

Technical Application Report



Conformal Coatings

Protecting the PCB board in critical applications which are exposed to harsh environmental working conditions is essential if product failure is to be avoided. A conformal coating is normally applied as a thin layer across the surface of the board, covering all components and delicate wiring.

For any coating to be effective it must maintain good adhesion to all the component substrates, be unaffected by changes in operational temperature and be resistant to any contaminants, such as moisture and chemicals. Its ability to flow around, under and over the components without leaving areas exposed to the atmosphere especially on sharp edges, is also important.

Most conformal coatings are clear and many formulations have a UV indicator to enable easy visual quality control inspection under an ultra violet light source. Cure systems vary and include air drying, heat cured and UV cured.



Coating Types

Silicone

These 1-component silicone coatings can be formulated using either addition cure technology for heat cured and condensation cure for materials that cure at room temperature (RTV). Very fast cycle times can be achieved using a heat cured coating in conjunction with a curing oven. Their ability to withstand a very wide operating temperature range makes them suitable for aerospace and automotive applications. Silicone also has a natural ability to protect against moisture ingress.

Key Features

- Wide operating temperature range (-55 °C to + 200 °C)
- Room temperature or heat cure
- Low viscosity
- 100% solids (no harmful solvents)
- Excellent adhesion to many substrates
- Low odour
- RoHS compliant

Acrylic & Polyurethane

These solvented acrylic and polyurethane systems are air drying and are ideal to use where there may be a need to rework components on the PCB board after coating. It is possible to solder through these coatings and easily remove them using a suitable cleaner, such as ACC50/51. Both acrylic and polyurethane coatings have approvals to MIL and IPC specifications.

Key Features

- Meets requirements of MIL-I-46058C and IPC-CC- 830
- Removable with solvent cleaner for rework
- Temperature range -55 to +130 C
- RoHS compliant
- Can be soldered through without releasing toxic gas

Application Methods

Brushing

This is probably the simplest of the application methods and ideally suited to small scale production or prototypes.

Ensure the coating has been mixed thoroughly and stood for 2 hours to allow bubbles to separate. For best results, coatings should be used at room temperature (above 16C), using a good quality brush. Apply the product gently to achieve a good coating without disturbing the wiring. The coating should then be left to dry in accordance with the curing regime stated on the technical data sheet.

Spraying

Spraying is probably the most common form of application method which allows for accurate control of coating thickness. In order to use the coating through suitable spray equipment it may be necessary to dilute the coating down to the desired viscosity. This viscosity will vary depending upon the coating and the equipment; technical data sheets provide approximate dilution rates only. It is important also to use only the recommended thinner as shown on the technical data sheet as this will vary from coating to coating.

These coatings can be used through manual air guns such as Devilbliss or airless equipment such as Nordson, PVA, Dima and Speedline. ACC technical staff are available to help with recommendations and trials to arrive at the best and most suitable coating for any combination of equipment and application.

After spraying the curing regime should be followed as detailed in the technical data sheet.

Dipping

Dip coating is another simple method of application suitable for very small scale production. It involves total immersion of the PCB in the coating; this can be done by hand or for a more accurate coating, with a machine. The coating may be diluted with the specified thinners if required.

The PCB should be immersed vertically, if possible, and left for approx 1 minute until air bubbles have dispersed. The PCB should be withdrawn very slowly so that an even film of the coating covers the surface of the PCB, it can then be allowed to drain and cure in accordance with the technical data sheet.

Masking

To avoid coating parts of the board such as connectors a masking material such as ACC 13, can be used. This synthetic mask is applied as a viscous liquid and will air dry or heat cure. After application of the coating it can be easily peeled off to leave a clean area free of coating.