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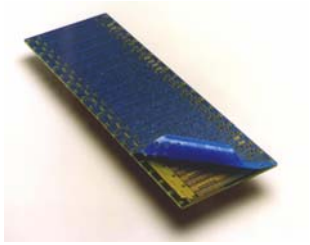
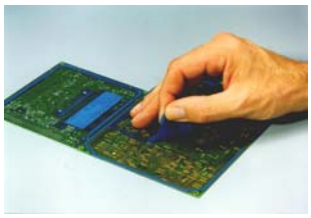
PETERS
Speziallacke für die Elektronik

AI APPLICATION INFORMATION

Selection criteria and processing advice for our peelable solder resists (solder masks) of the series SD 2950

AI 2/29





This application information sheet gives advice on the possible application fields of peelable solder masks, helps with the choice of a suitable peelable solder mask for different kinds of applications and contains detailed and in-depth information and advice that it is imperative to follow in order to ensure safe and reliable processing of our peelable solder resists (solder masks) of the series **SD 2950**.

Processing in accordance with the instructions is vital in order to obtain a solder- and tear-resistant peelable solder mask coating that can be easily removed.

Contents

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1. Application

When manufacturing printed circuit boards and assemblies it is often necessary to cover certain areas of the printed circuit board during soldering and other processes, in order to avoid them being wetted with solder or process chemicals. Such areas may be gold contacts, gold-plated rotary contacts, multipoint connectors, carbon-conductive touch-key contacts or even larger areas for which selective soldering and multiple soldering is necessary (e.g. SMD mixed assembly, manual or automatic soldering and others).

The peelable solder masks of the series **SD 2950** are processed by screen printing and can thus be applied precisely and economically to the required areas. After soldering, the masks are peeled off manually. Compared with the manual application of heat-resistant masking tapes, peelable solder masks offer significant technical and economic advantages, e.g.:

- solvent-free/VOC-free (VOC = Volatile Organic Compounds)
- considerably less time- and cost-consuming application
- no difficult-to-remove adhesive residues
- automatable and register-true application by screen printing
- even difficult areas, such as gold-plated rotary contacts, can be covered and protected without any problems
- depending on the ink type also suitable for multiple soldering, reflow soldering and lead-free soldering.

When applying a peelable solder mask in a conformal coating process it is possible that the intentionally low adhesion of the peelable solder mask to the substrate will allow the conformal coating to seep under the peelable solder mask or that the conformal coating will start to dissolve the peelable solder mask causing it to swell. Therefore, the suitability of the peelable solder mask for the conformal coating process must be ensured by pre-trials.

1.1 Requirements

Economic solder masking is only possible with peelable solder resists. In practice, very high and partly even contradictory demands are made on peelable solder resists, e.g.:

- good solderability
- high tear resistance
- thixotropic adjustment to achieve high definition and to enable tenting of plated-through holes
- no discolouration of base material
- good peelability, even out of plated-through holes
- resistance to Hot-Air Levelling (HAL)
- very high temperature stability when used in reflow soldering / lead-free soldering
- no change in the resistance of carbon-conductive inks when covered with peelable solder masks
- no corrosion of metallic copper
- resistance in electroless processes.

All these requirements cannot be met by one peelable solder mask alone. In Section 2 "Application" of the technical report on peelable solder masks of the series **SD 2950** there is a table illustrating the preferred fields of application of the various mask types.

Please be aware that the advice given in the technical report are non-binding recommendations. Many different parameters, such as coating thickness, layout of the printed circuit board, constitution of the substrate, curing and soldering conditions and process chemicals etc., may influence the suitability of the peelable solder mask for a particular process, so that a different peelable solder mask to the one indicated in the table may be more appropriate. You will find corresponding details in Section 6 "Advice on curing peelable solder masks in their various fields of application" of this Application Information sheet.

➔ Perform pre-trials to ensure the suitability for your particular application.

1.2 Technical advice

If there are requirements on the peelable solder masks that are not answered by this application information sheet or if there are special equipment features, please contact our **Application Technology Department (ATD)** who would be glad to offer you competent support. However, this does not release you from the obligation to conduct your own pre-trials.

1.3 Reports and further technical information

We offer technical papers and Technical Information sheets (TI's) that give particularly detailed information on numerous aspects of ink processing and on environmental and quality issues in the fabrication of printed circuit boards and assemblies.

We would gladly provide a list of all available publications (TI 15/100 "Overview of technical information sheets " and TI 15/101 "Reports") upon request. Furthermore, a number of technical publications can be ordered/accessed on our website at **http://www.peters.de**.

2. Safety recommendations

➔ Please read the corresponding material safety data sheet where you will find detailed specifications of safety precautions, environmental protection, waste disposal, storage, handling, transport as well as other characteristics.

➔ When using chemicals, the common precautions should be carefully noted.

3. Ink preparation

The peelable solder masks of the series **SD 2950** as well as the required thinner must be brought to room temperature before processing. It is sensible to place the containers into a room with the same temperature as the processing room the day before they are processed.

➔ Do not stir the solder mask too vigorously since otherwise bubbles will get increasingly incorporated into the ink, destroying the thixotropy and making optimum processing impossible.

Owing to the high viscosity, settling of the ink components is not to be expected.

3.1 Adjustment of viscosity

The peelable solder masks of the series **SD 2950** are adjusted in such a manner that they can normally be processed in the condition supplied. A process relevant reduction in the viscosity is only possible by adding the reactive thinner **VR 2950**. The added quantity must not exceed 2 %.

As the reactive thinner VR 2950 participates in the curing process it is impossible to use any other thinners or solvents. Please consider that when a thinned peelable solder mask is printed thinner layers will be achieved and the solder resistance and/or peelability may be impaired. Perform pre-trials to ensure that the thinned peelable solder mask can be peeled-off perfectly.

4. Processing

Application is by screen printing. Peelable solder masks are solvent-free and therefore do not dry in the screens.

Since the many different permutations make it impossible to evaluate the whole spectrum (parameters, reactions with materials used, chemical processes and machines) of processes and subsequent processes in all their variations, the parameters we recommend are to be viewed as guidelines only. We advise you to determine the exact process limitations within your production environment, in particular as regards compatibility with your specific follow-up processes, in order to ensure a stable fabrication process and products of the highest possible quality.

The product data specified in the technical reports is based upon standard processing/test conditions of the mentioned norms and must be verified observing suitable test conditions on processed printed circuit boards.

Feel free to contact our application technology department (ATD) if you have any questions or for a consultation.

4.1 Ink film thickness

Basically, all peelable solder masks need to be applied bubble-free and in thick layers in order to meet all the different kinds of requirements. When coating plane surfaces, i.e. areas of the printed circuit board without plated-through holes, one should aim for a minimum coating thickness of between 250 µm and 300 µm. For tenting plated-through holes, HAL applications, reflow soldering or multiple soldering a minimum coating thickness of between 300 µm and 400 µm is required. The coating thickness is mainly determined by the fabric thread, the size of the area to be coated, the flood process and the squeegee angle. The general rule is: the higher the coating thicknesses, the higher the tear resistance and consequently the better the peelability. The following technical advice for screen printing helps to achieve this.

4.2 Screens

Which screen fabric should be chosen depends on the size of the areas on the printed circuit board to be covered. For small areas, e.g. contact fingers, touch-key contacts and others, 17 T and 18 T polyester fabrics (polyester 18-250 according to new nomenclature, for example) have proven best. In order to obtain a thick ink film these fabrics additionally require a thick screen emulsion. For large areas, or if the coating nearly covers the whole board, it is recommendable to use coarse-meshed 12 T polyester fabrics, in which case an extremely high stencil build-up can be dispensed with. A sufficient screen tension of at least 25 Newton/cm or according to the instructions of the screen fabric manufacturer should be observed.

Alternatively, steel fabrics or fabrics with thinner polyester threads (compared with the T fabric) can be used. The ink can be more easily removed from them, thus enabling smoother surfaces to be achieved, if required.

4.3 Screen coating

The thickness of the screen coating also has a major influence on the film thickness - particularly at the edges of the coated area - and on the definition that can be achieved. Depending on the application a stencil build-up of approx. 200-700 µm is required. In order to achieve this high stencil build-up on the 12 T-18 T coarse-meshed screens easily, quickly and cost-effectively, we recommend the thick film emulsion **HP 5400** for the screen coating. **HP 5400** is a 1-pack liquid emulsion with an optimum flow when processed and particularly short processing and drying times. When applied multiply wet-on-wet the required stencil build-up can be achieved without difficulty. Depending on the coating thickness applied, the thick film emulsion is dried for 2-4 hours, then exposed and developed within a few minutes. The good bonding with the screen fabric enables the accomplishment of a high stability and edge definition during printing.

Coating of the screen with other, very highly viscous copy layers is very time consuming since they are difficult to process and must be dried for up to 24 h.

Alternatively, stencils can be built-up by means of a thick-film stencil (direct/indirect photo polymeric films). Thick-film stencils are available in thicknesses of 200 µm and more. These capillary films are transferred on to the screen fabric with the help of water. After drying, a photo-emulsion corresponding to the thick-film stencil is applied to the squeegee side until the screen structure is balanced. After thorough drying (e.g. 2 hours at 40 °C [104 °F]) the film can be exposed and developed. For further advice on the use of thick-film stencils, please contact the relevant manufacturers.

Compared to **HP 5400,** the generation of a thick-film stencil is faster, but also much more cost-intensive and the bonding with the screen fabric is poorer which negatively affects the printing stability.

4.4 Squeegee

Practical experience has shown that rubber squeegee blades with a shore-A hardness of 60-65 are ideal. If the definition allows, the blades can be slightly rounded, enabling a thicker ink film to be achieved. The squeegee angle should be set to approx. 75 degrees and as low a printing speed as possible observed. To achieve a satisfactory coating thickness in one print as far as possible, the screen fabric must be very well filled before commencing printing. If this is not achievable with standard metal pre-squeegees, the use of a rubber squeegee is recommended.

4.5 Printing machines

Peelable solder masks can be processed manually or in semi- or fully automatic screen printing machines. In order to achieve a thick ink coating, the squeegee pressure should be as low as possible. When tenting plated-through holes the squeegee pressure of the printing machine should be adjusted just enough to avoid pressing the ink through the holes, thus causing soiling of the back of the printed circuit board and/or of the screen printing table. In practice, push-stroke flooding with a right-angled, sharp-edged elastomeric squeegee has proven helpful in achieving thick, bubble-free ink coatings with good definition in only one print. This leads to an optimum filling of the screen mesh. Subsequent printing should be effected with as low a squeegee pressure as possible, as the peelable mask should only be gently dislodged from the screen fabric; if the process conditions allow, push-stroke flooding should also be used for printing.

4.6 Special advice

To make it easier to subsequently peel off the solder mask, we recommend also printing a pull tab. Where possible, neighbouring masked areas should be linked by strips of peelable. This additional and elementary support does not require much effort and is a welcome and cost-saving service for the user of the printed circuit boards.

5. Drying/curing

Peelable solder masks are thermally cured. The total temperature load to which the peelable solder mask is subjected during curing must be considered up until the point when it is peeled off, i.e. the curing parameters must be adapted to the follow-up process(es).

The temperature resistance of peelable solder masks is solely of a temporary nature, i.e. apart from the temperature the exposition time has a decisive influence on the temperature resistance of such a system. In the case of advanced requirements, such as multiple solder processes, we therefore recommend to reduce the curing time and/or temperature in order to increase the temperature resistance of the system in the follow-up processes. The temperature resistance can also be increased by applying a higher coating thickness.

You will find details of curing conditions in Section 6 “Advice on curing peelable solder masks in their various fields of application“.

Generally, the higher the chosen temperature the more complete the degree of cross-linking and the associated tear resistance and adhesion of the ink, i.e. brief yet high curing temperatures give the best results when it comes to the later peeling of the solder masks, particularly when they are peeled out of plated-through holes.

To this aim, care should be taken that the inks are not cured too much since over-curing leads to an increase in the adhesion of the ink film to the substrate causing loss of peelability.

In extreme cases a too extreme overall temperature load causes a kind of carbonisation of the ink. In this respect, we draw attention to the peelable solder masks **SD 2954** and **SD 2955** that exhibit a remarkably high temperature stability and therefore are particularly suitable für multiple soldering processes, for example.

Peelable solder masks can also be cured in IR curing ovens.

➔ Depending on the type of peelable solder mask, cure for 2-8 min at 160 -180 °C [320-356 °F]. Perform pre-tests to determine the optimum temperature profile.

Principally, curing in UV curing units is possible, although the curing is not caused by the UV energy but by the simultaneously generated thermal energy.

➔ Perform pre-tests to check the suitability of the UV unit and whether the thermal energy is sufficient to achieve an adequate cross-linking and stability of the peelable solder mask in the follow-up processes.

6. Advice on curing peelable solder masks in their various fields of application

The knowledge collected here is based upon more than 25 years‘ experience in the field of peelable solder masks – our company invented them! – and should certainly help to avoid making elementary mistakes.

The times mentioned are the object holding times: The curing time starts from the point the printed circuit boards have reached the curing temperature.

➔ Please note that the curing times stated in the following are guideline parameters that may have to be adjusted to the individual processing conditions.

➔ Please take into consideration that all peelable solder masks become thermoplastic by the impact of heat during the soldering process which may lead to sticking or imprints in the case of direct contact with the conveyor belt. If necessary, use product holders in order to avoid direct contact between the peelable solder mask and the transport system.

6.1 Wave soldering

During wave soldering comparably short temperature loads occur. Thus, it is not vital to use peelable solder masks with a high temperature resistance. Owing to other critical parameters, such as mechanical stability (required for example with a turbulent solder wave) or printed circuit board layout (necessary definition, tenting of plated-through holes. See also Section 6.7 “Tenting of plated-through holes“), totally different inks may be suitable. Please also consult Section 2 “Application“ of the technical data sheet.

- **Lead-free wave soldering**

Suitable inks	Curing parameters	Comments
SD 2954	30-60 min 130 °C-150 °C [266-302 °F]	high temperature resistance, easy to peel (lowest adhesion)
SD 2955	30-45 min 140-150 °C [284-302 °F]	best temperature resistance

The other peelable solder masks listed in the following table “leaded wave soldering“ may also be suitable for lead-free wave soldering, but owing to the higher soldering temperatures the particularly temperature-resistant types **SD 2954** and **SD 2955** are recommended.

- **Leaded wave soldering**

Suitable inks	Curing parameters	Comments
SD 2950, SD 2950 T	10-20 min 120 °C-150 °C [248-302 °F]	after curing at 120 °C [248 °F] only peelable after soldering, better adhesion than SD 2954 / SD 2955 SD 2950 T: high mechanical stability
SD 2952, SD 2952 HV SD 2953, SD 2953 HV	5-10 min 140 °C-150 °C [284-302 °F]	better adhesion and lower flexibility than SD 2954
SD 2954	30-60 min 130 °C-150 °C [266-302 °F]	high temperature resistance, easy to peel (lowest adhesion)
SD 2955	30-45 min 140-150 °C [284-302 °F]	best temperature resistance
SD 2958	10-20 min 120 °C-150 °C [248-302 °F]	high mechanical stability, slightly better temperature resistance than SD 2950/SD 2950 T
SD 2962 P SD 2990 T	5-15 min 140 °C-150 °C [284-302 °F]	SD 2990 T: good mechanical stability

6.2 Reflow soldering

During reflow soldering apart from high soldering temperatures extended temperature loads occur. The mechanical loads are irrelevant with reflow soldering, thus also weakly adhering peelable solder masks can be used, such as **SD 2954**. With lead-free reflow soldering the thermal load is so high (see figure 1) that only the most temperature-resistant peelable solder mask **SD 2955** is suitable.

The reflow profile must be tailored to each soldering challenge, with the thermal capacity of the whole assembly being decisive for the necessary temperature and conveyor speed.

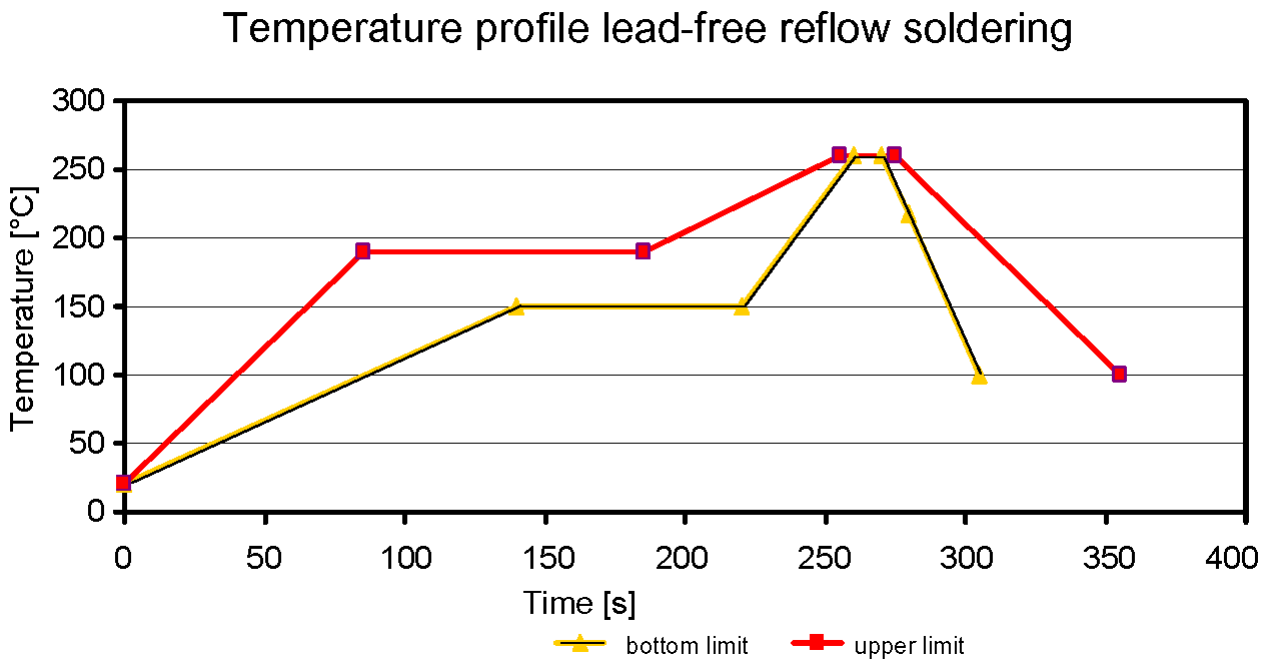


Figure 1: Example of a temperature profile for SD 2955 for lead-free reflow soldering (Source: Task Force Bleisubstitution ZVEI)

- **Lead-free reflow soldering**

Suitable inks	Curing parameters	Comments
SD 2955	30-45 min 140-150 °C [284-302 °F]	best temperature resistance

- **Leaded reflow soldering**

Suitable inks	Curing parameters	Comments
SD 2954	10-60 min 130 °C-160 °C [266-322 °F]	high temperature resistance, easy to peel (lowest adhesion)
SD 2955	30-45 min 140-150 °C [284-302 °F]	best temperature resistance

6.3 Hot-Air Levelling (HAL)

Hot-Air Levelling is a critical procedure for peelable solder masks since both a high temperature stability as well as high adhesion and mechanical stability are required. Thus the particularly thermally stable types **SD 2954 and SD 2955** are not suitable for HAL owing to their inadequate adhesion and mechanical stability. Generally, to ensure an acceptable process reliability peelable solder masks are only suitable for use in vertical Hot-Air Levelling units.

In general, peelable solder masks are **not suitable** for **horizontal HAL procedures**. While there may have been one or the other exception when using leaded solders despite the thermal and, in particular, the extreme mechanical load (due to the rollers at the in- and outlets of the tinning station as well as the air knives) with lead-free solders the combined thermal and mechanical load is too high.

Independent of the applied ink system the thermoplasticity of the inks inevitably leads to mechanical damage and ripping of the ink coating. A stronger cross-linking by means of higher temperatures and/or longer curing times improves the adhesion, but negatively influences the residue-free peelability. A lesser cross-linking increases the sensitivity to damage.

Besides exact observation of the determined curing conditions in particular a sufficient coating thickness of **at least** 300 µm is necessary (may be much higher depending on the HAL process parameters). The soldering temperature and pressure of the air knives are important parameters that may have to be optimised.

➔ To achieve the best results perform the HAL process the same day the peelable solder mask is printed.

- **Lead-free Hot-Air Levelling (HAL), vertical**

Suitable inks	Curing parameters	Comments
SD 2958	20-60 min 120 °C [248 °F]	high mechanical stability

- **Leaded Hot-Air Levelling (HAL), vertical**

Suitable inks	Curing parameters	Comments
SD 2950 SD 2950 T	20 min 120 °C [248 °F]	good adhesion (peelable only after soldering) SD 2950 T: high mechanical stability
SD 2958	20-60 min 120 °C [248 °F]	high mechanical stability higher temperature resistance than SD 2950/ SD 2950 T

6.4 Combination of soldering processes

When combining soldering processes, e.g. in SMD technology, the total temperature load has to be considered. As a rule, only the particularly temperature-resistant peelable solder masks **SD 2954** and **SD 2955** are suitable. However, their suitability for the individual processes must be verified. Curing should be as mild as possible, while still ensuring sufficient adhesion and mechanical stability for the handling of the printed circuit board.

Suitable inks	Curing parameters	Comments
SD 2954	e.g. 10 min 130 °C [266 °F]*	high temperature stability, universally applicable
SD 2955		best temperature stability, slightly better adhesion than SD 2954

* In this case SD 2955 **is not** peelable **before** soldering.

6.5 Chemical and electroplating processes

When used in chemical and electroplating processes peelable solder masks must be cured at higher temperatures and for much longer than in soldering processes in order to achieve a sufficient adhesion and to avoid seepage under the peelable solder mask. The substrate has a decisive influence on the adhesion. Therefore, in each individual case it must be verified whether the adhesion is sufficient.

Furthermore, it must be checked whether the leaching (bleeding) resistance is acceptable. Influential factors are:

- Chemistry of the used baths
- Bath handling
- Degree of potentially tolerable leaching (influence on the bondability, durability of the baths).

In case of previous thermal stress through soldering, the curing times and/or temperatures listed in the table must be reduced.

Suitable inks	Curing parameters	Comments
SD 2962 P SD 2990 T	45-60 min 150 °C [302 °F]	contain insoluble pigments, thus leaching of these colouring substances is excluded SD 2962 P: is best suited for chemical and electroplating processes, this must be verified for each individual application by means of pre-trials
SD 2950/SD 2950 T	30-60 min 150 °C[302 °F]	contain soluble dyes

6.6 Overprinting of carbon-conductive inks

In order to protect carbon-conductive inks in finish processes without changing their resistance, overprinting with the peelable solder masks listed in the following table is recommended.

Suitable inks	Curing parameters	Comments
SD 2950 SD 2950 T SD 2954 SD 2955 SD 2958 SD 2990 T	depending on the ink and finish process	this recommendation refers to our carbon-conductive inks **SD 2841 HAL-IR** and **SD 2843 HAL** the suitability of carbon-conductive inks from other manufacturers must be ensured by pre-trials

6.7 Tenting of plated-through holes

The selection of the appropriate peelable solder mask basically is dictated by the soldering process(es). Additionally, the following points should be considered:

- The highly viscous/thixotropic adjustments are particularly suitable for tenting plated-through holes.
- Sufficient tearability must be warranted in order to ensure complete removal of the ink from the holes.
- The larger the diameter the more difficult the tenting of the holes becomes. Influential factors include the thickness of the printed circuit board or the aspect ratio, the panel size, the area to be coated with peelable solder mask as well as the peelable solder mask itself. An example: In order to seal large holes completely, it is recommended to work with a very flat squeegee angle and low squeegee pressure. With very large panels or large printing areas, it gets more difficult to print the required layout in full. In standard process conditions holes of 2 to 3 mm can be tented, in optimum circumstances holes up to 4 mm can be tented.

Owing to the risk of residues remaining in the plated-through holes after peeling we strongly advise against tenting plated-through holes from both sides.

7. Advice on the storage of printed circuit boards coated with peelable solder mask

Based on the recommendations given by the VdL/ZVEI “Quality“ task force on “Storage conditions for unassembled printed circuit boards“ and on “Curing printed circuit boards before soldering“ the following advice is given for the storage of printed circuit boards coated with cured peelable solder mask in order to avoid the possible creation of bubbles and melting during soldering:

➔ Store the printed circuit boards at 20-25 °C [68-77 °F] and max. 70 % r. h., ideally away from air humidity (e. g. wrapped in shrink-wrap, vacuum foil or ESD bags with a humidity indicator or drying agent).

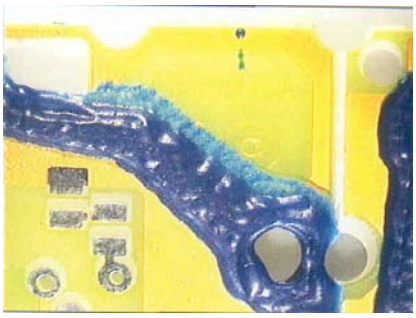
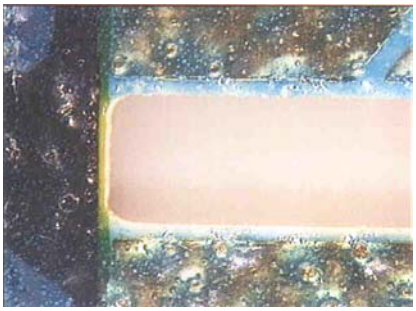
➔ If necessary, temper the printed circuit boards before soldering for 15-30 min at 80 °C [176 °F]. (Boards must be soldered within 24 h of tempering otherwise the soldering result will be negatively affected by the impact of air humidity).

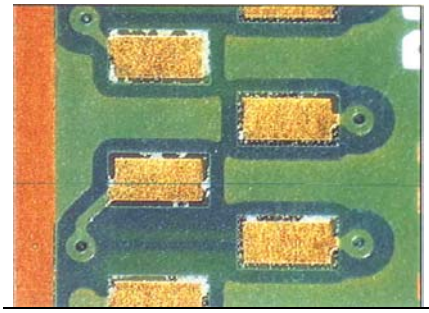
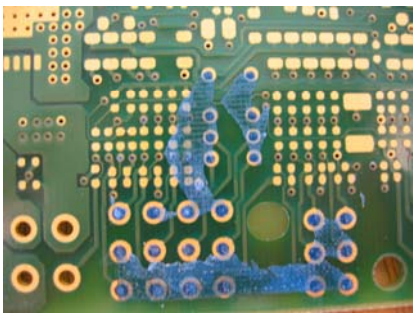
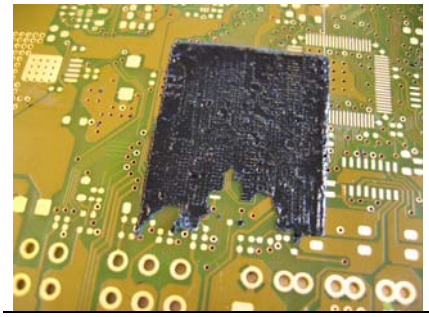
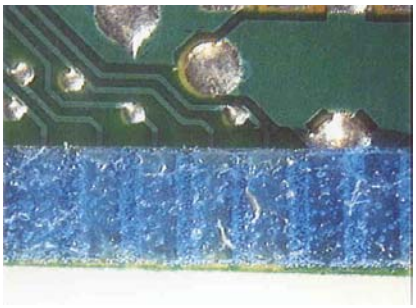
Tempering must not be carried out for longer times or at higher temperatures as this may impair the peelability of the solder mask (see also section 5 “Drying/curing“).

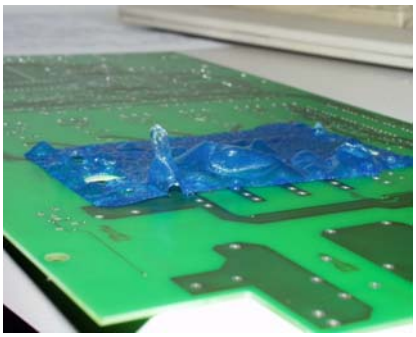
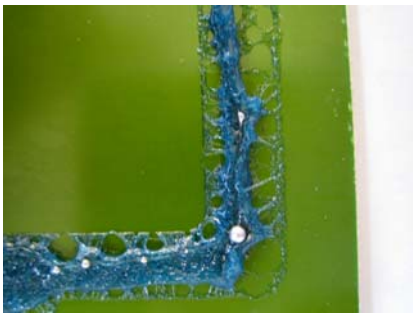
8. Trouble shooting

The application and processing of peelable solder masks is very reliable. If, despite this fact, mistakes are made, the resultant costs can be unpleasantly high, since errors are usually only noticeable on the final printed circuit board.

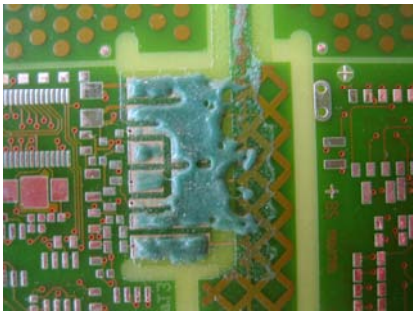
The following table gives details of typical mistakes, causes, effects and solutions:

Mistake	Cause	Solution
Smearing/irregular surface 	1. squeegee pressure too high 2. squeegee speed too high 3. snap-off too low	1.-3. optimise screen printing parameters
Bubbles in peelable solder mask 	1. coating thickness too low 2. printing parameters not optimum	1. increase coating thickness 2. optimise printing parameters
Peelable solder mask lifts at edges	1. stamping before soldering	1. as far as possible stamp before printing peelable solder mask or after soldering

Mistake	Cause	Solution
Ink film can only be peeled in bits; it is not tear resistant; ink residues on pcb 	1. printed too thin	1. use coarser meshed screens and higher stencil build-up
	2. cured at too low a temperature and for an insufficient length of time	2. check temperature guidance and increase temperature and/or time, if required
	3. squeegee pressure too high	3. reduce squeegee pressure
Ink film cannot be peeled out of plated-through holes 	1. printed too thin	1. see above
	2. cured at too low a temperature and for an insufficient length of time	2. see above
	3. hole side walls are too rough	3. check roughness of hole side walls and, if necessary, reinforce plated-through holes
	4. unsuitable ink type	4. use suitable ink type
Ink film (dark coloured) not peelable 	1. cured too long / temperature too high	1. check temperature guidance and adjust if necessary
	2. soldered too long / temperature too high	2. optimise soldering parameters
	3. unsuitable ink type	3. use suitable ink type
Adhesion of solder balls / solder smears 	1. cured at too low a temperature and for an insufficient length of time	1. check temperature guidance and adjust if necessary
	2. surface too rough	2. predry first ink layer and perform second print with finer screen; use SD 2950
	3. unsuitable soldering parameters	3. experiment with different fluxing agent quantities, concentrations and types, preheating, soldering temperature and dwell times
	4. coating exposed to high moisture for too long	4. create climatic environment (20-25 °C [68-77 °F], 50-70 % r. h.), temper affected printed circuit boards before soldering

Mistake	Cause	Solution
Extreme formation of bubbles 	1. residues on the printed circuit board 2. too much or wrong thinner added	1. clean printed circuit board before printing 2. add max. 2 % of VR 2950
Melting during wave soldering or extreme formation of bubbles 	1. unsuitable ink type 2. coating exposed to high moisture for too long 3. unsuitable soldering parameters	1. use suitable ink type 2. create climatic environment (20-25 °C [68-77 °F], 50-70 % r. h.), shrink-wrap printed circuit boards during storage or if necessary temper before soldering (see also section 7 of this AI) 3. optimise soldering parameters (see adhesion of solder balls)

The phenomenon of melting is strongly influenced by the type and structure of the printed circuit boards. On printed circuit boards with higher copper structures or larger ground planes the peelable solder mask has a greater tendency to melt during soldering.

Melting during vertical HAL (Hot-Air Levelling) 	1. unsuitable ink type 2. unsuitable HAL parameters 3. cured at too low a temperature and for an insufficient length of time 4. coating exposed to high moisture for too long	1. use suitable ink type 2. control and adjust parameters, particularly temperature and pressure of air knives 3. check temperature guidance and adjust if necessary 4. create climatic environment (20-25 °C [68-77 °F], 50-70 % r. h.), shrink-wrap printed circuit boards during storage or if necessary temper before soldering (see also section 7 of this AI)
Peelable solder mask is blown off in vertical HAL (Hot-Air Levelling) 	1. mechanical stability too low; unsuitable ink type 2. pressure of air knives too high	1. cure longer and/or at higher temperatures; use more mechanically stable types 2. reduce pressure

Mistake	Cause	Solution
Undercutting in electroless/ electroplating finish processes	1. unsuitable ink type 2. unsuitable process flow 3. cured at too low a temperature and for an insufficient length of time	1. use suitable ink type 2. optimise parameters 3. check temperature guidance and adjust if necessary
Leaching in electroless/ electroplating finish processes	1. unsuitable ink type 2. cured at too low a temperature and for an insufficient length of time	1. use suitable ink type 2. check temperature guidance and adjust if necessary

9. Further literature/ technical documentation

In addition to the recommendations given in this technical report, we can provide technical papers and information sheets written and compiled by members of our staff. A list of the technical publications available can be found in **TI 15/101 E** (technical papers) and **TI 15/100 E** (technical information sheets).

In our report manual all **t**echnical **i**nformation sheets **(TI's)** are filed under group 15. Alternatively, visit our website at **http://www.peters.de** or click on the "Service" section on our report manual CD.

Any questions?

We would be pleased to offer you advice and assistance in solving your problems. Free samples and technical literature are available upon request.

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