

# Vitronics Soltec

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## Which flux to choose for lead-free wave soldering

### Introduction

Due to the higher thermal process demands for lead-free soldering there is often a need for new fluxes that will meet these demands.

The general flux demands for lead-free soldering are however basically the same as for the fluxes that were commonly used for soldering with tin-lead solders.

### Basic flux requirements

The flux should promote the solderability of the parts to be joined and reduce solderbridging and webbing, solder-spike or solder-flag formation. Last but not least, the remaining residues should not impair the electrical properties of the equipment or boards on which the flux is applied.

To fulfil the last requirement it is often necessary to apply the flux in a controlled way, to assure that the maximum amount per Unit Square will not be exceeded. Most flux suppliers give in their data sheets advised boundaries for the amount of flux that should be applied to ensure that the climatic and electrical demands as tested by the flux manufacturer will be met. The test requirements are based on IPC and Bellcore test procedures for Surface Insulation Resistance, the Copper Mirror Test, etc.

It is the responsibility of the customer to check if these requirements meet its own specifications.

He should always select a flux that passes his tests or one that fulfils his test requirements.

### Flux selection

Important is next what type of flux should be selected, such as VOC-based flux or VOC-free flux.

The preheating demands of VOC-free fluxes are often higher than for a VOC-based flux.

An other selection criterion is if a flux must leave a 'clean' surface, or if some harmless residues may remain. E.g. most resin containing fluxes may leave some residues. This also depends on the solids content of the flux.

These are selection criteria that a customer has to make on forehand.

Next he should make a selection from a few fluxes that meet his requirements.

The final choice should next depend on practical tests.

E.g. if one uses an OSP-treated board, the final result may strongly depend on the (blend of) solvent(s) that are used in the flux.

The reason is that this organic coating must be dissolved first during the fluxing action before the flux can deploy its full activity on the surface to be soldered.

So each flux formula may have its specific points that can be of benefit for a specific process.

That is however something one has to test during real production.

## Flux application

Related to the flux selection is also the application method.

Foam fluxing will normally soak a board with flux and will give in most cases an optimal hole-fill with flux. Since this method gives less or no control over the amount of flux that is applied, often other systems are advised, such as spray fluxing. The benefit of a spray fluxing system is that it works with a closed system. Foam fluxing needs a flux control system, since the density will change due to evaporation of the flux solvent in an open system.

It is important that with the flux selection also the application method is taken into account.

## Final remark

If the data sheet does not provide sufficient information about the behaviour of the flux residues, one should contact the supplier or manufacturer to get the necessary information.

One should also be aware that not all flux that is applied would get the full thermal exposure during soldering. This is especially true for the flux at the board edges and on topside of the board.

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