Technical Data Sheet

SWAP
Safewash P

Product Description

The Safewash range consists of water based cleaning solvents, suitable for the cleaning of PCBs and production equipment. The Safewash products are water-based, non-flammable, 100% ozone friendly, biodegradable solvent blends designed to clean to well within the world's military cleanliness standards. (ANSI-J-001B/IPC TM-650).

SWAP removes all types of flux residues (RA, RMA, no-clean and water-soluble) quickly and efficiently, with minimal environmental effect using low cost, readily available cleaning equipment. It is a low foaming product therefore ideal for use in spray applications, and contains an anti-corrosion agent so is suitable for use on sensitive metals.

Alternative products in the Safewash range are:

	SWA	SWAJ	SWAS	SWAP	SWAF	SWAC	SWAT
Application by Immersion	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Application by Spray	No	No	No	Yes	Yes	Yes	Yes
Requires dilution	No	No	No	No	Yes	Yes	Yes
Use on sensitive metals	No	Yes	Yes	Yes	No	Test	Yes
Removes Flux/ionics	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Removes No-clean flux	No	No	Yes	Yes	Yes	Yes	Yes
Removes heavy grease & organics	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Removes uncured paste	Yes	Yes	Yes	No	No	Yes	Yes

Separate data sheets are available for each of the above Safewash products.

Features

- Non-flammable
- Low toxicity
- Environmentally friendly
- Excellent materials compatibility
- Exceptional flux take-up
- Cost effective
- Low foam
- Contains corrosion inhibitor

Approvals

SWAP is RoHS Compliant (2002/95/EC).

Safewash has been tested and approved by both military and commercial electronics manufacturing companies across the world. The British Ministry of Defence (Directorate General of Defence Quality Assurance) have tested Safewash on various fluxes and have found that the product cleans to well within Defence Standard 00-10 (and it performed approximately 10 times better than 1.1.1. Trichloroethane based solvents).

These results have been backed up by Siemens Central Research Laboratories in Erlangen. Their conclusions were:

"The residual contamination found on the circuit boards and components after cleaning with Safewash 2000 is significantly below the limit value of 1.56 micrograms NaCl/cm^2 permitted by MIL-P28809A. From the point of view of a high level of cleaning efficiency, the bio-cleansing agent "Safewash 2000" can be released for cleaning purposes in electrical engineering".

Typical Properties:

Appearance	Blue liquid
Boiling point (°C)	98
Freezing Point (°C)	-5
Density (g/ml)	1.00
Viscosity (cps)	25-30
pH	11.7
Conductivity @ 18°C (mS)	1.0
Flash Point (°C)	None

Packing	**Order Code**	**Shelf Life**
5 litre bulk	ESWAP05L	48 months
25 litre bulk	ESWAP25L	48 months
200 litre bulk	ESWAP200L	48 months

Directions For Use

SWAP has been specifically developed for use in 3 or 4 stage cleaning by spray application. It is supplied at a concentration suitable for immediate use and further dilution is not recommended.

Stage 1 - cleaning: SWAP is typically used at a temperature of 20-60°C. Re-circulation of the solution via angled high pressure spray nozzles allows effective cleaning under components and on both sides of the board.

Stage 2 – tap water rinse: The temperature of the rinsing solution can be ambient, but higher temperatures in addition to agitation, will accelerate and improve rinsing.

Stage 3 – deionised water rinse: This removes impurities left by the tap water. If military standard cleanliness is not required, this deionised rinse may not be necessary, though the PCBs may show some white streaking due to tap water impurities.

For ferrous metal cleaning operations it is possible to add a rust inhibitor (Code: SRIA) at 0.5% into this stage. This will prevent flash rusting of ferrous metals when they are dried at high temperatures.

Stage 4 – Drying: The length of time required to dry the PCB depends on the circuit design and the efficiency of the drying unit itself. This is enhanced by equipment that uses high air flow as opposed to 'heat only' systems. In general, this stage takes approximately 5 minutes at 90°C. Air-knives can be used as an optional extra to reduce temperature or total energy required.

Material Compatibility

In typical usage times and temperatures, SWAP has excellent compatibly with most materials used in the electronics industry, and with materials used in cleaning equipment. For sensitive plastics such as polycarbonate and ABS, testing is recommended to confirm compatibility.

Evaluation of Flux Concentration - Conductivity Method

The electrical conductivity of a Safewash solution will increase with flux concentration (and other ionic contaminants). Once it has been determined how much flux the Safewash can take up, while still achieving the cleanliness level required, the method below can be used to determine a method for monitoring the solution.

Whilst conductivity and other methods may be used to assess the contamination level, the critical test for replacement is when the process is not cleaning the boards to the desired standards.

A range of flux / Safewash solutions should be made up at 0.5, 2.5, 5, 7.5, 10 and 15%.

For solder pastes, thoroughly mix 100g of the paste with 100g of Safewash. Heat the mixtures to 50°C for 4 hours. Cool to room temperature and measure the conductivity of the liquid at a suitable fixed temperature. If the flux content of the paste is 10%, this gives a figure for the 10% flux in Safewash. Serial dilution of this master solution will allow a graph of conductivity/ concentration to be prepared.

For wave solder fluxes, take 150ml of a 10% flux** and evaporate to ca 50ml. (CARE - solvent is usually highly flammable). Dissolve this material in 100ml of Safewash to give a standard 15% solution. Measure conductivity at 20°C and construct a graph.

In production, the conductivity of the cleaning solution may now be monitored. When the conductivity indicates flux levels of 10-15%, or a concentration above which Safewash does not clean to an acceptable level, the bulk material should be replaced.

pH, refractive index or titration are also suitable methods for monitoring the contamination level in Safewash.

Estimated SWAP usage

Usage will depend greatly on PCB design, however the it can be estimated from the concentration of flux used and the size/number of boards cleaned. The table below lists the typical amount of contamination expected on a PCB.

Flux Concentration	Contamination per square metre of PCB
20%	11 - 13 grams
10%	5 - 8 grams
5%	2 - 5 grams

SWAP will absorb a maximum of 5% - 15% of its weight of flux while still cleaning to military standards.

In addition to the SWAP that it is used to absorb the flux, small amounts of cleaner will remain on the board and be transferred into the rinse stage. This is commonly known as drag-out, which typically results in loss of around 100ml/m^2 of board cleaned.

Disposal

Periodic additions of new SWAP to the cleaning tank to replace drag-out will normally ensure that the cleaning effect of the solution is never reduced to an unacceptable level. This means that disposal of the cleaning material is not normally required.

The rinse water should either be allowed to overflow to drain or recycled through a carbon filter preventing the rinse water becoming progressively more contaminated. If allowed to go to drain, the Local Water Authority should be consulted to ensure that the level of contaminated water being put to drain is within their guidelines. Experience shows that a flow rate of approx. 20 litres per square metre of PCB cleaned produces water with acceptable levels of contamination. The use of a carbon filter, through which the tap water is permanently re-circulated, produces no liquid waste.