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## Processing of our conformal/permanent coatings and thick-film lacquers

### Typical faults - Causes and remedies

Generally speaking, the processing of conformal/permanent coatings is rather unspectacular. Conformal/permanent coatings “only” have to be applied and dried - and the assembled printed circuit board is fully protected from external influences.

In spite of this - at first sight - very simple processing, it is always the little things that cause all the problems. Failures occur in practical operation time and again because of processing errors that could have been avoided.

In addition to the comprehensive advice given in our technical reports on our products of the series' SL 1300 to SL 1309 N, DSL 1600 FLZ, DSL 1705 FLZ and DSL 1706 FLZ and our Application Information AI 1/1, we would like to present to the users of our conformal/permanent coating systems some typical examples as well as causes and remedies in order to eliminate the majority of these trouble sources from the beginning.

#### 1. Poor wetting of the conformal coating on the substrate - dewetting



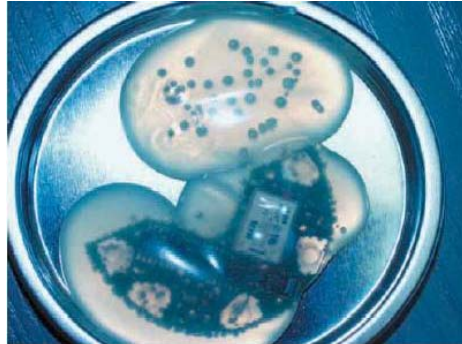
#### Possible causes:

- dewetting on components because of mould release agents used in production
- wetting problems caused by flux agent used and flux agent residues resulting after the soldering process
- surface-active substances in the solder resist (such as silicone)
- contamination of surface to be coated by, for instance, grease from finger prints.

#### Remedy:

- preclean assembled printed circuit board
- check and, if necessary, optimise flux agent application and soldering parameters
- check general compatibility of substrate and flux agent with the conformal coating
- ensure cleanliness in processing, mainly prior to application of the conformal coating; for instance, wear gloves.

## 2. Blistering in conformal coating



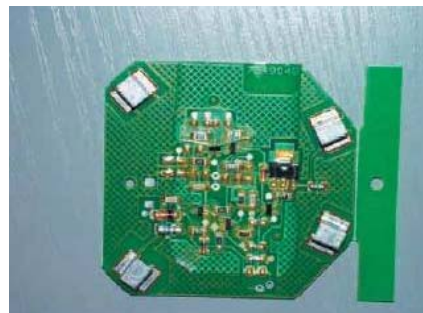
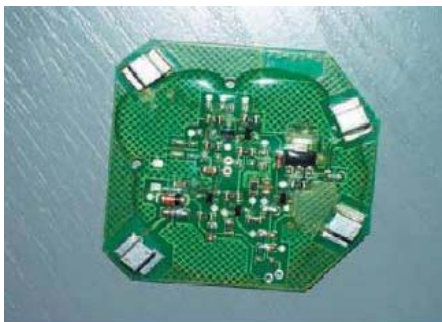
### Possible causes:

- coating processed with excessive viscosity
- layer thickness of coating too high
- drying too hot and/or too short.

### Remedy:

- observe recommended layer thickness for the conformal/permanent coatings of the series SL 1300 of 20 to 50  $\mu\text{m}$  and 8  $\mu\text{m}$  on component leads. Optimum final properties of the conformal coating are achieved with dry film thicknesses of 20 to 40  $\mu\text{m}$  on unpopulated areas. Layer thicknesses of more than 100  $\mu\text{m}$  should generally be avoided
- In the case of the thick film lacquers TWIN-CURE<sup>®</sup> DSL 1600 FLZ, DSL 1705 FLZ and of the series DSL 1706 FLZ substantially higher ink film thicknesses can be applied bubble-free with suitable coating procedures. In practical operation, layer thicknesses of up to 300  $\mu\text{m}$  predominate
- Adjustment of the processing viscosity recommended in the respective technical report by thinning in the case of the solvent-based conformal/permanent coatings of the series' SL 1300 to SL 1309 N. In the case of the solvent-free conformal/permanent coatings TWIN-CURE<sup>®</sup> DSL 1600 FLZ, DSL 1705 FLZ and of the series DSL 1706 FLZ, the viscosity should be adjusted by increasing the temperature
- The forced drying of solvent-based conformal coatings should not be effected too quickly because - depending on the type of solvent - sufficient evaporation time must be guaranteed. Detailed recommendations can be found in our technical reports and our Application Information AI 1/1 which also contains additional diagrams.

## 3. Cracking in conformal coatings



**Possible causes:**

- coating applied too thickly
- conformal coating system is too brittle for required rapid temperature changes.

**Remedy:**

- observe recommended layer thickness for the conformal/permanent coatings of the series' SL 1300 to SL 1309 N of 20 to 50  $\mu\text{m}$  and 8  $\mu\text{m}$  on component leads
- Optimum final properties of the conformal coating are achieved with dry film thicknesses of 20 to 40  $\mu\text{m}$  on unpopulated areas. Layer thicknesses of more than 100  $\mu\text{m}$  should generally be avoided
- The application of layer thicknesses of up to 300  $\mu\text{m}$  has turned out to be positive in the case of the thick film lacquers TWIN-CURE<sup>®</sup> DSL 1600 FLZ, DSL 1705 FLZ and of the series DSL 1706 FLZ
- Another possibility to avoid cracking would be the use of the thick film lacquer TWIN-CURE<sup>®</sup> DSL 1600 E-FLZ, a solvent-free 1-pack thick film lacquer based on a high-quality copolymerisate of polyurethane resin (PUR) and polyacrylate (AY) that forms a more flexible lacquer film after curing compared to the standard adjustment