CLEANER FLUX-EX 500

Designed for the effective removal of all types of soldering process residues

DESCRIPTION

Stannol Flux-Ex 500 is designed for the effective removal of all types of soldering process residues from circuit boards, screens, fixtures and equipment.

CHARACTERISTICS

The cleaner Flux-Ex 500 offers the following advantages:

- **Very low volatility**
- **Flash point 110°C**
- **No ozone depleting chemicals**
- **Low odour, very low mammalian and environmental hazard**
- **Safe with common PCB and equipment construction materials**
- **IPC tested and approved as a highly effective alternative to CFC cleaners**
- **Flux-Ex 500 only, mixed solvent and semi-aqueous processes**

APPLICATION

Stannol Flux-Ex 500 was developed primarily for the cleaning of printed circuit boards after soldering by any of the normal processes. However, this also makes Flux-Ex 500 suitable for a wide range of other cleaning applications, including soldering process equipment and fixtures, electronic components, stencils and screens. Boards cleaned by a process using Flux-Ex 500 meet the highest reliability requirements and can be conformally coated if required.

PROCESS CONFIGURATION

Many pieces of equipment are suitable for use as part of a Flux-Ex 500 cleaning process and some manufacturers have developed dedicated units for the product in one or more of its process orientations. Users are advised to discuss their intentions with Stannol technical staff and the equipment supplier's staff before experimenting with Flux-Ex 500. The following is only for guidance towards selecting the most appropriate option in particular circumstances.

Flux-Ex 500 only: Stannol Flux-Ex 500 is a blend of solvents showing the correct combination of affinity for non-polar molecules (such as resins) and polar molecules (such as ionic residues and surplus flux activators). Consequently it is capable of dissolving all residues from a soldering process in an acceptably short time under mild conditions. At the same time, the solvents will not harm PCB or component materials and most equipment may safely be left in contact with Flux-Ex 500 for extended times. (see Technical Data).

The typical process using only Flux-Ex 500 consists of an immersion wash, preferably incorporating agitation by ultrasonics and/or spray under immersion, at a temperature of 50-60°C. This is followed by a second wash with agitation in pure Flux-Ex 500 at room temperature and forced air drying. A second Flux-Ex 500 rinse may be incorporated as a way of reducing solvent usage. The solvent is normally cascaded from pure Flux-Ex 500 back into the initial wash tank, the contents of which eventually require replacement. The purity of the rinse sections may be maintained using a suitable filtration and purification process.

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The user should note that unlike CFC cleaners, there is no vapour phase cleaning, although a simple immersion cleaning system can be set up using the tank from CFC cleaner process equipment in some situations. The low volatility of Flux-Ex 500, which is the reason it has a high flashpoint, means that solvent purification cannot be achieved during the process as it can be with CFC cleaners. Attention to the drying process equipment may also be required to ensure that it is capable of dealing with the demands of evaporating Flux-Ex 500 from beneath components. Flux-Ex 500 usage and drying time can be minimised by ensuring effective drainage of excess material between process steps. Pure Flux-Ex 500 is particularly useful for selective cleaning processes using a convenient hand spray applicator followed by hot air drying with a suitable hand held blower.

Mixed solvent processes: It is probable that situations will arise in which the drying attributes of Stannol Flux-Ex 500 cause the total process to take too long or the boards and components to be subjected to too much heat stress. A way to resolve this problem is to substitute the final rinse step in the process described above by a rinse in a low boiling point solvent, producing a board residue with much increased volatility. A popular choice is a low molecular weight alcohol since this class of materials is totally miscible with Stannol Flux-Ex 500 and does not cause flux residues to precipitate back onto the board in the tank. However, a Flux-Ex 500/alcohol mixture has a low flashpoint and appropriate precautions must be taken in equipment design and operation.

This process can be viewed as a variant by which Flux-Ex 500 volatility may be increased. However, experience with alcohol-only processes suggests that it may also be appropriate to consider the use of a Stannol Flux-Ex 500 pre-wash, as a system enhancement which yields improved product cleanliness levels.
An alternative to alcohols in the final rinse stage is the use of a volatile but non-flammable solvent such as a perfluoro-compound. Such a process has special equipment requirements if economic operation is to be achieved.

Flux-Ex 500-water processes: Water is totally miscible with Flux-Ex 500. The improved volatility of Flux-Ex 500 achieved with a solvent rinse may also be obtained to a lesser degree with a water rinse, without the extra costs associated with a reduction in the flashpoint of the solvent. Of course water is not as volatile as low molecular weight alcohols but the blend with Flux-Ex 500 in the rinse stage is sufficiently volatile for practical processes. The rinse water requires continuous disposal and/or purification and this may be achieved in a number of ways, determined by the equipment design and the overall process configuration. The initial washing stages utilise pure Flux-Ex 500 in the same way as the Flux-Ex 500 only process.
There are some situations where it would be more appropriate to use a blend of Stannol Flux-Ex 500 and water in a single stage cleaning operation. Obviously total cleaning capacity is reduced and the disposal of the exhausted cleaner will be different to that of either contaminated Flux-Ex 500 or water on its own. An example where this might be suitable is the cleaning of process equipment such as solder stencils.

SUMMARY OF PROCESS CONFIGURATION

SYSTEM	WASH	RINSE	RINSE	DRY
Flux-Ex 500 only:	Flux-Ex 500	Flux-Ex 500	Flux-Ex 500	Dry
Semi-aqueous:	Flux-Ex 500	Flux-Ex 500	Deionised water	Dry
	Flux-Ex 500	Water	Deionised water	Dry
Mixed solvent:	Flux-Ex 500	Flux-Ex 500	Alcohol	Dry *
	Flux-Ex 500	Alcohol	Alcohol	Dry *

*drying by evaporation, no forced drying required

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PROCESS FEATURES

PROCESS	ADVANTAGES	DISADVANTAGES
Flux-Ex 500 only:	No DI water supply needed	Drying times slower than water or alcohol, unless special drier or in-line process used
	No DI water treatment needed	
	Single chemical system	
Semi-aqueous:	Non-flammable	DI water supply needed
	Reasonable drying times	
	Non-foaming	Water treatment may be needed
	Neutral pH	
	Fully water soluble	
Mixed solvent:	No DI water supply needed	Control of flammability
	No DI water treatment needed	
	Fast drying	Multiple chemical system
	Solvents compatible	

DISPOSAL OF PROCESS WASTE

The user is advised to consult local regulations and to refer to the Material Safety Data Sheet for Stannol Flux-Ex 500 before implementing particular strategies for the handling of process by-products.

Different process options may variously produce:

- **Flux-Ex 500 contaminated by flux residues, possibly including the metals tin and lead**
- **Water contaminated by Flux-Ex 500 and a small amount of flux residue**
- **A mixture of water, Flux-Ex 500 and flux residues**
- **Filters and ion exchange resins contaminated by flux residues**

No unique strategy for dealing with these by-products exists for every process in every country. However, Stannol personnel can direct the user to technically and economically viable alternatives which meet regulatory criteria. In many locations, contaminated water may be disposed of directly on site after suitable pre-treatment and/or dilution. Small users will probably find that the most attractive option is to pay for approved operators to remove by-products for controlled disposal. Stannol Flux-Ex 500 contaminated by flux residues has an intrinsic value as a low grade fuel.

TYPICAL PHYSICAL PROPERTIES

	FLUX-EX 500	
Flashpoint (PMCC):	100°C	
Boiling range:	217 – 224°C	
Vapour pressure, 20°C:	0,07 mbar	
Viscosity at 20°C 40°C 60°C	 6.5 cP 3.6 cP 2.3 cP	
Surface tension at 22°C:	28.3 mNm^{-1}	
Occupational exposure limit assigned:	UK(MEL/OES)	None assigned
	USA (TLV)	None assigned
	Germany MAK recommended	100 $mg.m^3$

PRODUCT COMPATIBILITY

Since Stannol Flux-Ex 500 is designed to remove organic materials (resins) from surfaces. It is not compatible with many painted or varnished surfaces. It should not be used for cleaning these, and process equipment having a painted metal finish is not recommended.

MATERIAL	S	SL	SW	NS
High density polyethylene (HDPE):	✓			
Low density polyethylene (LDPE):	✓			
Linear low density polyethyiene (LLDPE):	✓			
Polystyrene:		✓		
Polycarbonate:		✓		
Polypropylene:	✓			
Polyethersulphone:	✓			
Polyetherether ketone (PEEK):	✓			
Phenolic resins:	✓			
Polyethyleneterephthalate (PET):	✓			
Nylon:	✓			
Plasticised PVC:			✓	
Polymethyimethacryiate (PMMA):				✓
Acrylonitrilebutadiene styrene (ABS):		✓		
Nitrile rubber, Isoprene, natural rubber:				✓
Styrene butadiene:				✓
Butyl, ethylene propylene rubber:	✓			
Neoprene:			✓	
Fluoroelastomers:	✓			
Inks and markings:	✓			

Test Conditions = 60°C for 30 minutes

S = Suitable, no observable solvent attack
SL = Slight solvent attack (e.g. crazing of polymer surface)
SW = Some swelling (normally reversible with time)
NS = Not suitable, severe solvent attack

For materials not listed and for those where some solvent effects may occur (SL and SW categories), it is recommended that additional compatibility tests should be conducted prior to use with Flux-Ex 500.
Stannol Flux-Ex 500 is compatible with all commonly encountered metals.

CLEANING EFFICIENCY

Residual ion measurements on boards cleaned with Flux-Ex 500 show that it is capable of efficiently removing a wide range of flux residues. Surface Insulation Resistance measurements using a Bellcore test specification (TR-TSY-000078), indicate that cleaned boards have a resistance of greater than 1011 ohms after 96 hours.
Independent performance tests carried out by industry groups and individual companies consistently show that Stannol Flux-Ex 500 outperforms competing cleaners. The IPC has approved pure Flux-Ex 500 and Flux-Ex 500/Water processes in the Phase II evaluation programme, showing that the levels of cleanliness achieved are better than with conventional CFC cleaners.

SHELF LIFE

2 years after date of delivery (provided proper storage in originally sealed container).

HEALTH AND SAFETY

Stannol Flux-Ex 500 is a blend of glycol ethers that have low acute toxicity and are not associated with adverse reproductive effects. Before using please read the material safety data sheet carefully and observe the safety precautions described.

NOTICE

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