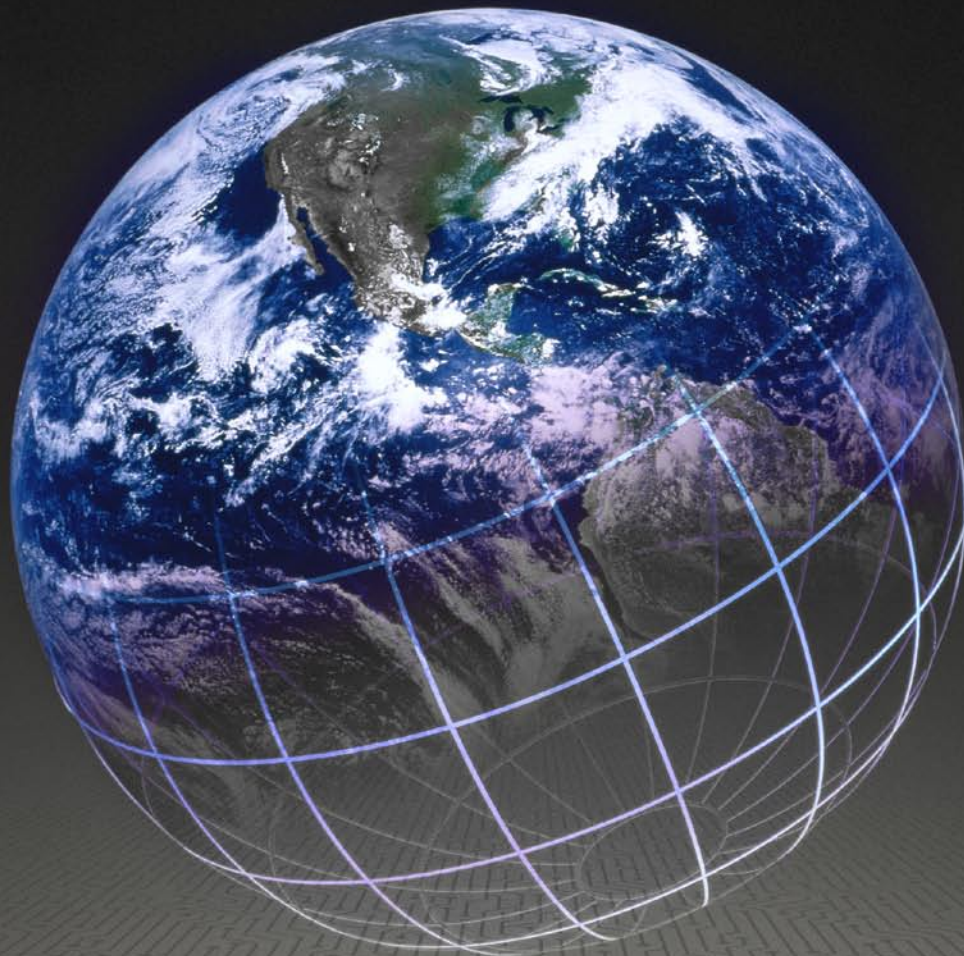


Electronic Assembly Materials



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

**New Location
as of Nov. 1, 2006**

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Email: twsales@kester.com.tw

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™

Technical Service can be contacted by calling:

800-2-KESTER
(847) 297-1600

or by faxing:
(847) 699-4980

email:
technicalservice@kester.com

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

Customer Service can be contacted by calling:

800-2-KESTER
(847) 297-1600

or by faxing:
(847) 699-5548

email:
customerservice@kester.com

Information Necessary for Ordering Kester Products.

Solder Paste

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

Bar Solder

1. Alloy type
2. Bar type and size
3. Quantity required

Cored Solder Wire

1. Alloy type
2. Wire diameter
3. Spool size
4. Core flux type
5. Core flux size
6. Quantity required

Liquid Flux

1. Formula number
2. Unit size
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



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.

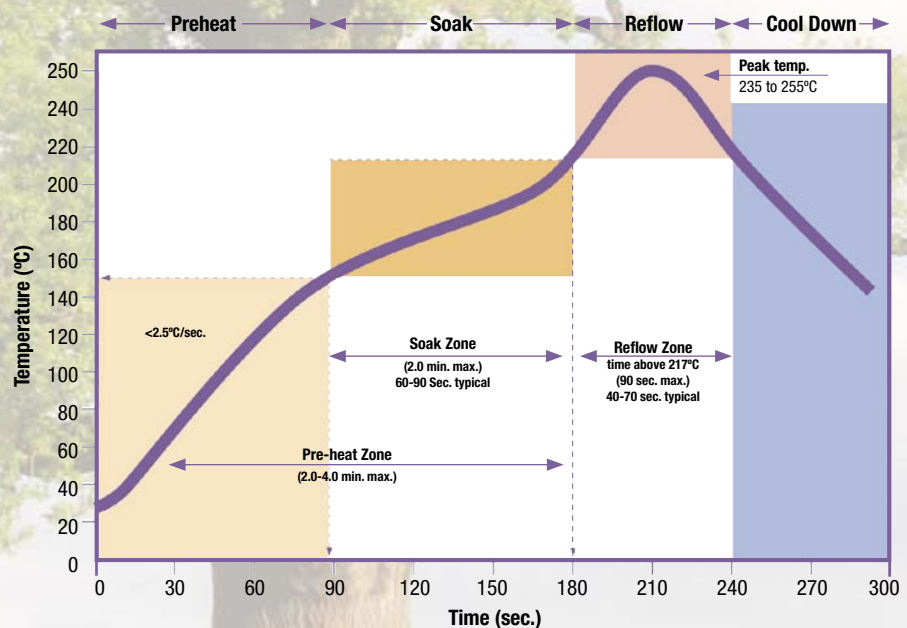
Stage 2 - Soak Zone (Temperature Equalization Zone)

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.

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



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.

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.

Formula	<i>RoHS Ready</i> EnviroMark™ 907	<i>RoHS Ready</i> EnviroMark™ 909	<i>RoHS Ready</i> EnviroMark™ 808	<i>RoHS Ready</i> R520A
Application	No-Clean Stencil Printing		Water-Soluble 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. Designed to be reflowable in air as well as nitrogen.	EM909 is a pin probeable solder paste specifically designed for the thermal requirements of lead-free alloys, including the Sn96.5Ag3.0Cu0.5 alloy. The resulting solder joints closely resemble those of SnPb alloys. EM909 is also capable of stencil printing downtimes up to 90 minutes with an effective first print down to 20 mils without any kneading.	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 life and print speed. The activator package is very aggressive and provides superior wetting to OSP coated and Immersion Silver boards.	The 520A is designed to solder effectively difficult metal surfaces in an 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.
Residue Characteristics	Light colored	Light colored Pin probeable	Cleanable in warm water	Cleanable in warm water
Copper Mirror Corrosion	Low	Low	Low	High
Halide Tests	Halide-Free	Halide-Free	Halide-Free	Halide-Free
Surface Insulation Resistance	Pass (uncleaned)	Pass (uncleaned)	Pass (cleaned)	Pass (cleaned)
Printing Characteristics	Excellent to 16 mils pitch (0.4mm)	Excellent to 16 mils pitch (0.4mm)	Excellent to 16 mils pitch (0.4mm)	Excellent to 16 mils pitch (0.4mm)
Idle Time	60 minutes at 70-77°F and 40-60% R.H.	90 minutes at 70-77°F and 40-60% R.H.	60 minutes at 70-77°F and 40-60% R.H.	60 minutes at 70-77°F and 40-60% R.H.
Maximum Print Speed	Up to 150 mm/sec	Up to 150 mm/sec	Up to 150 mm/sec	Up to 150 mm/sec
Typical Metal Percentage	88.5% Type III Powder for Stencil Printing	88% Type III Powder for Stencil Printing	88% Type III Powder for Stencil Printing	89.5% Type III Powder for Stencil Printing
Expected Stencil Life	12+ hours at 70-77° and 40-60% R.H.	12+ hours at 70-77° and 40-60% R.H.	8+ hours at 70-77° and 40-60% R.H.	8+ hours at 70-77° and 40-60% R.H.
Reflow Atmosphere	Air or Nitrogen	Air or Nitrogen	Air or Nitrogen	Air or Nitrogen
Compliant Specifications	Telcordia Issue 1 GR-78-CORE IPC/J-STD-004 Flux Designator ROLO	Telcordia Issue 1 GR-78-CORE IPC/J-STD-004 Flux Designator ROLO	IPC/J-STD-004 Flux Designator ORMO	IPC/J-STD-004 Flux Designator ORHO



No-Clean and Water-Soluble Pastes

Standard Solder Paste Alloys

Lead-Free	Sn96.5Ag3.0Cu0.5
Low Temperature Lead-Free	Sn42Bi57Ag01
Leaded	Sn63Pb37, Sn62Pb36Ag02
Low Temperature Leaded	Sn43Pb43Bi14

Lead Solder Paste

Stencil Printing

Flux Type	No-Clean		Water-Soluble	
Formula	Easy Profile® 256	Easy Profile 25HA	HydroMark 531	R562
Key Characteristic	Print Friendly	High activity	High Activity	Low Voiding
Cleaning	Not Required	Not Required	Use de-ionized water at 120-140°F	Use de-ionized water at 120-140°F

Dispensing

Flux Type	No-Clean	Water-Soluble
Formula	R276	R500
Cleaning	Not Required	Use de-ionized water at 120-140°F

6

Standard Solder Powder Distributions* for Solder Paste

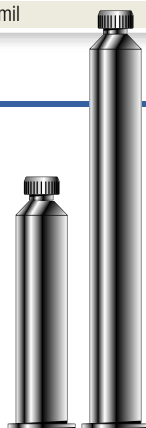
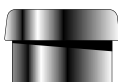
Powder Type	Mesh Designation	Typical Particle Diameter	Recommended Surface Mount Application (Pitch)
Type 3	-325 +500	25 to 45 micron	Down to 16 mil
Type 4	-400 +500	25 to 38 micron	Down to 12 mil

*Other distributions are available upon request.

Solder Paste Packaging Options*

Jar	Cartridge*
250 gram	600 gram
500 gram	1000 gram
* Jars are sized to fit Malcom® style viscometer.	

*Other packing options are available upon request.



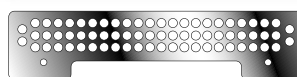
Syringe	
35 gram	10cc
100 gram	30cc

*Other packaging options are available upon request.



DEK ProFlow™ Cassette

750 gram



Standard Core Wire Solders

Flux Type	No-Clean	Organic Water-Soluble	Rosin Activated	Rosin Mildly Activated
Formula	RoHS ready 275	RoHS ready 331	RoHS ready 48	RoHS ready 285
Lead-Free Compatible	Yes	Yes	Yes	Yes
Product Characteristics	Superior wetting performance leaving an extremely clear post-soldering residue. Designed to be a low splattering core flux.	Industry standard water washable core for most electrical and electronic hand soldering.	Very high activity rosin flux used for difficult to solder metals.	Mildly activated rosin cored wire for sensitive electronic and military applications.
Compliant Specifications	Telcordia Issue 1 GR-78-CORE, & IPC/J-STD-004 Flux Designator ROL0	IPC/J-STD-004 Flux Designator ORH1	IPC /J-STD-004 Flux Designator ROL1	Telcordia Issue 1 GR-78-CORE, & IPC/J-STD-004 Flux Designator ROL0
Residue Removal Method	Not required for most applications but may be removed with solvent or Kester #5768 Bio-Kleen® saponifier.	Residue removal is required. Use soft or de-ionized water at temperatures of 120-150°F.	Not required for most applications but may be removed by solvent or Kester #5768 Bio-Kleen® saponifier.	Not required for most applications but may be removed by solvent or Kester #5768 Bio-Kleen® saponifier.
Use on Metals	Table 1, Category 1 Page 14	Table 1, Category 1, 2 & 3 Page 14	Table 1, All Categories Page 14	Table 1, Category 1 Page 14

Flux Type	No-Clean	Organic Water-Soluble	Rosin Activated
Formula	245	RoHS ready OR-421	RoHS ready 44
Lead-Free Compatible	In some applications	Yes	Yes
Product Characteristics	Performance similar to mildly activated rosin core, but leaves a visually cleaner appearance after soldering.	Activity level similar to an acid flux.	Activated rosin core with excellent wetting action. Industry standard for most electrical and electronic hand soldering.
Compliant Specifications	Telcordia Issue 1 GR-78-CORE & IPC/J-STD-004 Flux Designator ROL0	IPC/J-STD-004 Flux Designator ORH1	IPC/J-STD-004 Flux Designator ROM1
Residue Removal Method	Not required for most applications. May be removed with solvent or Kester #5768 Bio-Kleen® saponifier.	Residue removal is required. Use Kester #5760 neutralizer in water followed by a warm water rinse.	Not required for most applications. May be removed with solvent or Kester #5768 Bio-Kleen® saponifier.
Use on Metals	Table 1, Category 1 Page 14	Table 1, Category 1, 2 & 3 Page 14	Table 1, Category 1 & 2 Page 14

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.

Standard Flux-Core Sizes

Standard No. 50 Small	Standard No. 58 Medium	Standard 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.



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 five available formulas are listed in the chart below.

Flux-Pen® Formulas

Formula	951	RoHS ready 186	RoHS ready 2331-ZX	RoHS ready 959T	RoHS ready 186-18
Flux Type	Low Solids No-Clean	Mildly Activated Rosin	Neutral pH Water-Soluble	Low Solids No-Clean	Mildly Activated Rosin



No-Clean Liquid Fluxes

No-Clean Liquid Fluxes

	Alcohol Based			VOC-Free	
Formula	<i>RoHS ready</i> 959T	<i>RoHS ready</i> 959	951	<i>RoHS ready</i> 979	971M
Flux Type	Low Solids, No-Clean	Low Solids, No-Clean	Rosin Free Low Solids, No-Clean	VOC-Free No-Clean	VOC-Free No-Clean
Lead-Free Compatible	Yes	Yes	No	Yes	No
Percent Solids	2.9	3.9	2.0	4.5	3.25
VOCs(g/liter)	776	776	792	0	0
Specific Gravity (gm/cc) at 25°C (typical)	0.794 ± 0.005	0.800 ± 0.005	0.814 ± 0.003	1.016 ± 0.010	1.005 ± 0.010
Product Characteristics	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.	Formulated for wave soldering of conventional and surface mount circuit board assemblies. Developed to minimize the formation of micro-solderballs during wave soldering. Designed for spray or foam applications.	Developed for single wave soldering machines only, 951 is extremely low solid content and minimizes solder bridges (shorts) and excessive solder defects. Designed for spray or foam applications.	Most active VOC-Free flux for optimal top-side wetting and solderballs reduction. May be applied by spray fluxer only.	Developed for foam and wave fluxer applications.
Compliant Specifications	Bellcore Issue 1 GR-78-CORE, IPC/J-STD-004 Flux Designator ORLO	Bellcore Issue 1 GR-78-CORE, IPC ANSI/J-STD-004 Flux Designator ORLO	Bellcore Issue 1 GR-78-CORE, IPC ANSI/J-STD-004 Flux Designator ORLO	Bellcore Issue 1 GR-78-CORE, IPC ANSI/J-STD-004 Flux Designator ORLO	Bellcore Issue 1 GR-78-CORE, IPC ANSI/J-STD-004 Flux Designator ORLO
Residue Removal Method (not normally required)	Wash with hot de-ionized water at 140-160°F with 1% solution of Kester #5768 Bio-Kleen® saponifier.	Wash with hot de-ionized water at 140-160°F with 1% solution of Kester #5768 Bio-Kleen® saponifier.	Wash with hot de-ionized water at 140-160°F with 1% solution of Kester #5768 Bio-Kleen® saponifier.	Wash with hot de-ionized water at 140-160°F with 2% solution of Kester #5768 Bio-Kleen® saponifier.	Wash with hot de-ionized water at 140-160°F with 2% solution of Kester #5768 Bio-Kleen® saponifier.
Thinner	4662-SM	4662-SM	110	De-ionized Water	De-ionized Water
Flux Test Kit	PS-20 or PS-22	PS-20 or PS-22	PS-22	PS-20 or PS-22	PS-20
Use on Metals	Table 1, Category 1, Page 14	Table 1, Category 1, Page 14	Table 1, Category 1, Page 14	Table 1, Category 1, Page 14	Table 1, Category 1, Page 14

Flux Residue Remover

Formula	5768 Bio-Kleen®
Flux Type	Aqueous Saponifier
Product Characteristics	Rosin residues can be easily removed in an aqueous solution through saponification. 5768 is designed for difficult to remove solder paste residues. It is non-reactive with most metals present on electronic assemblies.
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.



Water-Soluble Liquid Fluxes

	Alcohol Based					VOC-Free
Formula	<i>RoHS Ready</i> 2331-ZX	<i>RoHS Ready</i> 2235	2224-25	<i>RoHS Ready</i> 2222	<i>RoHS Ready</i> 2120	<i>RoHS Ready</i> 2220VF
Flux Type	Neutral PH Organic Water-Soluble	Organic Water-Soluble	Organic Water-Soluble	Highly Activated Organic Water-Soluble	Organic Water-Soluble Halide-Free	VOC-Free Organic Water-Soluble
Lead-Free Compatible	Yes	Yes	In some applications	Yes	Yes	Yes
Percent Solids	33	11	25	25	14	7.2
VOCs (g/liter)	729	763	650	426	670	0
Specific Gravity (gm/cc)	0.899 ± 0.005	0.856 ± 0.005	0.882 ± 0.005	0.951 ± 0.005	0.862 ± 0.005	1.058
Percent Halides	2.2	1.5	1.5	3.0	0.0	3.0
Product Characteristics	Original pH neutral organic flux for automated wave and drag soldering processes.	Low solids flux for surface mount assemblies designed to help reduce skids on bottom side surface mount pads.	Highly active organic flux designed for automated wave soldering applications. Higher percent solids than 2235 for greater heat stability.	Kester's highest activity organic acid flux that can be applied by foam or spray methods.	Low solids flux for surface mount assemblies. Provides optimal board cleanliness.	VOC-Free, water soluble flux for difficult to solder assemblies, can be applied by spray, dip or foam techniques.
Compliant Specifications	IPC/J-STD-004 Flux Designator ORH1	IPC/J-STD-004 Flux Designator ORH1	IPC/J-STD-004 Flux Designator ORH1	IPC/J-STD-004 Flux Designator ORH1	IPC/J-STD-004 Flux Designator ORH0	IPC/J-STD-004 Flux Designator ORH1
Residue Removal Method	Residue removal is required. Use de-ionized water at temperatures of 120-150°F.	Residue removal is required. Use de-ionized water at temperatures of 120-150°F.	Residue removal is required. Use de-ionized water at temperatures of 120-150°F.	Residue removal is required. Use de-ionized water at temperatures of 120-150°F.	Residue removal is required. Use de-ionized water at temperatures 120-150°F.	Residue removal is required. Use de-ionized water at temperatures of 120-150°F.
Thinner	4662	4662	4662	4662	4240	De-ionized water
Use on Metals	Table 1 Category 1 & 2 Page 14	Table 1 Category 1 & 2 Page 14	Table 1 Category 1 & 2 Page 14	Table 1 Category 1, 2 & 3 Page 14	Table 1 Category 1 & 2 Page 14	Table 1 Category 1 & 2 Page 14

Rosin Based Liquid Fluxes

Flux Type	Rosin Non-Activated (R)	Rosin Mildly Activated (RMA)	Rosin Mildly Activated (RMA)	Rosin Activated (RA)
Formula	145	<i>RoHS Ready</i> 186 Series	182	<i>RoHS Ready</i> 1544
Lead-Free Compatible	N/A	Yes	N/A	Yes
Percent Solids	25	18, 25 or 36	25	50
Percent Halides	0	0.02	0.05	0.44
Specific Gravity (gm/cc)	0.844 ± .0005	0.879 ± .0003 (186) 0.848 ± .0005 (186-25) 0.831 ± .0005 (186-18)	0.843 ± .0005	0.928 ± .0005
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 is used on surfaces which are more difficult to solder.
Compliant Specifications	IPC/J-STD-004 Flux Designator ROL0	IPC/J-STD-004 Flux Designator ROL0	IPC/J-STD-004 Flux Designator ROL0	IPC/J-STD-004 Flux Designator ROM1
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 120-150°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 120-150°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 120-150°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 120-150°F.
Thinner	108	120	4662-SM	104
Use on Metals	Table 1 Category 1 Page 14	Table 1 Category 1 Page 14	Table 1 Category 1 Page 14	Table 1 Category 1, 2 & 3 Page 14

Bar Solder and Related Products

The quality of Kester bar and anode solder is guaranteed by using high purity 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 five distinct specifications. Each meets and exceeds requirements of QQ-S-571, ASTM 32, and IPC/J-STD-006.

Ready Ultrapure® K100LD

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.

Ready Ultrapure® K100

Kester Ultrapure® is a low-cost lead-free bar and wire solder. It is a near-eutectic Tin/Copper alloy with metallic dopants to control the grain structure of the solder joint. This improves joint reliability and virtually eliminates icling and bridging. The improved grain structure also results in shinier solder joints than other traditional lead-free alloys.

Kester Ultrapure®

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. The purity of Kester Ultrapure® far exceeds the requirements of QQ-S-571-F, ASTM B32, and IPC/J-STD-006.

Kester Ultra Low Dross

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

Kester Ultrapure® HAL

Kester Ultrapure® HAL bar solder combines the Ultrapure® process with electrolytically refined raw materials producing the highest purity solder available on the market.

Kester E-Bar

Designed for electrical, electronic and mechanical applications requiring bar solder that meets or exceeds the requirements of QQ-S-571, ASTM B32, and IPC/J-STD-006.

Ultrapure® Plating Anodes

Kester Ultrapure® plating anodes are made in the same process and meets the same metallic impurity limits as Kester Ultrapure® bar solder. The high pressure extrusion and the Ultrapure® process assures

that anodes are made with a dense fine grain structure. They permit higher current densities without passivation, guaranteed uniform dissolution, and do not normally require bagging.

Kester 5744 Solder Saver®

A chlorine-free, inorganic, white powder formulated to convert dross into usable solder in still solder pots and wave soldering machines. It does not decompose to sticky residues that are hard to remove. The product is low fuming and is stable at molten solder temperatures.

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.



Leaded Rectangle Bar

Lead-Free Triangle Bar

Maximum Allowed Impurities

Element		Kester E-Bar	Kester Ultrapure®	Ultrapure® HAL	Ultra Low Dross	Ultrapure Anodes
Copper	Cu	0.020	0.015	0.001	0.015	0.015
Gold	Au	0.002	0.002	0.001	0.002	0.002
Antimony	Sb	0.050	0.050	0.010	0.050	0.020
Cadmium	Cd	0.001	0.001	0.001	0.001	0.001
Zinc	Zn	0.001	0.001	0.001	0.001	0.001
Aluminum	Al	0.002	0.002	0.001	0.002	0.002
Iron	Fe	0.010	0.010	0.003	0.010	0.010
Arsenic	As	0.020	0.020	0.001	0.020	0.020
Bismuth	Bi	0.025	0.020	0.003	0.020	0.020
Silver	Ag	0.003	0.002	0.001	0.002	0.002
Nickel	Ni	0.002	0.002	0.001	0.002	0.002
Indium	In	0.007	0.007	0.002	0.007	0.007
Lead	Pb	0.050	0.050	0.050	0.050	0.050

Kester Solder Analysis Program

Option C
Tin
Antimony
Copper
Gold
Cadmium
Aluminum
Zinc
Iron
Arsenic
Bismuth
Silver
Nickel
Lead*

*Lead is measured as an impurity when not part of the alloy composition.

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.

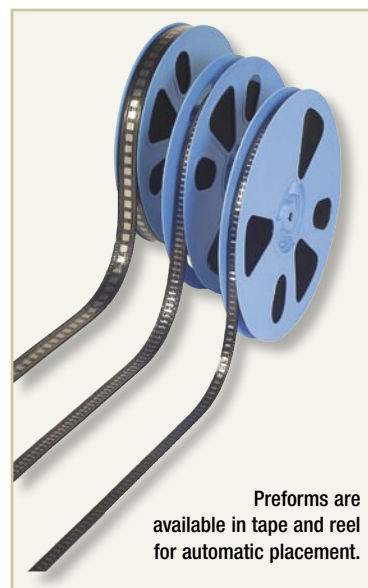


Solderforms®

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

Recommended Kester Preform Fluxes

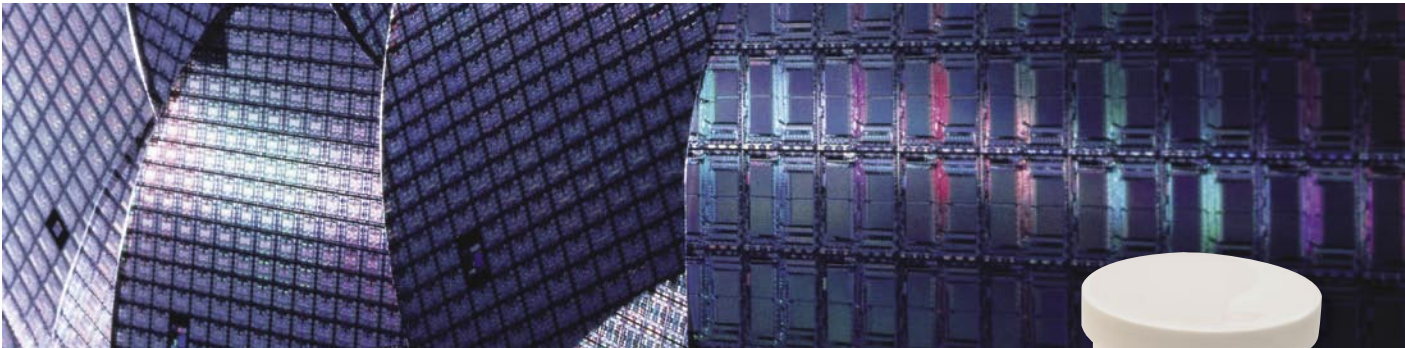
Description	Internal	External	Description
Rosin Fully Activated	48SF	48SF	Instant wetting action to most metal surfaces with non-corrosive/non-conductive amber residues. Classified as ROM1 flux.
Rosin Mildly Activated	286SF	291S	Excellent wettability on Tin, HASL, and OSP surfaces. Pale yellow residue. Classified as ROL1/ORLO 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 ROLO/ORLO flux.



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.



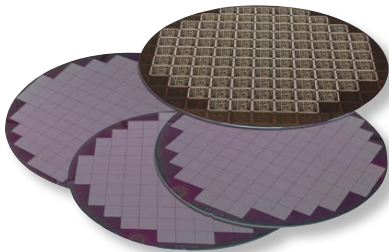
SE-CURE® 7101
Wafer Bumping Solder Paste



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	SE-CURE® 7101	SE-CURE® 7601
Product Characteristics	High performance water soluble paste for use in both wafer and substrate bumping.	Low voiding lead-free paste for use in both wafer and substrate bumping.
Typical Application Method	Metal Foil Stencils (50-100 microns)	Both Metal Foils and Organic In-Situ Stencils
Solder Availability	Sn63Pb37 and SnAgCu Alloys	SnAgCu Alloys
Cleaning Method	Water Cleanable	Solvent Cleanable

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

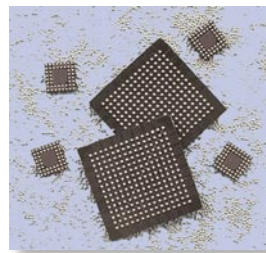
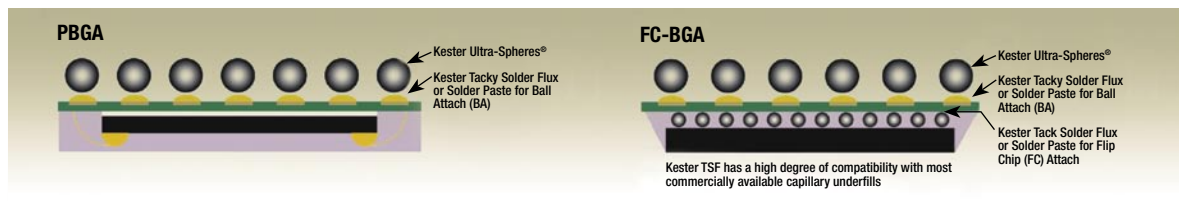


Magnified view of SE-CURE® 7101 printing on a metal foil water bumping stencil.

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.

Formula	RoHS Ready TSF-6592, TSF-6592LV, TSF-6592HV	RoHS Ready TSF-6850
Product characteristics	No-Clean paste flux for ball and flip chip application with peak temperatures up to 270°C in both air and nitrogen. Heat stable and robust activator for OSP-Cu, ENIG and immersion surface finishes.	Water-Soluble paste flux for ball and flip chip applications with peak temperatures up to 270°C in both air and nitrogen. The innovative activator package is very aggressive on a variety of lead-free surface finishes.
Typical Application Method	Dip, pin transfer, stencil/screen printing, syringe dispense	Dip, pin transfer, stencil/screen printing, syringe dispense
Residue Removal Method	Not required. Non-conductive and non-corrosive	38 - 65°C DI water
Solder Alloy Compatibility	Eutectic tin-lead and lead-free	Eutectic tin-lead and lead-free



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	Available Alloys
35 ± 1	—	210,000	Sn63Pb37
31.5 ± 1	—	290,000	Sn10Pb90
30 ± 1	—	335,000	Sn95.5Ag4.0Cu0.5
28 ± 1	—	410,000	Sn95.5Ag3.8Cu0.7
25 ± 1	325,000	—	Sn96.5Ag3.0Cu0.5
20 ± 1	650,000	—	Sn98.5Ag1.0Cu0.5
18 ± 1	875,000	—	
16 ± 0.8	1,250,000	—	
14 ± 0.8	1,900,000	—	
12 ± 0.8	3,000,000		
10 ± 0.8	3,000,000		
8 ± 0.4	3,000,000		
6 ± 0.4	3,000,000		

Contact Kester for additional alloys and sizes.

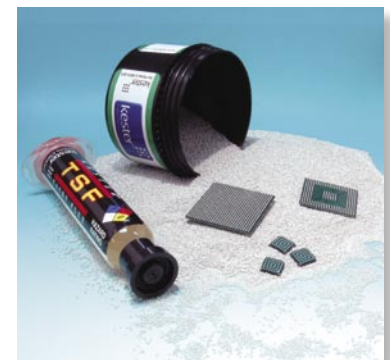


Table 1 Metal Solderability Chart

Category	If trying to solder to this metal surface:	Solder Paste and Tacky Soldering Fluxes	Liquid Fluxes and Flux-Pen® formulas	Cored Wire
1	Platinum, Gold, Copper, Tin, Solder, Silver.	All products can solder these metal surfaces.	All products can solder these metal surfaces.	All products can solder these metal surfaces.
2	Nickel, Cadmium, Brass, Lead, Bronze, Rhodium, Beryllium Copper, Palladium, Immersion Tin and Immersion Silver.	PureMark 202, Easy Profile 256, EM907, EM808, HydroMark 531, TSF-6592, TSF-6800 Series	186, 1544, 2120, 2331-ZX, 2235, 2224-25, 2222, 2220-VF	44, 48, 331, OR-421
3	Nickel-Iron, Kovar.	Base metal must be plated.	2222, 2220-VF	48, 331, OR-421
4	Zinc, Mild Steel, Chromium, Inconel, Monel, Stainless Steel.	Base metal must be plated.	Call Kester's customer service department.	48

Example 1: When soldering Beryllium Copper to Tin, you could use any of the products listed in Category 2, 3 or 4 since Beryllium Copper requires more active products than Tin.
 Example 2: If you were soldering solder-coated leads to a Copper surface, you could use any of Kester's products (Category 1, 2, 3 or 4).

Weights and Measures Common Conversions

To Change	To	Multiply by
Gallons (US)	Liters	3.7853
Quarts (liquid)	Liters	0.9463
Pounds (avdp.)	Grams	453.592
Pounds (avdp.)	Kilograms	0.4536
Ounces (avdp.) Liters	Grams	28.3495

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: $\frac{900(63 - 61.6)}{(100 - 63)} = \frac{1260}{37} = 34 \text{ lbs. of Tin to add.}$
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.

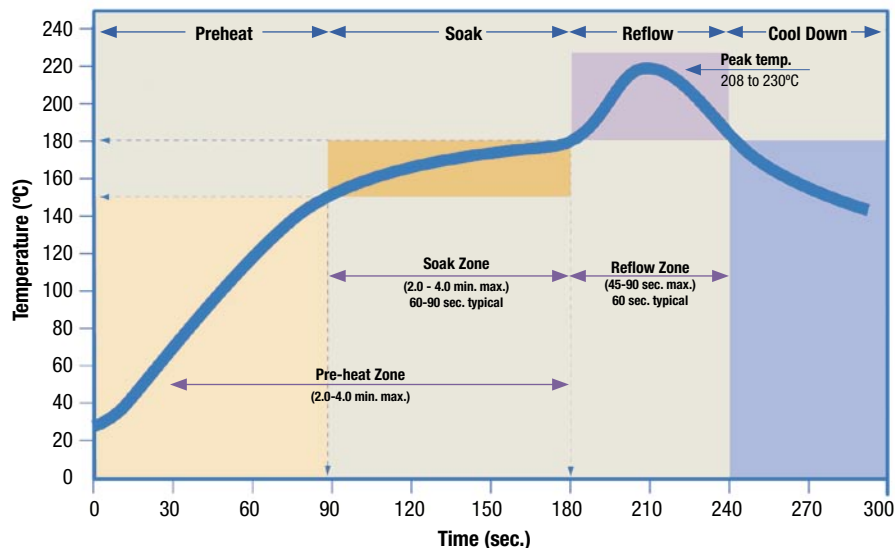
Stage 2 - Soak Zone (Temperature Equalization Zone)

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



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 and IPC/J-STD-006 specifications.

Solder Alloys and Available Forms

Alloy	Melting Range		Available Forms			
	°F	°C	Wire	Bar	Solder Paste	Solderforms®
Lead-Free						
K100LD	~441	~227		•		
Low cost Lead-Free near eutectic alloy for wave solder. K100LD diminishes copper dissolution, dullness, defects, dross and dollars (cost).						
K100	~441	~227	•	•		•
Low-cost Lead-Free near eutectic alloy for wave and hand soldering.						
Sn96.5Ag3.0Cu0.5	423	217	•	•	•	•
Recommended industry standard Lead-Free alloy for all SMT, wave and hand soldering assembly applications.						
Sn96.5Ag3.5	430	221	•	•	•	•
High temperature, eutectic alloy provides high joint strength.						
Sn95Sb05	450 - 464	232 - 240	•	•	•	•
For applications where connections see peak temperatures near 400°F.						
100%Sn	450	232	•	•		•
Sometimes referred to as Sn99, is used for making tin additions to solder pots.						

Alloy	Melting Range		Available Forms			
	°F	°C	Wire	Bar	Solder Paste	Solderforms®
Tin-Lead						
Sn63Pb37	361	183	•	•	•	•
Most common tin-lead eutectic used in PCB assembly applications.						
Sn62Pb36Ag02	354 - 372	179 - 189	•	•	•	•
Nearly eutectic silver bearing alloy for general applications. Most commonly used when soldering to silver-bearing boards or components.						
Sn43Pb43Bi14	291 - 325	144 - 163	•	•	•	•
Used in low temperature applications.						
Sn10Pb88Ag02	514 - 570	268 - 299	•	•	•	•
Used in products that operate in high ambient temperature environments.						
Sn10Pb90	514 - 576	268 - 302		•		•
Alloy of choice for solder spheres and columns used in ceramic BGA/CGA fabrication.						
Sn60Pb40	361 - 374	183 - 190	•	•		•
Used in single sided board soldering and solder dipping operations.						
Sn50Pb50	361 - 420	183 - 214	•	•		•
Intended use for bit soldering and sweat soldering iron, steel and copper.						

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