KESTER®

Electronic Assembly Materials

Connecting Innovation™

Kester Vision Statement

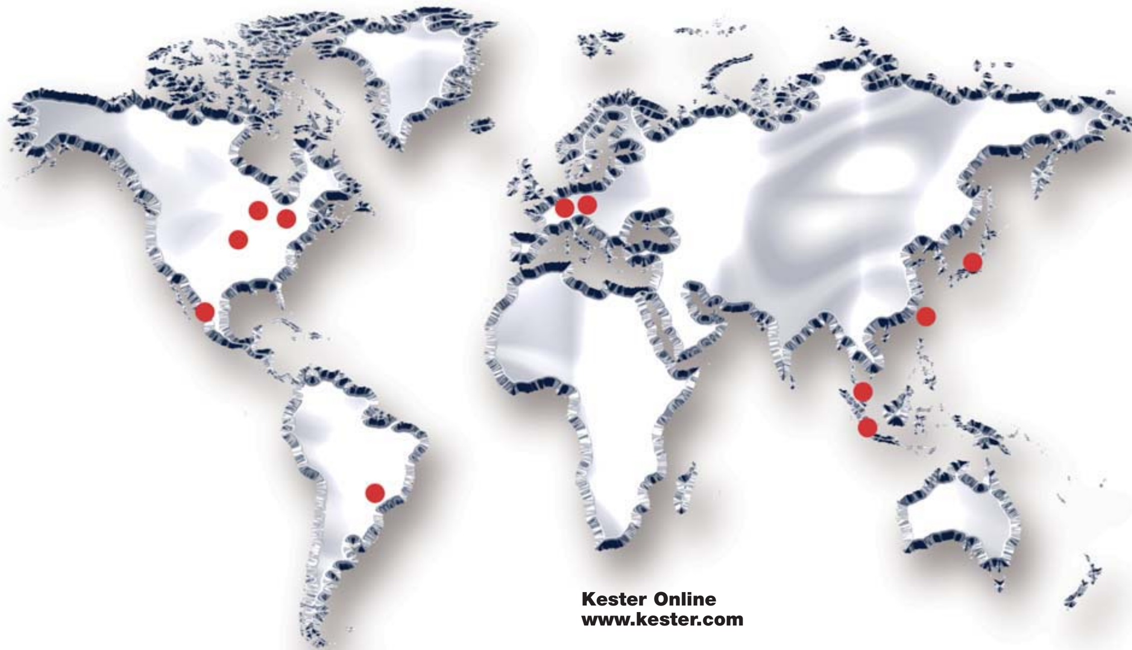
Smart Products • Great Service • No Boundaries

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.

Kester entered its second century of business in the year 2000. It has been a great first century of growth, change and progress. In the new century, change will come even faster for everyone in our industry. Kester's mission is to continue to build on its position as a leading manufacturer of electronic assembly and packaging materials on a global scale.

With four product development and testing laboratories around the world, Kester is equipped and staffed to work pro-actively with customers seeking advanced interconnection materials and applications.



Kester Online
www.kester.com

- Kester Service & Product Line Descriptions
- Product Technical Data Sheets
- Company Profile
- Kester Manufacturing Locations & Capabilities
- Sales locations and Contact Information
- Kester Lead-Free Solutions
- Other Industry related Web Site Links

GLOBAL HEADQUARTERS

USA

515 East Touhy Ave.
Des Plaines, Illinois
60018-2675

Tel: +1 847-297-1600
Fax: +1 847-390-9338
Customer Service
800-2-Kester
Fax: +1 847-699-5548

Email:
customerservice@kester.com

EUROPEAN HEADQUARTERS

Germany

Ganghoferstrasse 45
D-82216 Gernlinden,
Germany

Tel: (+49) 8142-4785 0
Fax: (+49) 8142-4785 62

Email:
customerservice@kester-eu.com

ASIA PACIFIC HEADQUARTERS

Singapore

500 Chai Chee Lane
Singapore 469024

Tel: +65 6 449 1133
Fax: +65 6 242 9036

Email:
customerservice@kester.com.sg

BRANCHES

Japan

20-11 Yokokawa
2-Chome, Sumida-Ku
Tokyo 130, Japan

Tel: (+81) 3-3624-5351
Fax: (+81) 3-3626-6253

Email: jpsales@kester.com.sg

Plauen-Neuensatz, Germany

Zum Plom 5
DE-08541
Plauen-Neuensatz
Germany

Brantford, Canada

68 Prince Charles Road
Brantford, Ontario,
Canada N3T 5N9

For Customer Service call the Global Headquarters facility.

Contents

Kester	2
Ordering Information	3
Solder Paste Products	4 - 5
Liquid Fluxes	6 - 7
Cored Wire Solder	8
Solderforms®	9
Rework Flux-Pen®	9
Bar Solder and Related Products	10
Lead-Free Solutions	11
SE-CURE® Micro-Electronic Materials	12
Tacky Solder Fluxes	13
Ultra-Spheres®	13
Technical Data	14
Alloy Temperature Chart	15

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.

Technical Service can be contacted by calling:
(+49) 8142-4785 0

or by faxing:
(+49) 8142-4785 62.

Customer service department

Kester's Customer Service Team can help you with 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:
(+49) 8142-4785 0

or by faxing:
(+49) 8142-4785 62.

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

Bromont, Canada

Technologie Estrie Inc.
30, boul. de í Aéroport
Bromont (Québec)

For Customer Service call the Global Headquarters facility.

Brazil

Av. Tegula
888 B. Ponte Alta
Atibaia-SP Brazil
CEP-12.940-970

Tel: (+55) 11-3472-1350
Fax: (+55) 11-3472-1380

Email:
comercial@kester.com.br

Taiwan

4th Floor, No. 128,
Lane 235
Pao-Chiao Road,
Hsien-Tien City
Taipei Hsien Taiwan
Republic of China

Tel: (+886) 2-8912-1066
Fax: (+886) 2-8912-1072

Email: twsales@kester.com.sg

Johor Bahru, Malaysia

PLO 113, Fasa 3
Kawasan Perindustrian Senai
81400 Senai, Johor, Malaysia

Tel: (+60) 7-598-4113
Fax: (+60) 7-598-3103

Penang, Malaysia

Hotel Equatorial Penang Unit 2,
Lower Level 3
No. 1, Jalan Bukit Jambul
11900
Penang, Malaysia

Tel: (+60) 4-641-4633
Fax: (+60) 4-641-4634

Email: mssales@kester.com.sg

Solder Paste Products

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 Technical Service Department for a specific product recommendation for your application.

Specific product information that will be needed at the time of ordering is listed on page 3.

Standard alloys* for solder paste products

				Recommended Formulas			
Application Dispensing	**Alloy****	**Melting Range**		**Stencil Printing**		**General Syringe**	
		°F	°C	No-Clean	Water Soluble	No-Clean	Water Soluble
Standard SMT	Sn63Pb37	361	183	Easy Profile® 256, PureMark 202	R562 HydroMark 531	R276	R500
Standard SMT	Sn62Pb36Ag02	354 -372	179 - 189	Easy Profile® 256, PureMark 202	R562 HydroMark 531	R276	R500
Lead-Free	Sn96.5Ag3.5	430	221	EnviroMark, R905	R520A	R276	R505
Lead-Free	Sn95.5Ag3.8Cu0.7	423	217	EnviroMark, R905	R520A	R276	R505

*** Other alloys available on request.**
**** In conjunction with the IPC/J-STD-005 specification.**

Standard solder powder distributions for solder paste

Powder type	Typical particle diameter	Mesh designation	Recommended surface mount application
Type 3	25 to 45 micron	-325 +500	Down to 16 mil
Type 4	20 to 38 micron	-400 +500	Down to 12 mil

Solder paste packaging options

Jar*		Box Qty.
500 gram	4.0 fl. oz.	10 per box
No partial boxes sold		

* jars are sized to fit Malcom® style viscometer

Cartridge		Box Qty.
600 gram	6.0 fl. oz.	24 per box
1200 gram	12.0 fl. oz.	12 per box
No partial boxes sold		

Syringe		Box Qty.
35 gram	10cc	10 per box
100 gram	30cc	10 per box
No partial boxes sold		

DEK ProFlow™ Cassette	Box Qty.
850 gram	6 per box
No partial boxes sold	

Solder paste formulas for stencil printing applications

No-Clean formulations

	No-Clean	No-Clean	No-Clean
Formula type	**PureMark 202**	**Easy Profile® 256**	**FL250D**
Product characteristics	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 residues 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 8 in/sec. Compatible with enclosed print head systems.	Standard no-clean paste for a wide variety of reflow profiles and printing conditions. Industry standard formula that performs well in a variety of applications. Compatible with enclosed print head systems.Not normally required.	Designed to meet the automotive requirements such as solid, non-sticky residues along with compatibility with all automotive conformal coatings and potting compounds. FL250D exhibits excellent wetting to a wide variety of metallizations (including Alloy 42), yet remains extremely reliable due to the solid nature of the residues. Tremendously print-friendly product compatible with 0201 technology and capable of high print speeds, long idle time, and long stencil life.
Residue removal method	Not normally required	Not normally required	Not normally required
Expected stencil life	12+ hours	8+ hours	8+ hours
Atmosphere required	Air or Nitrogen	Air or Nitrogen	Air or Nitrogen
Compliant specification	Telcordia Issue 1 GR-78-CORE, IPC/J-STD-004 Flux Designator ROL0	Telcordia Issue 1 GR-78-CORE, IPC/J-STD-004 Flux Designator ROL0	Telcordia Issue 1 GR-78-CORE IPC/J-STD-004 Flux Designator ROL0

Water-Soluble formulations

	Water-Soluble	Water-Soluble
Formula type	**HydroMark 531**	**R562**
Product characteristics	Designed as an all-purpose water-soluble paste, HydroMark 531 provides consistent hours of stable stencil life, tack time, and printing characteristics. Offers improved anti-slump characteristics along with excellent solderability to a wide range of surface and component lead metallizations, solving problems caused by slumping, bridging, and wetting.	A water soluble paste that demonstrates exceptional characteristics in all weather environments and reduced voiding in BGA attach operations. R562 maintains its print characteristics, tack, and activity even after prolonged exposure to environmental extremes.
Residue removal method	Use de-ionised water at 55 - 65ºC	Use de-ionised water at 55 - 65ºC
Expected stencil life	8+ hours	8+ hours
Atmosphere required	Air or Nitrogen	Air or Nitrogen
Compliant specification	IPC/J-STD-004 Flux Designator ORM0	IPC/J-STD-004 Flux Designator ORM0

Solder paste formulas for syringe dispensing applications

	No-Clean	Water Soluble
Formula type	**R276**	**R500**
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.	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-ionised or soft tap water at 55-65°C
Expected stencil life	8+ hours	8+ hours
Atmosphere required	Air or Nitrogen	Air or Nitrogen
Compliant specification	Telcordia Issue 1 GR-78-CORE, IPC/J-STD-004 Flux Designator ROL0	IPC/J-STD-004 Flux Designator ORH0

Liquid Fluxes

No-Clean liquid fluxes

	Alcohol Based	Alcohol Based	VOC - Free	VOC - Free
Formula type	**959-T**	**950-E**	**979**	**971**
Flux type	Low Solids No-Clean	Low Solids No-Clean	VOC-Free No-Clean	VOC-Free No-Clean
Percent solids	2.9	2.0	4.5	3.25
VOCs (g/litre)	765	792	0	0
Specific gravity (gm/cc)	0.794 ±0.005	0.812 ±0.003	1.016 ±0.010	1.012 ±0.010
Product characteristics	Non-corrosive, halogen free spray or foam flux designed for maximum heat stability in wave soldering process. 959-T was developed to minimise the formation of micro-solderballs during wave soldering operations.	Developed for single wave soldering machines only, 950-E has extremely low solids content and minimises solder bridges (shorts) and excessive solder defects. Designed for spray or foam applications.	Most active VOC-Free flux for optimal top-side wetting and solderball reduction. Mat be applied by spray fluxer only	Designed for foam and wave fluxer applications
Compliant specifications	Telcordia Issue 1 GR-78-CORE & IPC/J-STD-004 Flux designator ORL0	Telcordia Issue 1 GR-78-CORE & IPC/J-STD-004 Flux designator ORL0	Telcordia Issue 1 GR-78-CORE & IPC/J-STD-004 Flux designator ORL0	Telcordia Issue 1 GR-78-CORE & IPC/J-STD-004 Flux designator ORL0
Residue removal method (not normally required)	Wash with Kester's #5768 Bio-Kleen® saponifier at 2% concentration.	Wash with Kester's #5768 Bio-Kleen® saponifier at 2% concentration.	Wash with hot de-ionised water at 60 - 70ºC with 2% solution of Kester #5768 Bio-Kleen® saponifier	Wash with hot de-ionised water at 60 - 70ºC with 2% solution of Kester #5768 Bio-Kleen® saponifier
Thinner #	#108S	#110	De-ionised water	De-ionised water
Flux test kit	PS-20 or PS-22	PS-22	PS-20	PS-20
Use on metals	Table1, Category 1, Page14	Table1, Category 1, Page14	Table1, Category 1, Page14	Table1, Category 1, Page14

*Products subject to U.S. Patent #5,281,281 and #5,334,260.

Liquid fluxes	Pallet Qty.
20 liter container	28 per pallet
200 liter drum	
No partial pallets sold	

Water-Soluble liquid fluxes

	Alcohol Based	VOC - Free
Formula	**2235**	**HF-1189A**
Flux Type	Organic Water-Soluble	VOC-Free Organic Water Soluble
Percent solids	11	40
VOCs (g/litre)	763	0
Specific gravity (gm/cc)	0.856 ±0.005	1.20 ±0.010
Percent Halides	1.5	0
Product characteristics	Low solids flux for surface mount assemblies designed to help reduce skips on bottom side surface mount pads.	VOC-Free, halide free, citric acid based, water based flux developed by Hughes.
Compliant specifications	IPC/J-STD-004 Flux designator ORH1	IPC/J-STD-004 Flux designator ORH1
Residue removal method	Residue removal is required. Use de-ionised water at temperatures of 50 - 65ºC.	Residue removal is required. Use soft or de-ionised water at temperatures of 50 - 65ºC
Thinner #	4662	De-ionised water
Use on metals	Table 1, Category 1 & 2 page 14	Table1, Categories 1 & 2 Page14

Rosin based liquid fluxes

Formula	186 Series	1544
Flux Type	Rosin Mildly-Activated (RMA)	Activated Rosin (RA)
Percent solids	18 to 36	50
Percent Halides	0.02	0.44
Specific gravity (gm/cc)	0.879 ±0.003 (186) 0.848 ±0.005 (186-25) 0.831 ±0.005 (186-18)	0.928 ±0.005
Product characteristics	Designed for high thermal stability and superior solderability. Kester #186 is available in 18, 25 or 36 percent solids formulations.	Kester's active, non-corrosive rosin type flux. Used on surfaces which are more difficult to solder.
Compliant specifications	IPC/J-STD-004 Flux designator ROL1	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-ionised or soft tap water at 50 - 60ºC.	Residue is non-corrosive, but may be removed with solvent or with Kester's #5768 Bio-Kleen® saponifier at 7-10% solution in de-ionised or soft tap water at 50 - 60ºC.
Thinner #	120	104
Use on metals	Table1, Category 1, Page14	Table1, Category 1, 2, & 3 Page14

Rosin based liquid fluxes

Flux thinners

Thinner	Use With Soldering Flux
104	1544
108S	959 - T
110	950 - E
120	186 Series
4662	2235

Cored Wire Solder

Standard cored wire solders

Formula	245	405	285	331	44 Rosin
Flux type	No-Clean	Rosin Free Flux No-Clean	Rosin Mildly Activated (RMA)	Organic Water Soluble	Activated Rosin (RA)
Product characteristics	Performance similar to a mildly activated rosin core, but leaves a visually cleaner appearance after soldering.	Kester's 405 ultra-high activity allows for rapid solder joint formation producing exceptionally strong and reliable joints. Provides excellent wetting and spreading characteristics on difficult surfaces such as nickel. The synthetic resin leaves transparent flux residues.	Mildly activated rosin cored wire for sensitive electronic and military applications.	Industry standard water washable core for most electrical and electronic hand soldering.	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-006 Flux designator ROL0	Telcordia Issue 1 GR-78-CORE & IPC/J-STD-006 Flux designator REL0	Telcordia Issue 1 GR-78-CORE & IPC/J-STD-006 Flux designator ROL0	IPC/J-STD-006 Flux designator ORH1	IPC/J-STD-006 Flux designator ROM1
Residue removal Methods	Not required for most applications. May be removed by solvent or Kester's #5768 Bio-Kleen® saponifier.	Not required for most applications. May be removed using solvent cleaner.	Not required for most applications. May be removed by solvent or Kester's #5768 Bio-Kleen® saponifier.	Residue removal is required, Use soft or de-ionised water at temperatures of 50-65°C.	Not required for most applications. May be removed by solvent or Kester's #5768 Bio-Kleen® saponifier.
Use on metals	Table 1, Category 1, Page14	Table, Category 1, Page 14	Table 1, Category 1, Page14	Table 1, Categories 1, 2 & 3 Page14	Table 1, Categories 1 & 2 Page14
Recommended core: Tin Lead Lead-Free	 50 58	 50 58	 58 66	 58 66	 58 66

Standard Cored Wire solder	Box Qty.
12.5 Kg. (25lbs)	25 spools
No partial boxes sold	

Standard wire diameters

Metric	Inch	Gauge
0.25mm	0.010	31
0.4mm	0.015	28
0.5mm	0.020	25
0.6mm	0.025	23
0.8mm	0.031	21
1.0mm	0.040	19
1.2mm	0.050	18
1.5mm	0.062	16
2.5mm	0.093	13
3.0mm	0125	11

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

Standard flux-core sizes

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

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

Kester's cored wire solder for surface mount assembly and repair is available in electro-static discharge spools.

Solderforms® table

Solderform		Minimum (mm)	Maximum (mm)
Ribbons	Width Thickness	0.50 ±0.13 0.0762 ±0.03	76.20 ±0.75 3.18 ±0.13
Cut-offs	Width Thickness Length	0.50 ±0.13 0.0762 ±0.03 0.762 ±0.25	76.20 ±0.76 3.18 ±0.13 500 ±1.25
Washers	Outside Diameter Inside Diameter Thickness	0.889 ±0.05 0.38 ±0.05 0.0762 ±0.03	63.5 ±0.13 58.42 ±0.13 6.35 ±0.25
Discs	Outside Diameter Thickness	0.41 ±0.05 0.0762 ±0.03	65 ±0.05 6.35 ±0.25
Pellets	Diameter Length	0.254 ±0.03 0.50 ±0.13	12.7 ±0.13 152.4 ±0.76
Sleeves	Inside Diameter Wall Thickness Height	1.52 ±0.005 0.25 ±0.03 0.56 ±0.03 1.90±0.25	14.0 ±0.13 -- -- 5.0 ±0.25
Stampings	Description	Stampings use special dies that are customer specific and require a customer's engineering drawing and specification.	

Quantity varies by item.

Kester Solderforms®

Kester Solderforms® are stamped, extruded, 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.

Solderforms® may be produced as flux cored, solid metal, and with or without a flux coating.

Fluxes available are no-clean, water soluble, RMA, and RA chemistries. External dyes are also available for identification or to aid in determining the solder melt point.

Manufacturing aides

Kester's Flux-Pen® is a unique tool for rework and touch-up soldering that allows a controlled application of flux. Kester's peelable and water soluble temporary solder masks are formulated to be compatible with all Kester and competitive fluxes as well as other process chemicals found in a typical assembly operation.

Flux-Pen® formulas

Formula	950 - E	951	186	2331 - ZX
Flux type	Low solids No-Clean	Low solids No-Clean	"RMA" No-Clean	Neutral pH Water Soluble

Flux-Pen®	Box Qty.
Flux-Pen®	10 pens per box
No partial boxes sold	

Solder mask formulas

Formula	TC-530	TC-533	TC-564-1
Description	Peelable De-Ammoniated	Peelable Solder Mask	Water Soluble Temporary Solder Mask

Solder mask	Qty.
Solder Mask	Call for details

Bar Solder and Related Products

The quality of Kester bar solder is guaranteed by using high purity metals and strict quality control standards. Kester extrudes its bar to minimise oxidisation, limit segregation and provide a denser grain structure than cast bar. Kester manufactures bar solder to 3 distinct specifications. Each meets and exceeds requirements of QQ-S-571-F, ASTM B32 and IPC/J-STD-006.

Kester bar solder

Kester 5744 Solder Saver®

Kester Ultra-Low Dross

Manufactured using the Ultrapure® process and containing the same metal purity as Kester Ultrapure®, Kester Ultra 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®

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 IPC/J-STD-006.

Kester E-Bar

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

Kester 5744 Solder Saver®

A chloride-free, inorganic white powder formulated to remove dross, which is the oxide of solder, from still solder pots and wave soldering machines. It does not decompose to sticky residues that are harder to remove than the original dross.

The is low fuming and is stable at molten solder temperatures.

Sold in increments of 10 lbs.

Solder analysis program

The Kester solder analysis program is prepaid method for solder sample analysis . It allows customers to document solder pot impurities for conformance to Federal specifications or ISO quality requirements. Customers purchase prepaid mailers and then simply insert a solder sample into the mailer and return it to Kester.

Option A	Option C	Option D
Tin	Tin	Tin
Copper	Copper	Copper
Antimony	Antimony	Antimony
Gold	Gold	Gold
	Cadmium	Cadmium
	Aluminium	Aluminium
	Zinc	Zinc
	Iron	Iron
	Arsenic	Arsenic
	Bismuth	Bismuth
	Silver	Silver
	Nickel	Nickel
		Sulphur
		Phosphorous

Element		Ultra-Low Dross	Kester Ultrapure®	Kester E-Bar
Copper	Cu	0.015	0.015	0.020
Antimony	Sb	0.002	0.002	0.002
Gold	Au	0.050	0.050	0.500
Cadmium	Cd	0.001	0.001	0.001
Aluminium	Al	0.001	0.001	0.001
Zinc	Zn	0.002	0.002	0.002
Iron	Fe	0.010	0.010	0.010
Arsenic	As	0.020	0.020	0.020
Bismuth	Bi	0.020	0.020	0.025
Silver	Ag	0.002	0.002	0.003
Nickel	Ni	0.002	0.002	0.002
Indium	In	0.007	0.007	0.007

Bar solder	Qty.
Bar solder, 12Kg (25 lbs.) per box	1 ton (pallet)
No partial pallets sold	

Driving Forces to Eliminate Lead

- Environmental legislation
- Customer requirements
- Increasing costs associated with the disposal of toxic materials.
- Environmental concerns:
  - Toxins leaching into groundwater.
  - Dwindling amount of space available for land use.
- Marketing and competitive factors

Issues and Concerns Moving Forward to Lead-Free

- Component compatibility with temperature requirements.
- Solderability of alternative metallization on components and printed wiring boards.
- Reliability of joints and stress/strain issues.

Kester's lead-free portfolio

SMT Products		Wave Soldering Products		Rework Products		Micro-Electronic materials	
No-Clean	**Water Soluble**	**No-Clean**	**Water Soluble**	**No-Clean**	**Water Soluble**	**No-Clean**	**Water Soluble**
R905 Solder Paste	R520A Solder Paste	979 VOC-Free Flux	2220 Alcohol Based Flux	405 Cored Wire (Core 58)	331 Cored Wire (Core 58)	TSF-6502	TSF-6805
EnviroMark Solder Paste		959T Alcohol Based Low Solids Flux	2235 Organic Water Soluble			TSF-6516	

Common lead-free alloys

*Alloy	Melt Temperature	Application
Sn95.5Ag3.8Cu0.7	217ºC	SMT
Sn96.5Ag3.5	221ºC	SMT
Sn99.3Cu0.7	227ºC	Wave
Sn95.8Ag3.5Cu0.7	217ºC	Wire

*Kester can produce a multitude of lead-free alloys.

Kester Licensing Agreements

Kester is licensed to manufacture, use, and sell any solder product covered by U.S. Patent 5,527,628 that is assigned to Iowa State University Research Foundation (ISURF). Kester is additionally licensed to manufacture and sell solder compositions patented by Senju/Matsushita with Japanese Patent JP3027441. A non-exclusive sublicense for the Oatey Company lead-free solder (U.S. Patent 4,879,096 and Canadian Counterpart) was also obtained.

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.

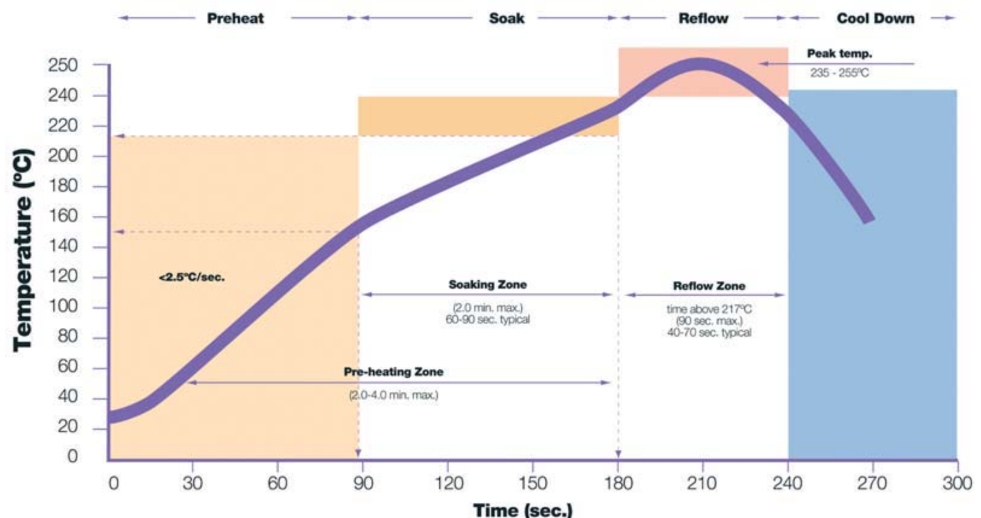
Stage 2 - Soak Zone (Temperature Equalisation Zone)

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.

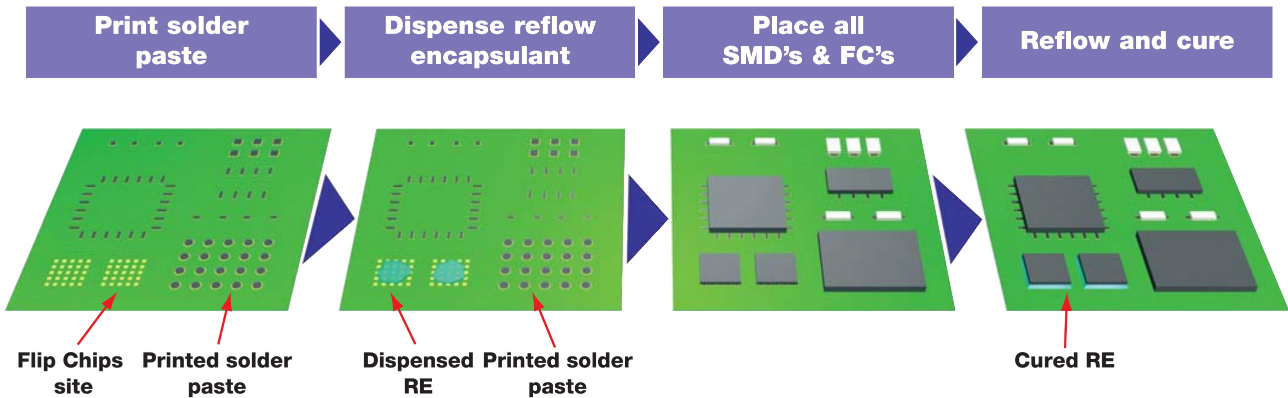
Stage 3 - Reflow Zone (Rapid Heating and Cooling

The purpose of this stage is 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: Sn95.5Ag3.8Cu0.7 and Sn96.5Ag3.5



SE-CURE® Micro-Electronic Materials



Reflow encapsulants & capillary underfills

	Reflow Encapsulants*			Capillary Underfill
Formula	**SE-CURE® 9126**	**SE-CURE® 9110 series**	**SE-CURE® 9130**	**SE-CURE® 9208**
Product class features	SE-CURE® 9100 series Reflow Encapsulants are compression-flow flux and underfill materials used in flip-chip attachment operations. These Reflow Encapsulants are single component materials which act as flux during soldering operations and as underfill material after the soldering process. • Eliminates long underfill and flow times and post curing operations. • Compatible with a wide range of gap sizes and pad metallurgies. • Excellent adhesion strength			SE-CURE® 9208 capillary underfill material provides thermal cycle and mechanical protection for flip components assembled to rigid organic and ceramic substrates. This fast flowing and self-filtering underfill material is formulated for high adhesion to die passivation layers for process flexibility.
Product characteristics	• Single pass flip-chip on rigid board • Low voiding	• Single pass flip-chip for flexible circuit • Eutectic and lead-free materials	• Lead-free • Single pass flip-chip on rigid board • Low voiding	SE-CURE® 9208 is a filtered one-component, snap cure underfill epoxy material designed for flip-chip applications. It has excellent strength properties with a wide robust process window producing a void-free epoxy encapsulant for gaps of 25 -150 microns (0.001 - 0.005 inches).
Cure schedules	Single pass typical SMT reflow profile *Refer to page 14	Single pass typical SMT reflow profile *Refer to page 14	Single pass typical SMT reflow profile *Refer to page 11	• 20 minutes @ 125ºC • 8 minutes @ 150ºC • 5 minutes @ 160ºC
CTE (ppm/ºC)	70	65	70	26.5
Tg (ºC)	70	75	70	150

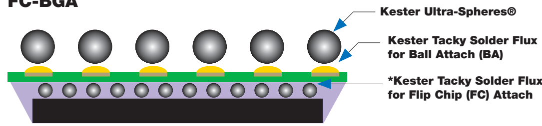
*Patent Pending

Reflow encapsulants & capillary underfills

Formula	**SE-CURE® 7101**
Product characteristics	Designed for wafer bumping and ultra-low pitch bumping applications, SE-CURE® 7101 is a stable flux system that reduces voiding in Flip-Chip (FC) and Chip Scale Packages (CSP). When using Kester's engineered 7101, the voiding level of FC and CSP's have been reduced from 25% to less than 10%. SE-CURE® 7101 releases cleanly from stencil apertures up to area ratios of 1.5 (mesh size dependent) without slumping or flux bleedout 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 with Sn63Pb37, lead-free alloys, Low alpha (<0.02 cph/cm^2), and Ultra Low alpha (<0.002 cph/cm^2) solder alloys.
Residue removal method	Use de-ionised water @ 50 - 60ºC
Powder distribution	Available in Type 5 and Type 6 powder

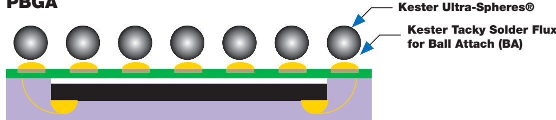
SE-CURE® 7101 Wafer Bumping Solder Paste

FC-BGA



*Kester TSF has a high degree of compatibility with most commercially available capillary underfills

PBGA



Winner of four Intel Supplier Continuous Quality Improvement Awards

Epoxy fluxes & tacky soldering fluxes (TSF)

Formula	SE-CURE® 9603 Epoxy Fluxes*	SE-CURE® 9611 Epoxy Fluxes*	TSF-6516 No-Clean	TSF-6502 No-Clean	TSF-6805 Water Soluble
Product characteristics	SE-CURE 9600 series Epoxy Fluxes are designed for flip-chip soldering and underfill applications to printed wiring assemblies. • Ideal for FC-BGA/PGA, DCA, COB, FC-CSP die attachment • Residues polymerise with underfill for highest level of reliability • Air or Nitrogen reflowable • High activity no-clean soldering/underfill process		High viscosity. ideal for sphere and pin attachment (BGA, CSP, PGA) flip-chip mounting (FCIP and FCOB) and no-clean rework operations. Compatible with air or nitrogen reflow. Residues interact well with many capillary underfill materials.	Low viscosity. ideal for sphere and pin attachment (BGA, CSP, PGA) flip-chip mounting (FCIP and FCOB) and no-clean rework operations. High activity no-clean soldering, for more difficult metallizations. Compatible with air or nitrogen reflow. Residues interact well with many capillary underfill materials.	Low voiding for sphere/pin attachment to BGA or PGA substrates. Residue can be exposed to multiple reflow cycles prior to cleaning. Air or nitrogen reflowable. Leaves shiny solder joints after reflow. Low foaming during wash cycles.
Typical application method	• Rotating drum/doctor blade applicator • Thin film applicator • Screen printing	• Side Fluxer • Rotating drum/doctor blade applicator • Thin film applicator	• Stencil or screen printing • Dot dispensing • Thin film applicator	• Stencil or screen printing • Pin transfer • Rotating drum/doctor blade applicator • Thin film applicator	• Stencil or screen printing • Pin transfer • Rotating drum/doctor blade applicator • Thin film applicator
Viscosity	34 kcps @ 5 rpm Brookfield @ 25ºC TD-spindle	5.1 kcps @ 5 rpm Brookfield @ 25ºC TD-spindle	285 poise @ 10 rpm Malcom @25ºC	100 poise @ 10 rpm Malcom @25ºC	260 poise @ 10 rpm Malcom @25ºC
Tack (grams-force)	175	>100	100	120	85
Compliant Specifications	IPC/J-STD-004 Flux designator REH1	IPC/J-STD-004 Flux designator REH1	IPC/J-STD-004 Flux designator ROL0	IPC/J-STD-004 Flux designator ROL0	IPC/J-STD-004 Flux designator ORH0
Residue removal method	Removal of residue is not required but can be done with solvent systems (aliphatic ketones).		Removal of residue is not required but can be eliminated using Kester #5768 Bio-Kleen® saponifier 10 to 12% solution in de-ionised water at 55 - 65ºC.		Residues are best removed using 55 - 65ºC de-ionised water in automated cleaning equipment.

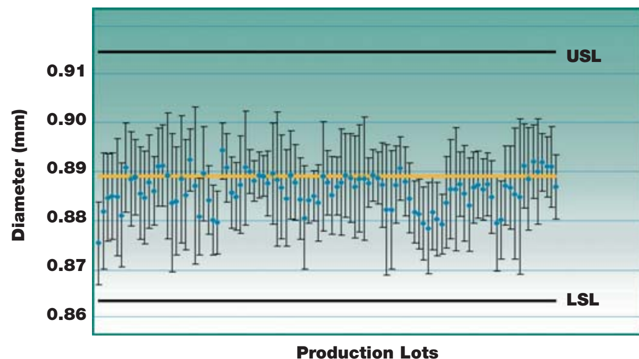
Ultra-Spheres®

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

Diameter µm	mil	2oz. Jar	6oz. Jar	Available Alloys
889 ±25	35 ±1	--	200,000	Sn63Pb37
762 ±25	30 ±1	--	300,000	Sn62Pb36Ag02
635 ±25	25 ±1	300,000	--	Sn95.5Ag3.8Cu0.7
508 ±25	20 ±1	600,000	--	Sn96.5Ag3.0Cu0.5
457 ±25	18 ±1	800,000	--	Sn5Pb95
406 ±5%	16 ±5%	1,200,000	--	Sn10Pb90
356 ±5%	14 ±5%	1,800,000	--	Sn96.5Ag3.5
305 ±5%	12 ±5%	2,750,000	--	Contact Kester for additional alloys and sizes
381 ±5%	15 ±5%	1,400,000	--	

Ultra-Spheres® Lot to Lot consistency

For 0.889 mm (0.035 in), Sn10Pb90 spheres with ± 3 sigma error bars



Technical Data

Table 1 metal solderability chart

Change	If trying to solder to this metal surface	Solder pastes and Tacky Soldering Fluxes	Liquid Fluxes and Flux-Pen® formulas	Cored Wire
1	Platinum, Gold, Copper, Tin, Solder, Palladium, 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.	Easy Profile® 256, PureMark 202, FL250D, R562, TSF 6800 Series, HydroMark 531	186, 1544, 2235, HF-1189A	44, 88, 331
3	Nickel-Iron, Kovar.	Base metal must be plated.	HF-1189A	331
4	Zinc, Mild Steel, Chromium, Inconel, Monel, Stainless Steel.	Base metal must be plated.	Call Kester's customer service department.	

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
Litres	Gallons (US)	0.2642
Litres	Quarts (liquid)	1.057
Grams	Pounds (avdp.)	0.002204623
Kilograms	Pounds (avdp.)	2.205
Grams	Ounces (avdp.)	0.035273962

Formula for adding tin to solder pots

	Example
$T = \frac{W(A - B)}{(100 - A)}$	Ex: $\frac{408\ (63 - 61.6)}{(100 - 63)} = \frac{571.2}{37} =$ 15kg. of Tin to add.

Adding tin to 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.

Key:

T = Kilograms of Tin to add.

A = Percentage of Tin desired.

W = Kilograms of solder in pot.

B = Percentage of Tin in pot.

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.

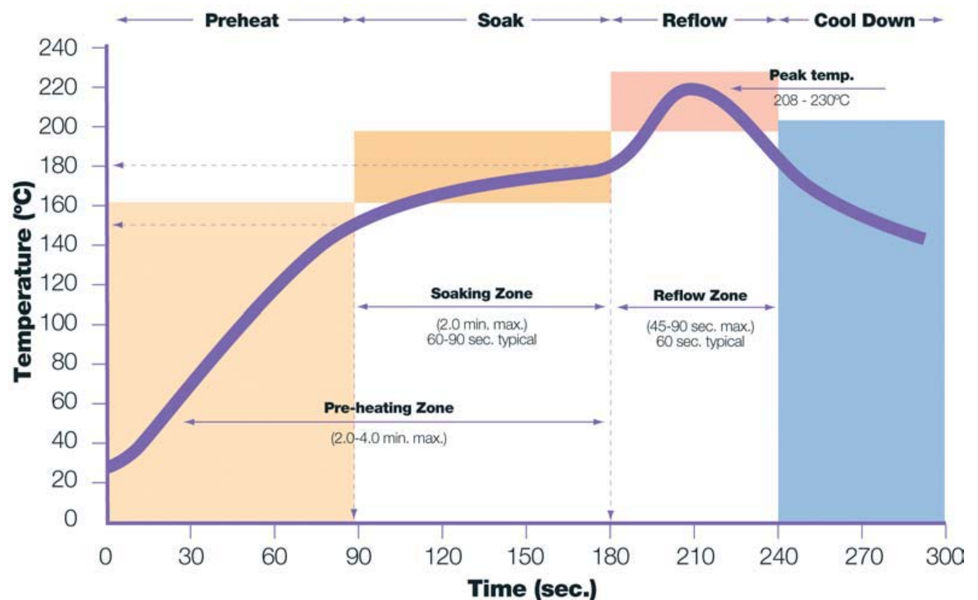
Stage 2 - Soak Zone (Temperature Equalisation Zone)

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 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



Alloy Temperature Chart

KESTER

Kester speciality 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. Speciality 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 application, 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 solders meet and exceed ASTM B32, QQ-S-571 and IPC/J-STD-006 specifications.

Solder Alloys and available forms

Alloy	Melting Range		Available Forms			
Tin-Lead	**°F**	**°C**	**Wire**	**Bar**	**Solder paste**	**Solderforms®**
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.						
Sn43Pb43Bi14	291 - 325	144 - 163	•	•	•	•
Used in low temperature applications.						
Sn10Pb88Ag02	514 - 570	268 - 299	•	•	•	•
Used in products that operate in high temperature environments.						
Sn10Pb90	514 - 576	268 - 302		•		•
Alloy 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.						

Alloy	Melting Range		Available Forms			
Lead-Free	**°F**	**°C**	**Wire**	**Bar**	**Solder paste**	**Solderforms®**
Sn95.5Ag3.8Cu0.7	423	217	•	•	•	•
Standard lead-free alloy for general assembly applications.						
Sn96.5Ag3.5	430	221	•	•	•	•
High temperature, eutectic alloy provides high joint strength.						
Sn99.3Cu0.7	440	227	•	•	•	•
High temperature, eutectic alloy for lead-free wave soldering applications.						
Sn95Sb05	450 - 464	232 - 240	•	•	•	•
For applications where connections see peak temperatures near 400ºF.						
100%Sn	450	232	•	•		•
Sometimes referred to as Sn99, is used for making tin additions to solder pots.						

Definitions:

eutectic An alloy that exhibits no plastic range upon melting. The melting point is also lower than that of any other alloy composed of the same constituents in different proportions.

dross A waste product or an impurity, especially an oxide formed on the surface of molten metal.

sweat soldering To join metal parts by interposing cold solder and then heating.

silver leaching The tendency for tin/lead-bearing solder to dissolve silver-bearing surface metallizations during reflow operations. Ceramic component metallizations often contain silver which is very easily dissolved into tin. The rate at which silver leaches into the molten tin/lead solder alloy is retarded by using solder alloys which contain smaller amounts of silver.

Worldwide Facilities

Kester, established in 1899, joins Northrop Grumman's newly established Component Technologies Sector in 2001. As a leading worldwide manufacturer, supplier, and marketer of soldering materials, Kester maintains 8 modern and efficient manufacturing facilities. Kester is headquartered in Des Plaines, United States, with additional manufacturing locations in Canada, Germany, Brazil, Singapore, Taiwan, Malaysia and Japan.

Kester products and services are used by a wide range of industries such as telecommunications, computer, automotive, military, components manufacturing, and consumer electronics. Throughout the world, Kester products are known for their high quality and advanced technology. Kester's multiple plants assure quick delivery and protection against regional shipping delays and natural disasters. In addition, Kester has an extensive distributor network which permits easy access to sources of supply for Kester's fine products.

Global HEADQUARTERS

Des Plaines, **Illinois, USA**

European HEADQUARTERS

Gernlinden, **Germany**

Asia Pacific HEADQUARTERS

Singapore

BRANCHES

Brazil

Canada

Japan

Malaysia

Taiwan

The data and recommendations presented in this catalogue are based on tests which we consider reliable. Because Kester Solder has no control over the conditions of use, we disclaim any responsibility connected with the use of any of our products or the information presented in this catalogue. We advise that all chemical products be used only by or under the direction of technically qualified personnel who are aware of the hazards involved and the necessity reasonable care in their handling. Consult the Material Safety Data Sheet before handling or using any chemical product.

KESTER, KESTER Solder logo and the Northrop Grumman logos are registered trademarks in the United States of America and many other countries.

The following trademarks are registered in the United States of America: AQUABOND, BIO-KLEEN, COPPER-NU, FLUX-PEN,SE-CURE, SOLDER SAVER, SOLDERFORMS, ULTRAPURE, "44", EASY PROFILE, ULTRA-SPHERES.
SOLDERFORMS is also registered in Canada. "44" is also registered in Canada, Hong Kong, Malaysia, Singapore and Taiwan.

ProFlow™ developed from concept by Novatec.

EAM v02/17/10/03