

Technical Bulletin

Conformal Coating Masking

In conformal coating many components and printed circuit board locations must remain uncoated due to the insulating nature of the coating. The purpose of the conformal coating masking materials is to prevent migration of the conformal coatings into components that need to clear and designated keep out areas. This applies to both liquid conformal coating and Parylene processing.

Get this basic process wrong and it can be a big problem, leading to the next stage of either repairing the conformal coating leak, stripping the conformal coating off the circuit board, removing a component to replace it or scrapping the board.

Determining Where to Mask

Sometimes it is very obvious what you need to mask. A connector clearly does not want an insulating varnish contaminating the conducting parts. However, on other occasions it is not so clear. For example, it's important to know whether a component is sealed against penetration of the coating from the back as well as the top.

For example, masking the top of the component in Figure 1 is fine as long as the base is also sealed. The question to be asked is whether it is?

Once the masking areas have been defined for the particular circuit board then the next stage to consider is the application process.

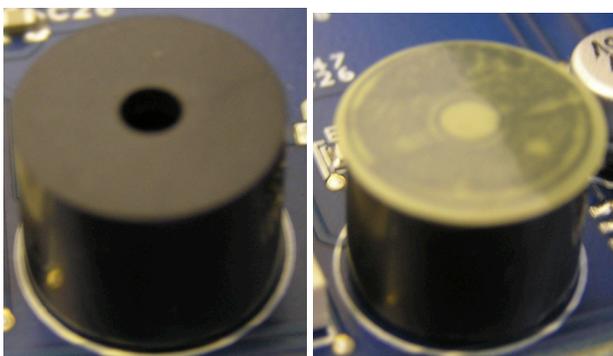


Figure 1: Is the component sealed at the base as well as at the top for conformal coating leaking?



Do you need to mask the circuit board the same for conformal coating dipping or spray applications?

For those who process with these two different methods then the answer is clearly no. Dipping is a much more difficult and intensive process to mask for because the liquid floods everywhere and the surface tension of the liquid ensures it penetrates everywhere. Parylene falls into the same category as dipping as you are masking against a vapour penetrating the coating

A good example is shown in Figure 2. Here a connector is to be masked with a reusable masking boot. The boot is placed over the top of the connector and protects it easily in a conformal coating spray application. However, how successful would it be in a dip process?

Unless this is a gasket seal to the device then this is likely to be a big problem.

Therefore, considering the conformal coating application process is a critical factor in defining how the circuit board should be masked and defining if the masking is a Barrier versus Shield system is crucial.

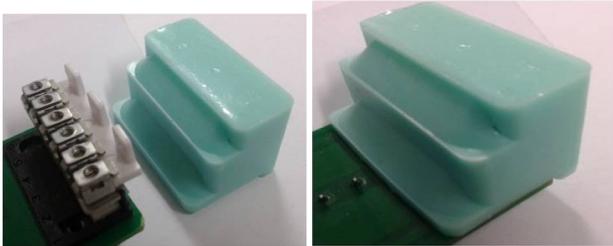


Figure 2: A masking boot placed on top of a connector would be perfect for spraying but perhaps not so successful for dipping unless there is a strong seal.

The Different Types of Masking Materials

There are several different masking techniques using different masking materials such as masking tape, dots, shapes, boots and liquid latex in conformal coating processing.

The key issue is to know how to use the different materials on their own or in combination to ensure that masking failures do not occur.

Techniques for masking components, connectors, test points, mounting holes and via's have been developed with years of experience and standard methods now exist.

Masking Dots and Tapes

Masking dots and tapes have been used from the first day conformal coating was applied to circuit boards. It is a standard method and used highly successfully by many companies.

However, some adhesive tapes have problems being used for conformal coating processing and these issues include:

- Reacting in an adverse way with the conformal coatings themselves to produce de-wetting effects on the circuit board (Figure 3)
- Leaving adhesive residues when de-masked which need to be removed or may cause long term reliability issues
- Allowing bleeding / leaking under the tape of the conformal coating during the application process so failing to mask the part successfully

- Not staying sealed for long enough during processing so the tape or dot is not protecting the circuit board
- Tearing when removed from the circuit board leaving residues of the tape behind which again may cause long term reliability issues
- Compatible with all types of conformal coatings including solvent based acrylic, silicone and polyurethane materials so the solvents don't react with the tapes.

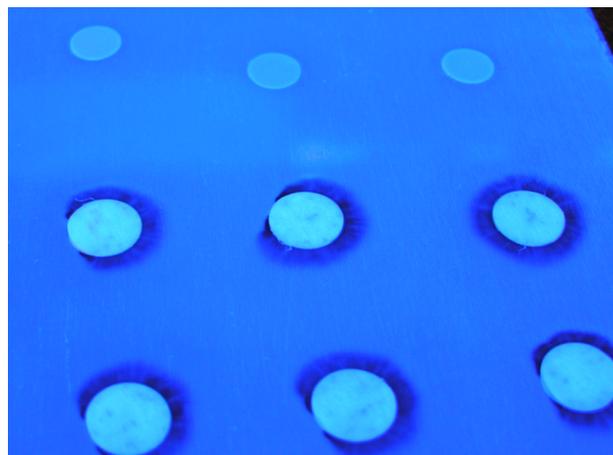


Figure 3: De-wetting of the conformal coating around the masking dots on a blank circuit

Therefore, choosing the right masking dots and tapes for your process can be crucial in having a smooth conformal coating masking process.

Liquid Latex

The use of peelable solder mask products is a good option for masking. The material can seal effectively against ingress of coating into the component as shown in Figure 4.

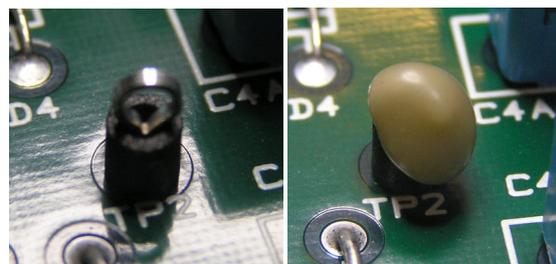


Figure 4: Masking of a test point with Liquid Latex is simple and seals very effectively

However, when considering liquid latex there are a few key points:

- Ensure the ingredients in the latex are compatible with the circuit board. For example, natural latex can be heavily ammoniated.
- Check how hard the latex dries. If it is very tough it could damage components when removed from the circuit board.
- Further, if the latex breaks up easily when removing it you may find residues get entrapped in components and cause reliability problems.

Masking Boots

The use of masking tapes, dots and liquid latex is an effective process in protecting components from ingress of conformal coating.

However, the masking application can be labour intensive, especially in higher volume applications. Therefore, recyclable masking boots can offer a labour saving alternative in both the masking and de-masking stages of the coating process.

Figure 5 shows an effective example of a masking boot protecting a complex part. If this was to be masked by hand with tape then the labour costs will increase significantly.

Each boot is generally custom made unless a popular part like a Molex connector is being used. Therefore, there is some investment in manufacturing the initial run of boots. However, for even small volumes of repeat processing of the circuit boards can quickly show a Return on Investment compared to hand masking especially where there is intensive labour.

The Conformal Coating Masking Process

In general masking a circuit board for conformal coating can be a straightforward process. This is the case when

- The circuit board masking requirements are completely understood
- Component designs have been checked to see if they are sealed or are compatible with the conformal coatings
- The coating application process is defined and fits with the masking process
- The materials selected for masking are compatible with the coatings and circuit board.



Figure 5: Masking a complex component like this is done in seconds with a boot compared to hand masking with tape.

SCH Technologies Masking Materials

SCH Technologies provide a range of conformal coating tapes, dots and masking boots that meet the highest standards required for both liquid conformal coating and Parylene processing whilst ensuring the products are price competitive.

We use these masking materials in our Conformal Coating Services around the world.

SCH Technologies offer

- Conformal coating Subcontract Services
- Global supply of Conformal Coating Equipment
- Conformal Coatings and Masking Materials
- Conformal Coating Training & Consultation

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