

977

VOC-Free No-Clean Liquid Flux

For Lead-bearing and Lead-free alloys

US Patent 5,281,281 and 5,334,260

Product Description

Kester 977 is an organic water-soluble, water-based, no-clean chemistry for high quality soldering of electronic circuit board assemblies. Designed for wave soldering applications, Kester 977 provides good wetting on most surface finishes. The flux was specifically designed to reduce bridging, which is commonly associated with VOC -free no-clean fluxes.

Kester 977 has excellent soldering properties for improved productivity without sacrificing reliability of the assembly. The flux leaves bright shiny solder joints and will not attack properly cured solder masks or FR-4 Epoxy-Glass laminate. The minimal amount of residue remaining after soldering is non-conductive, non-corrosive and need not be removed. The residues left after soldering will not interfere with in-circuit testing. Kester 977 is not detrimental to the Surface Insulation Resistance (SIR) of the soldered assembly.

Performance Characteristics:

- Biodegradable at pH of 2.0 or greater
- Chemically compatible with most solder masks and board laminates
- Does not degrade Surface Insulation Resistance
- No offensive odors
- Bright, shiny solder connections
- Classified as ORL0 per J-STD-004
- Compliant to Bellcore GR-78

Physical Properties

Specific Gravity: 1.012 ± 0.010

Antoine Paar DMA 35 @ 25°C

Percent Solids (typical): 3.25

Tested to J-STD-004, IPC-TM-650, Method 2.3.34

Acid Number: 27.0 ± 1.0 mg KOH/g of flux

Tested to J-STD-004, IPC-TM-650, Method 2.3.13

pH (10% solution): 3.0

Hanna Instruments 8314 @ 25°C

Flash Point: >100°C (212°F)

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

Chloride and Bromides: None Detected

Tested to J-STD-004, IPC-TM-650, Method 2.3.35

Fluorides by Spot Test: Pass

Tested to J-STD-004, IPC-TM-650, Method 2.3.35.1

SIR, IPC (typical): Pass

Tested to J-STD-004, IPC-TM-650, Method 2.6.3.3

	Blank	977 PD	977 PU
Day 1	4.1 × 10 ⁹ Ω	7.1 × 10 ⁸ Ω	8.4 × 10 ⁸ Ω
Day 4	7.0 × 10 ⁹ Ω	1.3 × 10 ⁹ Ω	2.8 × 10 ⁹ Ω
Day 7	8.0 × 10 ⁹ Ω	1.7 × 10 ⁹ Ω	3.5 × 10 ⁹ Ω

Application Notes

Flux Application:

Kester 977 can be applied to circuit boards by a spray or dip process. Flux deposition should be 120-240 μg of solids/ cm^2 (750-1500 μg of solids/ in^2). An air knife after the flux tank is recommended to remove excess flux from the circuit board and prevent dripping on the preheater surface.

Process Considerations:

The optimum preheat temperature for most circuit assemblies is 90-115°C (194-239°F) as measured on the top or component side of the printed circuit board. Dwell time in the wave is typically 2-4 seconds. The wave soldering speed should be adjusted to accomplish proper preheating and evaporate excess water, which could cause splattering. For best results, speeds of 1.4-1.8 m/min (4½-6 ft/min) are used. The surface tension has been adjusted to help the flux form a thin film on the board surface allowing rapid water evaporation.

Elimination of Splattering:

Since VOC-free fluxes are water-based, splattering can be a problem. Splattering occurs when water comes in contact with molten solder, so it may be necessary to use forced air to drive off the water. Manufacturers have reported that blowing hot air at 0.28-0.85 m^3/hr (10-30 ft^3/hr) greatly assists in drying the water off the circuit boards.

Flux Control:

Acid number is normally the most reliable method to control the flux concentration of low solids, no clean fluxes. Evaporative loss is minimal because this flux is water-based. To check concentration, a simple acid-base titration should be used. PS-20 Test Kit and procedure are available from Kester.

Cleaning:

Kester 977 flux residues are non-conductive, non-corrosive and do not require removal in most applications. If residue removal is required, plain DI water at 43-54°C (110-130°F) may be used.

Storage and Shelf Life:

Because this formulation is water based, it is subject to freezing. A minimum storage temperature of 4°C (40°F) is recommended. If frozen, the Kester 977 is easily reconstituted by stirring at room temperature. Shelf life is 3 years from date of manufacture when handled properly and held at 4-25°C (40-77°F).

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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