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Ein Unternehmen der PETERS-Gruppe

PETERS
Speziallacke für die Elektronik

PTR PRELIMINARY TECHNICAL REPORT

2-pack solder resist

ELPEMER® SD 2491 SM-TSW

ELPEMER® PETERS
= registered trademark of Lackwerke Peters GmbH + Co KG

ELPELIGHT PETERS
Products for optoelectronics

compliant: RoHS ✓ WEEE ✓ ELV ✓ lead-free ✓

- **white opaque**
- for application by means of screen printing
- photoimageable
- highest resolution even of finest details (e.g. 75 µm)
- aqueous-alkaline developable
- extraordinary yellowing resistance even after lead-free reflow soldering and tempering processes
- UL approval: best flame class V-0 acc. to UL 94, UL File No. E80315
- meets requirements of IPC-SM-840D
- halogen-free acc. to JPCA-ES01-2003/IEC 61249-2-21
- especially suitable as a reflective background for LED applications

Indices: **SD = screen printing**
SM = silk-mat
TSW = thermally stable white

Contents

Please read this technical report and the corresponding material safety data sheet, the process data sheet, the Application information sheet AI 2/1 and the Technical Information sheet TI 15/13 (see Item 3) carefully before using the product.

LP 090304 E-2 / 0261100e.001

1. General information

The solder resist **ELPEMER® SD 2491 SM-TSW** is a solder mask in the sense of VDI/VDE 3710, sheet 4: "Fabrication of printed circuit boards; printing processes". It is a permanent solder mask that is applied to those parts of the printed circuit board which are not to be tinned during subsequent soldering processes.

The photoimageable 2-pack solder resist **ELPEMER® SD 2491 SM-TSW** is suitable for application by means of screen printing and developed in aqueous-alkaline solutions.

All symbols that are used in this technical data sheet and on our containers, such as , are explained on our website www.peters.de in the section "Service – Symbols on labels".

2. Application

On account of its high resolution alongside its excellent dielectric properties the 2-pack solder resist **ELPEMER® SD 2491 SM-TSW** is used as an insulating coating for pcbs in fine and superfine line technology, SMD technology as well as for multilayers.

On account of its extraordinary yellowing resistance it is especially suitable as a reflective background for LED applications as it keeps its pure white colouration even after reflow soldering and temper processes. Underneath white LEDs it totally prevents the substrate from influencing the light colour.

3. Special notes/application information

Perform pretests to check the resistance of SD 2491 SM-TSW when using chemical/electro-plated surface finish processes. It is definitely advisable to perform a suitable multi-step chemical preclean that utilises the grain boundary etching principle.
Please see our technical information sheet TI 15/13 "Precleaning in the pcb fabrication process" for more information.
In case of any further questions our Application technology department (ATD) will gladly assist you.

To complement this preliminary technical report you will find product-specific data such as characteristics and recommendations for process parameters in the process data sheets (PD) of each solder resist. Further and detailed general information and notes that need to be observed to achieve an optimum processing result are indicated in the **Application Information** sheet **AI 2/1** "Processing information for photoimageable **ELPEMER®** solder resists".

On our report manual CD and on our website you will find application information sheets and technical information sheets in the "Service" section. The process data will be supplied together with your initial order.

As an all-round supplier of lacquers for the production of pcbs our product range contains numerous conformal coatings that boast approvals from UL and the automotive industry. Naturally they are also compatible with our **ELPEMER®** solder resists as well as our other solder resist systems. By subsequently applying coating materials from our product range your high-quality assemblies can fulfil even higher requirements as regards reliable functioning, service life and quality even under increased climatic stress (moisture, condensation, temperature).

4. 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.

➔ Solvent vapours are heavier than air, thus when planning workplace ventilation arrangements, ensure that extractor units are positioned at worktop height.

5. Characteristics

The characteristics are indicated in the product-specific process data sheets. We will gladly provide you with the process data sheets upon request.

6. Properties

The photoimageable solder resist **ELPEMER® SD 2491 SM-TSW** is distinguished by the following properties:

6.1 General properties

- for application by means of screen printing
- high productivity due to short processing times
- a high solids content and an optimum thixotropy enable an excellent edge coverage at a low wet ink weight as well as a favourable ratio of lacquer to pad height
- broad processing window in the process step “pre-drying“
- highest resolution: virtually vertical side walls enable the representation of finest details. e.g. 75 µm ink dams between SMD pads
- good scratch resistance protects against mechanical damage during handling
- strongly solder-repellent ink surface thus minimum solder ball adhesion
- extraordinary yellowing resistance even after lead-free reflow soldering and tempering processes
- excellent adhesion of subsequent coatings (marking inks, conformal coatings and others)
- does not contain substances listed in the RoHS directive 2002/95/EC, EU End-Of-Life Vehicle directive 2000/53/EC and WEEE directive 2002/96/EC
- meets requirements of IPC-SM-840D
- best flame class V-0 according to UL 94, UL File No. E80315, Registered trademark of Underwriters Laboratories Inc., Northbrook, Illinois 60062
- free of halogenated flame retardants
- halogen-free acc. to JPCA-ES01-2003 / IEC 61249-2-21.

6.2 Physical and mechanical properties

Property	Test method	Result
Adhesion	IPC-SM-840D, 3.5.2.1	class H and T
Cross hatch	ISO 2409 on copper on FR 4	 Gt 0 Gt 0
Pencil hardness	IPC-SM-840D, 3.5.1 acc. to Wolff-Wilborn	5 H 5 H
Resistance to solvents/ cleaning agents	IPC-SM-840D, 3.6.1 Isopropanol Isopropanol : water (75 : 25) D-Limonene 10% alkaline cleaning agents Monoethanolamine Deionised water	 passed passed passed passed passed passed
Resistance to solvents	test boards, dipped in dichloromethane (> 2 h at room temperature)	no swelling
Solder bath resistance	IPC-SM-840D, 3.7.2 IPC-TM-650, 2.6.8	> 20 s at 265 °C [509 °F] > 20 s at 288 °C [550.4 °F]*

* With a solder bath resistance of > 10 s at 288 °C [550.4 °F] the solder resist **ELPEMER® SD 2491 SM-TSW** fulfils the required temperature resistance for lead-free soldering.

6.3 Electrical properties

Property	Test method	Result
Dielectric strength	VDE 0303, part 21 DIN EN 60243-1	70 kV/mm
	IPC-SM-840D, 3.8.1	passed
Surface resistance	VDE 0303, part 30/DIN IEC 60093 IPC-TM-650, 2.5.17.1	2 x 10^{14} Ohm
Volume resistivity	VDE 0303, part 30/DIN IEC 60093 IPC-TM-650, 2.5.17.1	10^{16} Ohm x cm
Moisture and insulation resistance	IPC-SM-840D, 3.9.1	class H and T
Comparative Tracking Index (CTI, Tracking resistance)	DIN EN 60 112 on FR 4 base material with CTI 225 with CTI 600	 CTI 300* CTI 600*

* The CTI value of the coating also depends on the tracking resistance values of the base material, etc. The CTI value of the base material is at least maintained when the 2-pack solder resist **ELPEMER® SD 2491 SM-TSW** is used.

Note: Optimum electrical insulation values can only be achieved when all flux residues are removed thoroughly from the printed circuit boards.

7. Processing

➔ Please observe the product-specific processing parameters recommended in the corresponding process data sheets for each solder resist as well as the **Application Information** sheet **AI 2/1** "Processing information for photoimageable **ELPEMER®** solder resists".

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 specified product data 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.

Protect opened containers from UV light

7.1 Auxiliary products

We recommend the following auxiliary products for the **ELPEMER®** process:

- **Cleaning and deoxidising agent HP 5625 for conveyorised spraying units**
  for the pre-treatment of Cu pcbs prior to ink/resist application, deoxidises and degreases without copper degradation; minimum foaming.
- **Screen opener HP 5200**
  The screen opener **HP 5200** is a highly active spray for dissolving dried screen printing inks immediately and safely from clogged screens. **HP 5200** is silicone-free and does not contain oils or oily substances, so that no smearing occurs.

- **Anti-Static Spray HP 5500**
  The anti-static spray **HP 5500** prevents and eliminates any static charge that occurs during screen printing. **HP 5500** is silicone- and grease-free.
- **Special stripper HP 5707**
  in its concentrated form **HP 5707** can be used to remove exposed and possibly cured photoimageable solder resists (e.g. in case of mis-exposures); diluted with water it is also suitable for cleaning ink developer and resist stripping units.
- **Defoamant HP 5911**
  for fast and safe defoaming of aqueous-alkaline developing media, silicone-free, completely biologically degradable, quantity to be added 0.02 up to 0.05%
- **Cleaning agents R 5899, R 5821 and R 5817**
  The cleaning agent **R 5899** does not have to be marked according to German dangerous goods regulations and can be handled simply and safely. Owing to its high flash point (> 100 °C [> 212 °F]) it is especially suitable for use in screen washing equipment. The cleaning agent **R 5899** is particularly distinguished by a low vapour pressure (< 0.1 hPa at 20 °C [68 °F]) and thus is not affected by the EU-VOC regulation 1999/13/EG which judges solvents by their percentage of volatile organic compounds (VOC = volatile organic compounds).
  Furthermore, the cleaning agent **R 5821** is available which, owing to its high flash point of +32 °C [89.6 °F], is also suitable for use in screen washing equipment as well as for cleaning work tools. For the manual cleaning of screens and tools we recommend our cleaning agent **R 5817** with its fast and thorough cleaning properties.

Do not use cleaning agent as a thinner or for washing hands since solvents remove the natural grease from skin.

Special technical reports for these products are available upon request. Further information regarding the content and consequences of the EU-VOC regulation can be found in our **t**echnical **i**nformation **sheet TI 15/110 E "EU-VOC regulations – Content and consequences for the PCB industry"**.

8. Drying/curing

There are 3 drying steps in the standard processing of **ELPEMER® SD 2491 SM-TSW**:

- Pre-drying – prior to exposure and developing
- Drying of the pcb after developing and rinsing
- Curing as the final process step.

Further information regarding the above mentioned steps can be found in the corresponding process data sheets of each solder resist.

9. Standard packaging

ELPEMER® SD 2491 SM-TSW is packed for delivery as follows:

Component A	Component B	Selling unit
10 tins of 0.9 kg	10 plastic bottles of 0.05 kg	9.5 kg

The corresponding thinner **V 2467-SD** is available in cans of 25 kg.

Partial lots of the selling units may be ordered, but will entail surcharges to cover repackaging costs.

10. Shelf life and storage conditions

The shelf life / minimum shelf life and storage conditions are indicated in the product-specific product data sheets (PD) and shown on the container labels.

11. Further literature/technical publications

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. Visit our website at **http://www.peters.de** or click on the "Service" section on our report manual CD.

12. Further products for the production of pcbs

We offer a wide range of **etch resists (photoimageable, UV curing, conventional curing), plating resists, solder resists (photoimageable, UV curing, conventional curing) as well as peelable solder masks, marking inks (photoimageable, UV curing, conventional curing), carbon-conductive inks, via hole fillers (purely thermal curing), thick film fillers, plugging pastes, heatsink pastes, special strippers for solder resists and further auxiliary products for screen printing (e. g. cleaning agents, thinners).**

Special technical reports are also available for these products and can be provided on request. On our report manual CD you will find technical reports in the "Products" section.

13. Further products for the electronics/ electrical engineering industries

We boast a wide range of **conformal coatings, thick film lacquers, casting compounds, casting resins, electro pastes, insulating lacquers, impregnating varnishes, adhesive lacquers and auxiliary products for electronics.**

Special technical reports are also available for these products and can be provided on request. On our report manual CD you will find technical reports in the "Products" section.

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.

ATTENTION!
For new products, according to preliminary technical reports, adequate practical results are not always available which would permit a comprehensive assessment of such a product.
It is therefore imperative to exercise particular care in the testing of such products with regard to the application intended!

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