984
Low-Solids No-Clean Liquid Flux

Product Description

Kester 984 flux is a significant technological development of low-solids, alcohol-based no-clean chemistry for high quality soldering of electronic circuit board assemblies. Kester 984 flux only contains about 2.2% solids content but does not require any nitrogen in the wave soldering process. The residue left behind is minimum and non-tacky so that boards are cosmetically clean as they exit the wave solder machine. The minimal amount of residue remaining after soldering is non-conductive and non-corrosive. Hence it is possible for the residue to be left on the boards without degrading the reliability of the assembly. Kester 984 is classified as Type ORL0 flux under J-STD-004 specifications.

Performance Characteristics:

- Excellent cosmetic appearance
- Non-corrosive, non-conductive and tack-free residues
- No surface insulation degradation
- Minimizes micro-solderballing at connectors and CPU and bridging by providing a clean snap-off during wave soldering
- Provides good solderability on surface mount circuit boards under air wave soldering
- Eliminates the need and expense of cleaning
- Bright, shiny solder connections
- Classified as ORL0 per J-STD-004
- Compliant to Bellcore GR-78-CORE

RoHS Compliance

This product meets the requirements of the RoHS (Restriction of Hazardous Substances) Directive, 2002/95/EC Article 4 for the stated banned substances.

Physical Properties

Specific Gravity: 0.792 ± 0.005
Anton Paar DMA 35 @ 25°C

Percent Solids (theoretical): 2.2

Acid Number (typical): 15.5 mg KOH/g of flux
Tested by potentiometric titration

Thinner: Kester 108-S

Reliability Properties

Copper Mirror Corrosion: Low
Tested to J-STD-004, IPC-TM-650, Method 2.3.32

Corrosion Test: Low
Tested to J-STD-004, IPC-TM-650, Method 2.6.15

Silver Chromate: Pass
Tested to J-STD-004, IPC-TM-650, Method 2.3.33

Fluorides by Spot Test: Pass
Tested to J-STD-004, IPC-TM-650, Method 2.3.35.1

S.I.R., IPC (typical): Pass
Tested to J-STD-004, IPC-TM-650, Method 2.6.3.3

	Blank	984 PD	984 PU
Day 1(24h)	$6.1 \times 10^9\ \Omega$	$1.8 \times 10^9\ \Omega$	$2.6 \times 10^9\ \Omega$
Day 4(96h)	$2.1 \times 10^9\ \Omega$	$3.1 \times 10^9\ \Omega$	$2.8 \times 10^9\ \Omega$
Day 7(168h)	$1.6 \times 10^9\ \Omega$	$2.0 \times 10^9\ \Omega$	$2.3 \times 10^9\ \Omega$

S.I.R., Bellcore (typical): Pass
Tested to Bellcore GR-78-CORE

	Blank	984 PD	984 PU
Day 1(24h)	$4.5 \times 10^{13}\ \Omega$	$3.7 \times 10^{13}\ \Omega$	$2.3 \times 10^{13}\ \Omega$
Day 4(96h)	$3.0 \times 10^{13}\Omega$	$5.1 \times 10^{13}\Omega$	$5.9 \times 10^{13}\Omega$

Electromigration, Bellcore (typical): Pass
Tested to Bellcore GR-78-CORE

	984 PD	984 PU
Day 4 (96h)	$3.3 \times 10^{11}\ \Omega$	$6.0 \times 10^{10}\ \Omega$
Day 21(500h)	$1.0 \times 10^{13}\ \Omega$	$3.0 \times 10^{12}\ \Omega$

Application Notes

Flux Application:

Kester 984 is specially designed for spray fluxing. Flux deposition should be 48-80μg of solids/cm^2 (300-500μg of solids/in^2). An air knife after the flux tank is recommended to remove excess flux from the circuit board and prevent dipping on the preheater surface.

Process Considerations:

The optimum preheat temperature for most circuit assemblies is 80 – 100°C (176 – 212°F), as measured on the top or component side of the assembly. The optimum preheat temperature for most circuit assemblies is 100 - 150°C (212 - 302°F), as measured at the bottom or component side of the assembly. It is still important to note that the optimum preheat temperature for a given assembly will depend on the circuit board design, board thickness, length of contact time with molten solder, solder wave shape, speed of solder flow and preheating time.

Dwell time in the wave is typically 2-4 seconds. The wave soldering speed should be adjusted to accomplish proper preheating and evaporate excess solvent, which could cause spattering. For best results, speeds of 1.1-1.8 m/min (3½-6 ft/min) are used. The surface tension has been adjusted to help the flux form a thin film on the board surface allowing rapid solvent evaporation. The solderpot temperature is recommended to be 245-255°C (473 – 491 °F), for Sn63Pb37 alloy and about 260-270°C(500 – 518°F), for lead-free SAC alloy.

Above information is a guideline and it is advisable to note that the optimum settings for a given assembly may vary and this is dependent on the circuit board design, board thickness, components used and equipment used. A design of experiment is recommended to be done to optimize the soldering process.

Flux Control:

Control of the flux in the foam flux tank during use is necessary for assurance of consistent flux distribution on the circuit boards. The complex nature of the solvent system for the flux makes it imperative that Kester 108-S Thinner be used to replace evaporative losses. When excessive debris from circuit boards, such as board fibers and from the air line build up in the flux tank, these particulates will redeposit on the circuit boards which may create a build up of residues on probe test pins. It is, therefore, necessary to clean the tank and then replenish it with fresh flux when excessive debris accumulates in the flux tank. Incoming solderability inspection of circuit boards and components is advisable as a part of process control to maintain consistent soldering results.

Acid number is normally the most reliable method to control the flux concentration of low solids, no-clean fluxes. To check concentration, a simple acid-base titration should be used. Kester PS-22 test kit method gives a more accurate procedure than the use of auto-density controller in the determination of flux concentration. The test method is outlined as follows:

1. Dispense 5 ml of Kester PS-22 test kit solution into the test tube. The test tube has a 5 ml mark on it to facilitate this measurement. Add one drop of indicator, cap the test-tube and shake. The solution will change to a pink colour.
2. Using a dropper, a sample from the flux tank is then drawn and added to the test solution in the test tube, dropwise by counting exactly 11 drops. The dropper must be held in a *vertical* position.
3. Replace the stopper to the test tube and mix by shaking.
4. Observe the colour of the solution: some turbidity may be present, and this is acceptable. If the solution is pink, proceed to Step 5. If the solution is colourless (with or without turbidity), then proceed to Step 8.
5. Remove the stopper and add 1 more drop of flux using the same dropper.
6. Replace the stopper on the test tube and mix by shaking.
7. Observe the colour of the solution. If the solution is pink, return to Step 5. Repeat Step 5 and 6 until the solution turns clear. Refer to Table 1 for the proper value of thinner for the flux in use.

8.If the test solution is colourless (with or without turbidity) from Step 4, it is an indication that the flux concentration is too high. The approximate concentration and the corrective action needed can be determined as follows:

a) Using a fresh test tube, fill with 5 ml of test solution. Add 1 drop of indicator solution. Cap the tube and shake.

b) Add 8 drops of flux with the dropper provided. Mix by shaking and observed the colour of the solution. If the solution is colourless, a supervisor should be contacted. This is an indication that the flux concentration has exceeded the recommended level. Corrective actions should be taken immediately to drain the flux and replenish it with fresh flux.

Continue adding flux, one drop at a time to the test solution, mixing between each additional drop. Keep count of the total number of drops needed to change the solution from pink to colourless. Using this count, refer to Table 1 for the correct amount of thinner to add to the flux tank.

Table 1: Flux tank adjustments using Kester PS-22 Test Kit

Titer (Number of Drops)	Corrective Action
27	Attention should be given as to how well the flux is performing on the process line. The flux concentration is too low and may need to be adjusted to a higher concentration or entirely replaces with fresh flux
26	Attention should be given as to how well the flux is performing on the process line. The flux concentration may be too low and may need to be adjusted with fresh flux
17 – 25	No corrective action is needed.
16	Add 600 ml thinner per gallon (3.8L) of flux.
15	Add 800 ml thinner per gallon of flux. Add 600 ml thinner per gallon of flux.
14	Add 1000 ml thinner per gallon of flux. Add 800 ml thinner per gallon of flux.
13	Add 1250 ml thinner per gallon of flux. Add 1000 ml thinner per gallon of flux.
12	Add 1400 ml thinner per gallon of flux

Cleaning:

Kester 984 flux residues are non-conductive, non-corrosive and do not require removal in most applications. If residue removal is required, call Kester Technical Support.

Storage and Shelf Life:

Kester 984 flux is flammable. Store away from sources of ignition. Shelf life is 1 year from date of manufacture when handled properly and stored at room temperature (preferably held at 10-25°C (50-77°F)), without exposure to direct sunlight.

Health & Safety:

This product, during handling or use, may be hazardous to health or the environment. Read the Material Safety Data Sheet and warning label before using this product.

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