)
Ribbons	Width Thickness	0.015 ± 0.005 0.002 ± 0.001	3.50 ± 0.030 0.125 ± 0.005
Cut-offs	Width Length Thickness	0.015 ± 0.005 0.030 ± 0.010 0.002 ± 0.001	3.50 ± 0.030 20.0 ± 0.050 0.125 ± 0.005
Washers	Outside Diameter Inside Diameter Thickness	0.035 ± 0.002 0.015 ± 0.002 0.002 ± 0.001	3.00 ± 0.005 2.30 ± 0.005 0.125 ± 0.010
Discs	Outside Diameter Thickness	0.016 ± 0.002 0.002 ± 0.001	3.00 ± 0.005 0.125 ± 0.010
Pellets	Diameter Length	0.010 ± 0.001 0.020 ± 0.005	0.585 ± 0.005 6.00 ± 0.030
Sleeves	Outside Diameter Inside Diameter Height Wall	0.070 ± 0.002 0.060 ± 0.002 0.075 ± 0.010 0.010 ± 0.001	0.560 ± 0.005 0.550 ± 0.005 0.200 ± 0.010 ------
Stampings	Description	Stampings use special dies that are customer specific and require a customer's engineering drawing and specification.	

Recommended Kester Preform Fluxes

Description	Internal	External	Description
Rosin Fully Activated	48SF	48SF	Instant wetting action to most metal surfaces with non-corrosive/non-conductive amber residues. Classified as ROM1 flux.
Rosin Mildly Activated	286SF	286SF	Excellent wettability on Tin, HASL, and OSP surfaces. Pale yellow residue. Classified as ROL1 flux.
Water-Soluble	OR-420	435	Water washable, heat stable, low odor, and excellent wetting to most metals including brass and nickel alloys. Classified as ORH1 flux.
No-Clean	246SF	291S	Latest, highly activated no-clean flux system with extremely wide processing window. Clear residue. Classified as ROL0/ORL0 flux.

Preforms are available in tape and reel for automatic placement.

Bar Solder and Related Products

Kester makes no vague claims of outstanding solder purity. The quality of Kester Bar and Anode Solder is guaranteed by using virgin metals and strict quality control standards. Kester extrudes its bar and anode products to minimize oxidation, limit segregation and provide a denser grain structure than cast bar. Kester manufactures solder to distinct specifications. Each meets and exceeds requirements of QQ-S-571, ASTM 32, ANSI/J-STD-006, and JIS-Z-3282.

Kester Ultrapure® Solder Bar

Made by a special process which controls the inclusion of oxides and metallic and non-metallic impurities, Kester Ultrapure® is the industry standard bar solder for use in high tech electronics applications where lower surface tension and hole filling ability are essential. The purity of Kester Ultrapure® far exceeds the requirements of QQ-S-571-F, ASTM B32, and ANSI/J-STD-006.

Kester Ultrapure® Low Dross Solder Bar

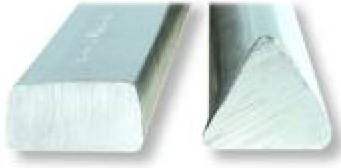
Manufactured using the Ultrapure® process and containing the same metal purity as Kester Ultrapure®, Kester Ultrapure® Low Dross is formulated with a special low dross additive which dramatically decreases dross formation on the solder pot. Lower dross formation decreases joint weakening inclusions in the solder, keeps surface tension low and decreases costly solder loss through drossing.

Kester Ultrapure® Solder Anodes

Kester Ultrapure® Anode is made using the highest purest virgin metal. High pressure extrusion and the Ultrapure® process assure all anodes with a dense fine grain structure. They permit higher current densities without passivation, guarantee uniform dissolution, and do not normally require bagging. Kester Ultrapure® Anode is available in 19mm and 25mm with a range of alloy combinations and in half or full spherical.

Shinsolder

A low dross alloy that meets and exceeds the JIS-Z-3282 requirements. This alloy is designed to reduce dross formation on the solder pot while providing good wetting. Shinsolder is available in solder bar and wire. For full descriptions, please refer to the Alloy Temperature Chart on pg. 17.



Leaded Rectangle Bar   Lead-Free Triangle Bar

Alloy 46

A fatigue resistant alloy designed to improve solder joint reliability for electrical and electronic applications requiring an alloy that meets the JIS-Z-3282 requirement. Comparing to Sn63Pb37, Alloy 46 features better resistance in thermal cycling, withstands repeated mechanical stresses, high temperature creep, and strength against shock.

Solder Analysis Program

Kester Solder Analysis Program is designed to effectively provide the control required for various soldering operations. By selecting the analysis option which best monitors the solder composition, the quality of the solder can be maintained. The recommendations are made on the basis of contamination levels reporting solder pot impurities.

Maximum Allowed Impurities

Element		Kester Ultrapure®	Ultrapure® Low Dross	Ultrapure® Anodes	JIS Grade E	JIS Grade A	JIS Grade B	ANSI/IPC J-STD-006
Copper	Cu	0.015	0.015	0.015	0.050	0.050	0.080	0.080
Gold	Au	0.002	0.002	0.002	-	-	-	0.050
Antimony	Sb	0.050	0.050	0.020	0.050	0.120	1.000	*
Cadmium	Cd	0.001	0.001	0.001	0.002	0.002	0.005	0.002
Zinc	Zn	0.001	0.001	0.001	0.001	0.002	-	0.003
Aluminum	Al	0.002	0.002	0.002	0.001	0.002	-	0.005
Iron	Fe	0.010	0.010	0.010	0.020	0.020	-	0.020
Arsenic	As	0.020	0.020	0.020	0.030	0.030	-	0.030
Bismuth	Bi	0.020	0.020	0.020	0.050	0.100	-	0.100
Silver	Ag	0.002	0.002	0.002	-	-	-	0.050
Nickel	Ni	0.002	0.002	0.002	-	-	-	0.010
Indium	In	0.007	0.007	0.007	-	-	-	0.100
					Total for Cd+Zn+Al +Fe+As Max. 0.080	Total for Cd+Zn+Al +Fe+As Max. 0.080	Total for Bi+Zn+Fe +Al+As Max. 0.350	*For variation A,B and C alloys the Sb maximum is 0.50%, 0.20% and 0.050%.

Kester Solder Analysis Program

Option A	Option C
Tin	Tin
Copper	Antimony
Antimony	Copper
Gold	Gold
	Gadmium
	Aluminum
	Zinc
	Iron
	Arsenic
	Bismuth
	Silver
	Nickel

Kester Specialty Alloy Capability

Kester is dedicated to producing high quality solder products meeting our customers' application driven requirements. A few of the most common alloys used by the electronic assembly market are shown below. However, if you have a need for a low melting solder alloy (< 350°C) not shown below, containing elements such as Tin (Sn), Lead (Pb), Silver (Ag), Bismuth (Bi), Antimony (Sb) or Copper (Cu), contact our customer service department with your requirements. Chances are that Kester has made it before. Special alloys can often be produced in several forms including bar, wire, solder preforms and solder paste.

Common Alloy Temperature Chart

Commonly specified solder alloys are shown in the table. The selection of alloy is determined by applications, melting temperature and physical properties. The alloys listed may be available in forms other than those indicated. Other solder alloys are also available. Where applicable, Kester solder material products meet and exceed ASTM B32, QQ-S-571, IPC ANSI/J-STD-006, and JIS-Z-3282 specifications.

SOLDER ALLOYS AND AVAILABLE FORMS						
ALLOY	**MELTING RANGE**		**AVAILABLE FORMS**			
LEAD-FREE	**°F**	**°C**	**WIRE**	**BAR**	**SOLDER PASTE**	**SOLDERFORMS®**
K100 - Low-cost lead-free near eutectic alloy for wave and hand soldering.	441	227	X	X		X
100%Sn - Sometimes referred to as Sn99, is used for making tin additions to solder pots.	450	232	X	X		X
Sn96.5Ag3.5 - High temperature, eutectic alloy provides high joint strength.	430	221	X	X	X	X
Sn96Ag04 - This alloy is used in applications where high joint strength is required.	430 - 444	221 - 229	X	X		X
Sn96.5Ag3.0Cu0.5 - (#5042) Commonly used lead-free alloy.	424 - 430	218 - 221	X	X	X	X
Sn95.8Ag3.5Cu0.7 - Commonly used lead-free alloy.	423 - 424	217 - 218	X	X	X	X
Sn94.8Ag1.2Cu4 - (#5046) Used in high temperature applications, prevents copper leaching.	423 - 662	217 - 350		X		
Sn93.5Ag0.5Cu6 - (#5140) Used in higher temperature applications, prevents copper leaching.	423 - 734	217 - 390		X		
Sn*Ag3Cu0.5Ge* - (SS#5042) For good solderability and less oxides.	424 - 430	218 - 221		X		X
Sn42Bi58 - Use in low temperature lead-free applications.	280	138			X	
Sn99.3Cu0.7 - (#5020) High temperature eutectic alloy that provides high reliable joint.	441	227	X	X		X
Sn95Sb05 - For applications where connections see peak temperatures near 400°F.	450 - 464	232 - 240	X	X	X	X
Sn89Zn8Bi3 - (#6020) Used in applications where middle temperature soldering is required.	376 - 388	191 - 198			X	
LEADED						
Sn63Pb37 - Most common, tin-lead eutectic used in PCB assembly applications.	361	183	X	X	X	X
Sn60Pb40 - Used in single sided board soldering and solder dipping operations.	361 - 174	183 - 190	X	X		X
Sn50Pb50 - Intended use for bit soldering and sweat soldering iron, steel, and copper.	361 - 240	183 - 214	X	X		X
Sn40Pb60 - Higher temperature applications, common in automobile radiator soldering.	361 - 460	183 - 238	X	X		X
Sn30Pb70 - Higher temperature applications, common in automobile radiator soldering.	361 - 496	183 - 258	X	X		X
Sn20Pb80 - Not commonly used, solder for automotive body or radiator work.	361 - 536	183 - 280	X	X		X
Sn10Pb90 - Alloy choice for solder spheres and columns used in ceramic BGA/CGA fabrication.	514 - 576	268 - 302	X	X		X
Sn05Pb95 - High temperature alloy used infrequently in specialty applications.	574 - 597	301 - 314				X
No. 123 - Low drossing alloy used in high temperature wire tinning operations.	366 - 503	186 - 262	X	X		
Sn62Pb36Ag02 - Used on silver coated ceramics and PdAg substrates, prevents silver leaching.	354 - 372	179 - 189	X	X	X	X
Sn60Pb36Ag04 - Used on silver coated ceramics and PdAg substrates, prevents silver leaching.	354 - 475	179 - 246	X	X		X
Sn10Pb88Ag02 - Used in products that operate in high ambient temperature environments.	514 - 570	268 - 299	X	X	X	X
Sn05Pb93.5Ag1.5 - Used in products that operate in high ambient temperature environments.	565 - 574	296 - 301	X			X
Sn05Pb92.5Ag2.5 - The highest temperature, eutectic alloy available from Kester.	536	280	X	X		X
Sn57Pb40Bi3 - (#2090) Bismuth contained solder, used in low temperature applications.	347 - 358	175 - 181		X	X	X
Sn46Pb46Bi8 - (#2072) Bismuth contained solder, used in low temperature applications.	325 - 352	163 - 178		X	X	X
Sn43Pb43Bi14 - Used in low temperature applications.	291 - 325	144 - 163	X	X	X	X
Alloy 46 - Provides high strength to solder joints.	352 - 365	178 - 185	X	X		X
Shinsolder - This alloy provides good solderability and less oxide.	361 - 363	183 - 184	X	X		

*Please call Kester Customer Service Department for specific alloy percentage.

Weights and Measures Common Conversions

To Change	To	Multiply By:
Gallon (US)	Liters	3.7853
Quarts (liquid)	Liters	0.9463
Pounds (avdp.)	Kilograms	0.4536
Ounces (avdp.)	Grams	28.3495
Inches	Millimeters	25.400
Meters	Feet	3.2808
Celsius = 5/9(°F-32) Fahrenheit = 9/5(°C) + 32		

Formula for Adding Tin to Leaded Solder Pots

Tin can be added to solder to replace tin lost by oxidation. The pot temperature should be at least 238°C. Tin bars should be added slowly and the solder should be mixed well.

	Example
$T = \frac{W(A - B)}{(100 - A)}$	Ex: $\frac{900\ (63 - 61.6)}{(100 - 63)} = \frac{1260}{37} =$ 34 lbs. of Tin to add.
T = Pounds of Tin to add. **A** = Percentage of Tin desired.	**W** = Pounds of solder in pot. **B** = Percentage of Tin in pot.

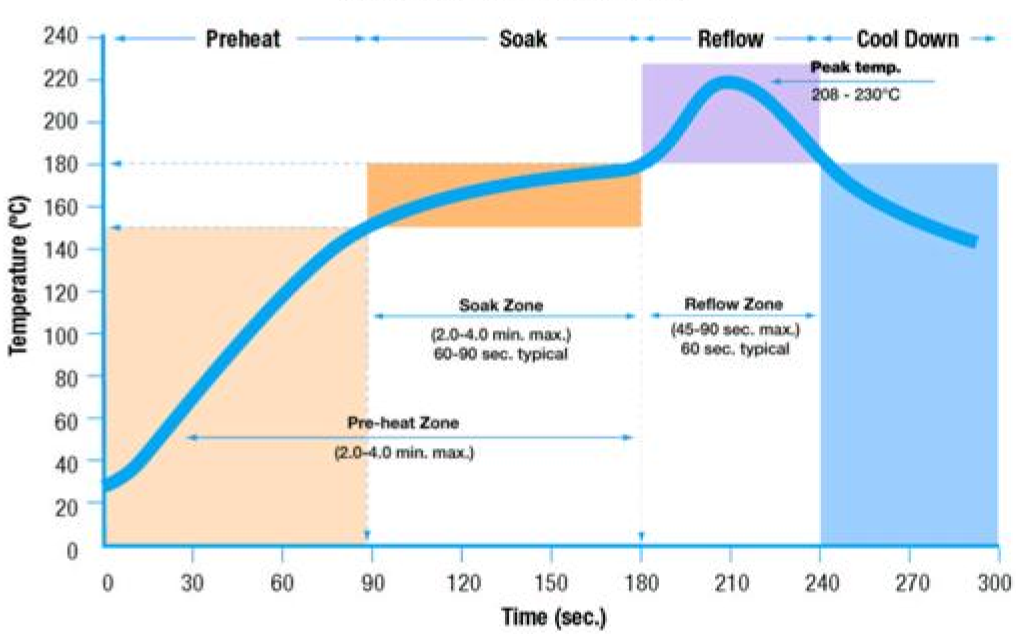
The formula above is only designed to be used with a Sn/Pb solder pot. For a pot calculator for lead-free (SAC alloy systems), please visit www.kester.com and click on Lead Free Solutions. On this page, you will find a link to a Solder Analysis Calculator.

Stage 1 - Preheat Zone (Rapid Heating Stage)
The purpose of this zone is to quickly bring the assembly up to a temperature where solder paste can become chemically active.

Stage 2 - Soak Zone (Temperature Equalization Zone)
The purpose of this stage is for the thermal mass of the assembly to reach a uniform temperature plateau so that there is a very small differential between the hottest and coldest soldering locations on the assembly.

Stage 3 - Reflow Zone (Rapid Heating and Cooling)
The purpose of this stage is to rapidly heat the assembly above the melting (liquidus) temperature of the solder and subsequently cool the assembly down quickly to solidify the solder. Wetting of solder onto substrates occurs in the reflow zone.

Standard Solder Paste Reflow Profile for Kester Paste Containing Alloys: Sn63Pb37 or Sn62Pb36Ag02



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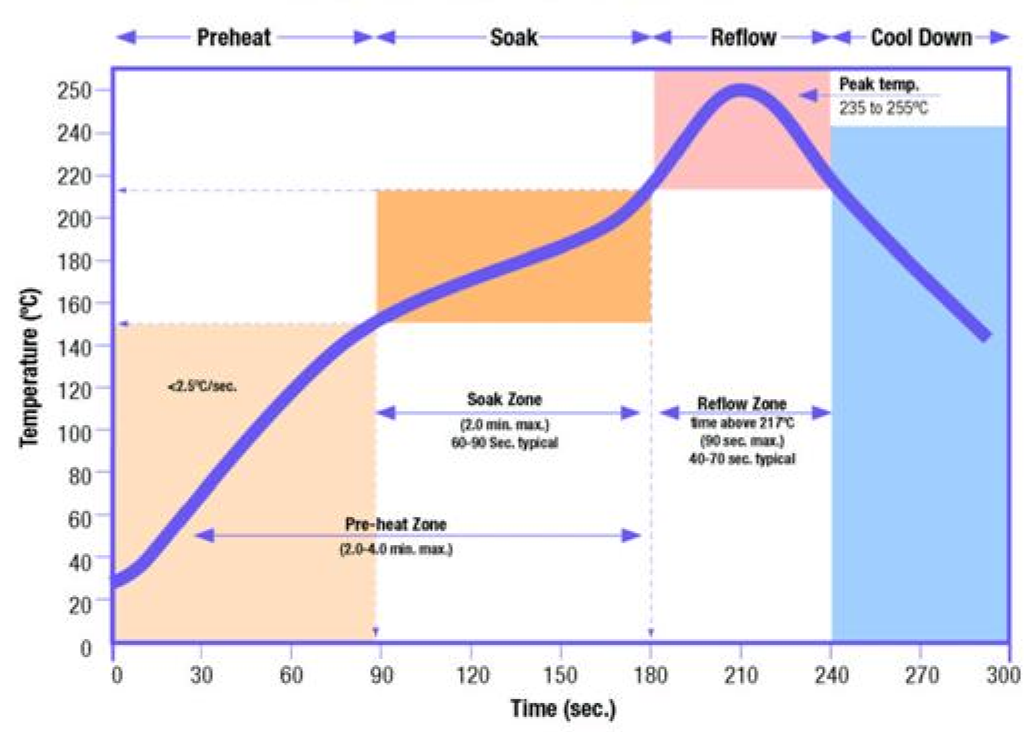
Lead-Free Reflow Profile Alloys: Sn96.5Ag3.0Cu0.5 and Sn96.5Ag3.5



Bellcore Issue 1 GR-78-CORE (1997) Standard for Flux

Copper mirror	No evidence of complete copper removal (No white background visible).
Halides	Must pass silver chromate paper.
Surface insulation resistance (SIR)	>2 x 10^{10} Ohms for 12.5mil/12mil line and spacing comb pattern. >1 x 10^{11} Ohms for 25mil. 50mil line and spacing comb pattern.
Electromigration	Under 10X magnification, no dendrite growth reducing spacing more than 20%. Minor discoloration is acceptable but heavy corrosion not acceptable. $IR_{500\ hrs} > IR_{96\ hrs}/10$.

Joint Industry Standard J-STD-004 (1995) Flux Activity Classification

Flux Classification Test	L0	L1	M0	M1	H0	H1
Copper mirror	No evidence of mirror breakthrough.		Breakthrough in less than 50% of test area.		Breakthrough in less than 50% of test area.	
Qualitative halide silver chromate (Cl, Br)	Pass	Pass	Pass	Fail	Pass	Fail
Qualitative halide spot test (F)	Pass	Pass	Pass	Fail	Pass	Fail
Quantitative halide: (Cl, Br, F)	0.0%	<0.5%	0.5 to 2.0%	0.0%	<2.0% No	Fail
Corrosion test	No evidence of corrosion.		Minor corrosion acceptable.		Major corrosion acceptable.	
Conditions for passing 100 megaohm surface insulation resistance requirements (SIR)	Both cleaned and unclean.		Cleaned and unclean.		Cleaned.	

JIS Standard of Resin Flux-Core Solder

Item	Characteristics		
	AA	**A**	**B**
Flux content (wt. %)	1.0 - 3.0		
Dryness	Chalk powder to be easily removed from test plate.		
Chlorine content (wt. %)	Max 0.1	0.1 - 0.5	0.5 - 1.0
Copper plate corrosion	No greater corrosion than reference test piece.		
Copper mirror corrosion	No greater corrosion than standard flux.	–	–
Aqueous solution resistance (Ωm)	Min. 1,000	Min. 500	–
Insulation resistance (Ωm)	Min. 1x10^{12}	Min. 1x10^{11}	Min. 1x10^{9}
Moisture resistance under application of voltage (Ω)	Min. 1x10^{12}	Min. 1x10^{11}	Min. 1x10^{9}
Voltage applicability (visual)	No remarkable corrosion on test piece.		
Spread factor (%)	Min. 75	Min. 80	Min.80
Main use	Microelectronics, wireless, etc. where corrosion is a problem.	Assembling and wiring of telecommunication apparatus.	Assembling and wiring of radio and TV general relaying.

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