

The function of nitrogen in reflow soldering

Introduction

With the increasing use of copper-OSP boards the use of nitrogen in reflow soldering is often demanded. This in view of the wave soldering process that has to follow reflow soldering.

During reflow the OSP that protect the solderability of the copper surface will vanish since the OSP film will be evaporated during the reflow process.

In order to prevent oxidation of the copper surface during reflow soldering the use of nitrogen might be mandatory.

The effect of nitrogen on the reflow process

For reflow soldering alone the use of nitrogen is often not necessary. When the solderability of the components and the board is according to the necessary level, the solderpaste should be able to create sound soldered joints if the correct heating profile is used.

The addition of nitrogen is in that case for the reflow process not necessary.

If however nitrogen is used it will support the process since during the reflow process now further oxidation of the joint surfaces and the solderpaste will be decreased. The nitrogen supports the wetting capability of the solderpaste due to this minimised oxidation during soldering.

Another effect of nitrogen is that it changes the surface tension of the solder compared to soldering in an air environment. Depending on the solder alloy this can give a higher or a lower surface tension. A higher surface tension might assist in the alignment of the components during soldering

As long as the wetting of the component joint surfaces is not initiated and the solderpaste is completely molten this can cause a movement of the component. The component will "float" at the solder globule surface. This globule is formed during melting of the solderpaste when the wetting of the joint surfaces is not directly initiated during the melting and confluence of the solderpaste.

As long as the component is still in contact with the solder, wetting will again (partly) compensate for this component movement as the surface tension of the solder will try to keep the wetted joint surface in contact with the solder and the other joining part (solderpad). Depending on the mass of the component and the displacement that has taken place before wetting took place, the component might after soldering not be completely in contact with the solder pad. However as long as the joint is sound and the gap to the adjacent component is still sufficient such displacements can often be allowed.

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