

# The solder resist family Elpemer® SD 2491 TSW

Please find below the technical reports on the photoimageable ELPEPCB® solder resists of the series **SD 2491 TSW** as an overall download. Individual technical reports will be sent upon request addressed to [peters@peters.de](mailto:peters@peters.de). We will gladly assist in finding the right adjustment for your application.

	<b>Properties / particularities</b> Application by screen printing excellent resolution aqueous-alkaline developable halogen-free acc. to JPCA-ES01-2003/ IEC 61249-2-21 no discolouring after electroless Ni/Au (ENIG) and lead-free reflow soldering UL approval: UL File No. E80315	<b>Gloss</b>		<b>Colour</b>		<b>Reflectivity at 460 nm</b>	<b>Yellowing resistance</b>	<b>Tear resistance in thermal shock test</b>	
		silk-glossy	silk-mat	snow white	white to snow white				white
<a href="#">SD 2491 SG-TSW-R5</a>	best reflectivity very good yellowing resistance	X				X	95 %	very good	100 cycles -65 to +125 °C
<a href="#">SD 2491 SM-TSW-R6-B</a>	short exposure times very good representation of dams best tear resistance in thermal shock test		X	X			approx. 90 %	good	100 cycles -65 to +125 °C <b>and</b> 500 cycles -40 to +125 °C
<a href="#">SD 2491 SG-TSW-R7</a>	short exposure times very good representation of dams high-gloss surface	X			X		approx. 90 %	good	100 cycles -65 to +125 °C

Curtain coating and spray coating versions of this product series are available upon request.

## 2-pack solder resist

# Elpemer® SD 2491 SG-TSW-R5

- **white opaque**
- for application by means of screen printing
- photoimageable
- high resolution
- 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
- halogen-free acc. to JPCA-ES01-2003/IEC 61249-2-21
- very high reflectivity of light, thus especially suitable for LED applications

Indices: **SD** = **screen printing**  
**SG** = **silk-glossy**  
**TSW** = **thermally stable white**  
**R5** = **remission 5 (reflectivity)** – improved remission is indicated by consecutive numbers

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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 15/3 and 15/13 (see Item 3 and 4) carefully before using the product.

## 1. General information

The solder resist **Elpemer® SD 2491 SG-TSW-R5** 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 SG-TSW-R5** 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](http://www.peters.de) in the section “Service – Technical publications – Label symbols“.**

## 2. Application

On account of its high resolution alongside its excellent dielectric properties the 2-pack solder resist **Elpemer® SD 2491 SG-TSW-R5** 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 and IMS printed circuit boards, as well as for a use in automobile electronics, 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 SG-TSW-R5 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 “Precognizing 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 website, you will find application information sheets and technical information sheets in the section “Service – Technical publications”. The process data will be supplied together with your initial order.

## 4. Safety recommendations

<sup>TM</sup> 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.

<sup>TM</sup> When using chemicals, the common precautions should be carefully noted.

<sup>TM</sup> Solvent vapours are heavier than air, thus when planning workplace ventilation arrangements, ensure that extractor units are positioned at worktop height.

<sup>TM</sup> Please read our **Technical Information sheet TI 15/3 “Protective measures when using chemicals including lacquers, casting compounds, thinners, cleaning agents“**. On our website, the technical information sheets can be accessed in the section “Service – Technical publications“.

## 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

### 6.1 General properties

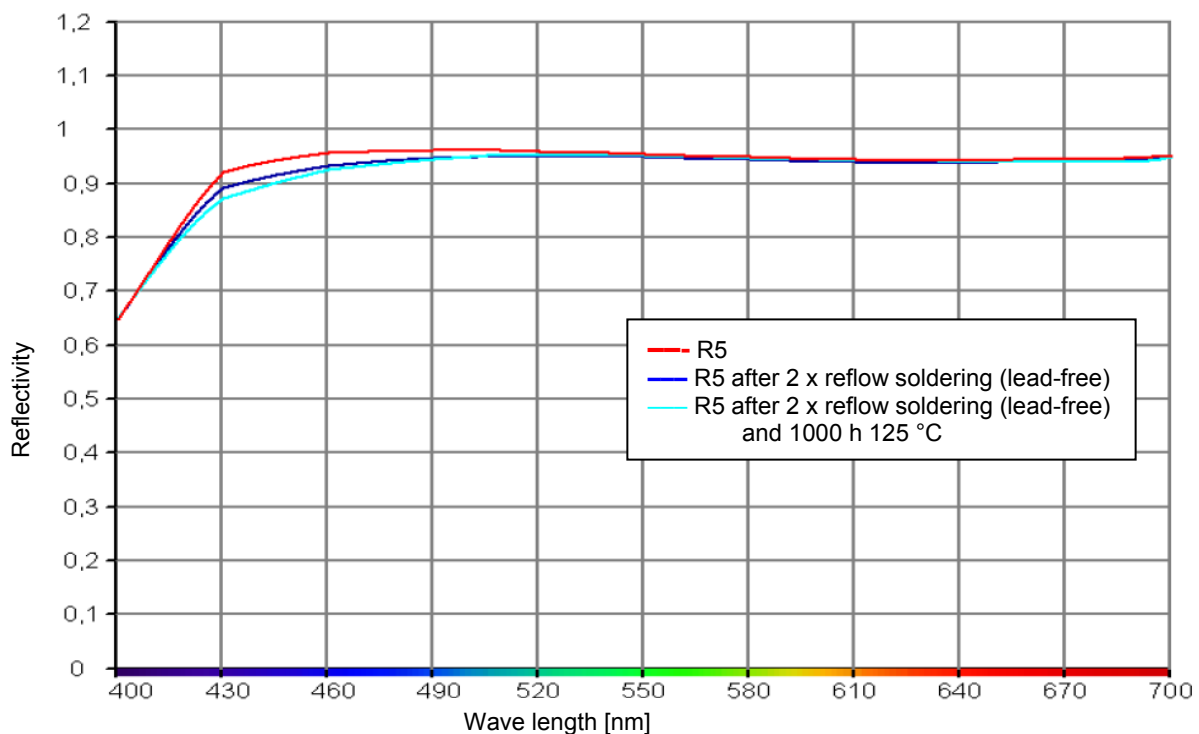
- for application by means of screen printing
- broad processing window
- a high solids content and an optimum thixotropy enable an excellent edge coverage at a low wet ink weight as well as a favourable ratio of lacquer to pad height
- high resolution
- good scratch resistance protects against mechanical 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 2011/65/EU, EU End-Of-Life Vehicle directive 2000/53/EC and WEEE directive 2002/96/EC
- best flame class V-0 according to UL 94, UL File No. E80315, Registered trademark of **UL** Underwriters Laboratories Inc., Northbrook, Illinois 60062
- free of halogenated flame retardants
- halogen-free acc. to JPCA-ES01-2003 / IEC 61249-2-21.
- very good remission values (see item 6.2).

### 6.2 Optical properties

Property	Test method	Result
Remission at 460 nm	40 µm coating thickness measured on copper with a spectral photometer (measuring geometry: 45/0, light source type: D 65, standard observer: 10°)	95 %
Δb	1000 h, 125 °C, comparison standard: PCB after 2 x reflow soldering (lead-free)	1.2

#### Reflectivity of Elpemer® SD 2491 SG-TSW-R5

40 µm coating thickness measured on copper with a spectral photometer (measuring geometry: 45/0, light source type: D 65, standard observer: 10°)



### 6.3 Physical and mechanical properties

Property	Test method	Result
Adhesion	IPC-SM-840E, 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-840E, 3.5.1 acc. to Wolff-Wilborn	5 H 5 H
Resistance to solvents/ cleaning agents	IPC-SM-840E, 3.6.1 Isopropanol Isopropanol : water (75 : 25) D-Limonene Deionised water	passed passed passed passed
Solder bath resistance	IPC-SM-840E, 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 SG-TSW-R5** fulfils the required temperature resistance for lead-free soldering.

### 6.4 Electrical properties

Property	Test method	Result
Dielectric strength	VDE 0303, part 21 DIN EN 60243-1	105 kV/mm
	IPC-SM-840E, 3.8.1	passed
Surface resistance	VDE 0303, part 30/DIN IEC 60093 IPC-TM-650, 2.5.17.1	2 x 10 <sup>14</sup> Ohm
Volume resistivity	VDE 0303, part 30/DIN IEC 60093 IPC-TM-650, 2.5.17.1	10 <sup>15</sup> Ohm x cm
Moisture and insulation resistance	IPC-SM-840E, 3.9.1	class H and T
Comparative Tracking Index (CTI, Tracking resistance)	DIN EN 60 112 on FR 4 base material with CTI 175 with CTI 600	CTI 350* 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 SG-TSW-R5** 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".



**Protect opened containers from UV light**



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 that were determined in laboratory conditions. 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 conditions/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.

## 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 electrostatic discharge 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.

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 technical information sheet TI 15/110 E "EU-VOC regulations – Content and consequences for the PCB industry". On our website, you will find technical reports in the "Products" section and technical information sheets in the "Service" section.

## 8. Drying/curing

There are 3 drying steps in the standard processing of **Elpemer® SD 2491 SG-TSW-R5**:

- 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 SG-TSW-R5** is packed for delivery as follows:

Component A	Component B	Selling unit
10 tins of 0.85 kg	10 tins of 0.1 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.

## 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.

The above information as well as advice given by our Application Technology Department whether in verbal or written form or during product evaluations is provided to the best of our knowledge, but must be regarded as non-binding recommendations, also with respect to possible third-party proprietary rights.

The products are exclusively intended for the applications indicated in the corresponding technical data sheets.

The advisory service does not exempt you from performing your own assessments, in particular of our material safety data sheets and technical information sheets, and of our products as regards their suitability for the applications intended. The application, use and processing of our products and of the products manufactured by you based on the advice given by our Application Technology Department are beyond our control and thus entirely your responsibility. The sale of our products is effected in accordance with our current terms of sale and delivery.

### 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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Coating Innovations  
for Electronics

# Elpemer® solder resist

## SD 2491 SM-TSW-R6-B

On account of its high resolution alongside its excellent dielectric properties the photoimageable solder resist **Elpemer® SD 2491 SM-TSW-R6-B** 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 pure white colour and its extraordinary yellowing resistance it is especially suitable for LED applications in automobile electronics.

- **white-opaque**
- for application by means of screen printing
- aqueous-alkaline developable
- **extraordinary yellowing resistance even after lead-free reflow solder processes and high temperature loads**
- no influence on light colour when applied below white LEDs
- good resistance in TCT (temperature cycling test): -40 to +125 °C [-40 to +257 °F], 500 cycles, no cracking of ink if appropriate FR4 base material is used
- UL approval: best flame class V-0 according to UL 94, UL file no. E80315
- halogen-free acc. to JPCA-ES01-2003 / IEC 61249-2-21.
- very good reflectivity values
- broad processing window for predrying
- good scratch resistance
- excellent adhesion of subsequent coatings (marking inks, conformal coatings and others.)
- no pink/purple discolouration after electroless Ni/Au (ENIG) and SMD soldering

## Characteristics

The characteristics are indicated in the product-specific process data sheets. We will provide them with the first shipment of this product or send them to you upon request.

Indices: SD = screen printing, SM = silk-mat, TSW = thermally stable white R6 = reflectivity 6, B = snow white



## Optical properties

Property	Test method	Result
Reflectivity at 460 nm	40 µm coating thickness measured on copper with a spectral photometer (measuring geometry: 45/0, light source type: D 65, standard observer: 10°)	≈ 90 %
Yellowing resistance	1000 h, 125 °C [257 °F], comparison standard: PCB after 2 x reflow soldering (lead-free), CIE lab system	Δb ≈ 1.2

## Physical and mechanical properties

Property	Test method	Result
Adhesion	IPC-SM-840E, 3.5.2.1	class H and T
Cross hatch	DIN EN ISO 2409 on copper on FR 4	Gt 0 Gt 0
Pencil hardness	IPC-SM-840E, 3.5.1 acc. to Wolff-Wilborn	5 H 5 H
Resistance to solvents/ cleaning agents	IPC-SM-840E, 3.6.1 Isopropanol Isopropanol : water (75 : 25) D-Limonene deionized water	passed passed passed passed
Solder bath resistance Solder flux = 2 % adipic acid	IPC-SM-840E, 3.7.2 IPC-TM-650, 2.6.8	20 s at 265 °C [509 °F] 20 s at 288 °C [550.4 °F]*
Simulation lead-free reflow soldering	IPC-SM-840E, 3.7.3.1 5 x 10 s at 260 °C [500 °F]	no cracking no delamination
Temperature shock	IPC-SM 840E, 3.9.3, -65 to +125 °C [-85 to 257 °F], 100 cycles	class H and T
Resistance against acid	10 % H <sub>2</sub> SO <sub>4</sub> , 30 min at 20 °C [68°F]	no change
Resistance against lye	10 % NaOH, 30 min at 20 °C [68 °F]	no change

\* With a solder bath resistance of 20 s at 288 °C [550.4 °F] the solder resist **Elpemer® SD 2491 SM-TSW-R6-B** fulfils the required temperature resistance for lead-free soldering.


## Electrical properties

Property	Test method	Result
Dielectric strength	VDE 0303, part 21 DIN EN 60243-1	105 kV/mm
	IPC-SM-840E, 3.8.1	passed
Surface resistance	VDE 0303, Teil 30/DIN IEC 60093 IPC-TM-650, 2.5.17.1	2 x 10 <sup>14</sup> Ohm
Volume resistivity	VDE 0303, Teil 30/DIN IEC 60093 IPC-TM-650, 2.5.17.1	10 <sup>15</sup> Ohm x cm
Moisture and insulation resistance	IPC-SM-840E, 3.9.1	class H and T
Comparative Tracking Index (CTI, Tracking resistance)	DIN EN 60 112 on FR 4 base material with CTI 175 with CTI 600	CTI 450* CTI 600*

\* The CTI value of the coating depends on the CTI value of the base material; this value is at least maintained.

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

## Processing

	Please read this technical report and the publications listed below carefully before using the product. These sheets are enclosed with the first shipment of product or sample.
<b>MSDS</b>	The corresponding material safety data sheet contains detailed information and characteristics on safety precautions, environmental protection, transport, storage, handling and waste disposal.
<b>PD</b>	The process data sheet contains product-specific data such as characteristics and recommendations for processing parameters.
<b>AI</b>	Application information AI 2/1 "Processing instructions for photoimageable Elpemer® solder resists"
<b>TI</b>	Technical information TI 15/3 "Protective measures when using chemicals including lacquers, casting compounds, thinners, cleaning agents"
<b>TI</b>	Technical information TI 15/13 "Precleaning in the pcb fabrication process"

→ When applying electroless/galvanic surface finish processes the resistance of **SD 2491 SM-TSW-R6-B** has to be verified in pre-trials. In any case, a multiple chemical pre-treatment according to the principle of grain boundary etching (see TI 15/13 for detailed information) is recommended.



Protect from UV light

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 that were determined in laboratory conditions. 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 conditions/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.

### Safety recommendations

- When using chemicals, the common precautions should be carefully noted.
- Ensure that extractor units of workplace ventilation arrangements are positioned at solvent source level.
- Please also pay attention to national guidelines or directives concerning operating safety such as the German TRBS (technical rules for operating safety) and those concerning the handling of flammable liquids as for example the German TRbF (technical rules for flammable liquids) or European directives.

## Auxiliary products recommended

- **Deoxidising agent HP 5625**  
Deoxidises Cu areas in continuous spray coating units as a pre-treatment of pcbs prior to ink/resist application
- **Screen opener HP 5200**  
highly active spray for dissolving dried screen printing inks from the screen; silicone- and grease-free, thus no surface defect/dewettings or smearing effects to be expected
- **Anti-static spray HP 5500**  
prevents and eliminates electrostatic discharge occurring during screen printing; silicone- and grease-free
- **Special stripper HP 5707**  
for removing photoimageable solder resists (e.g. in case of incorrect exposure) and for cleaning ink developer and resist stripping units
- **Defoamant HP 5911**  
for defoaming of aqueous-alkaline developer solutions, silicone-free, biologically degradable
- **Cleaning agent R 5899**  
for screen washing equipment, simply and safely to handle, no labelling in accordance with the German dangerous goods regulations required, extremely high flash point (> 100 °C [> 212 °F]), low vapour pressure < 0.1 hPa at 20 °C [68 °F], thus not affected by the EU-VOC regulation 1999/13/CE
- **Cleaning agent R 5821**  
for screen washing equipment and the cleaning of work tools, high flash point (+32 °C [89.6 °F])
- **Cleaning agent R 5817**  
for the manual cleaning of screens and tools

## Drying/curing

Further information on drying/curing can be found in the corresponding process data sheets of each solder resist.

## Standard packaging

	Component A	Componente B	Selling unit
SD 2491 SM-TSW-R6-B	10 tins à 0.96 kg	10 tins of 0.08 kg	10.4 kg
Thinner V 2467-SD	1 can of 15 kg	—	15 kg

Partial lots of the selling unit / smaller quantities available against surcharge.

## 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.

## Disclaimer

All descriptions and images of our goods and products contained in our technical literature, catalogues, flyers, circular letters, advertisements, price lists, websites, data sheets and brochures, and in particular the information given in this literature are non-binding unless expressly stated otherwise in the Agreement. This shall also include the property rights of third parties if applicable.

The products are exclusively intended for the applications indicated in the corresponding technical data sheets. The advisory service does not exempt you from performing your own assessments, in particular as regards their suitability for the applications intended. The application, use and processing of our products and of the products manufactured by you based on the advice given by our Application Technology Department are beyond our control and thus entirely your responsibility. The sale of our products is effected in accordance with our current terms of sale and delivery.

**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!**

Any questions?

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

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# Solder resists of the series Elpemer® 2491 SG-TSW-R7

On account of their high resolution alongside its excellent dielectric properties the photoimageable solder resists of the series **Elpemer® 2491 SG-TSW-R7** are used as an insulating coating for pcbs in fine and superfine line technology, SMD technology as well as for multilayers.

On account of their pure white colour and their extraordinary yellowing resistance they are especially suitable for LED applications in automobile electronics.

- **white-opaque**
- for application by means of screen printing or spraying
- aqueous-alkaline developable
- **good yellowing resistance even after lead-free reflow solder processes and high temperature loads**
- no influence on light colour when applied below white LEDs
- UL approval: best flame class V-0 according to UL 94, UL file no. E80315
- halogen-free acc. to JPCA-ES01-2003 / IEC 61249-2-21.
- very good reflectivity values
- broad processing window for predrying
- good scratch resistance
- excellent adhesion of subsequent coatings (marking inks, conformal coatings and others.)
- no pink/purple discolouration after electroless Ni/Au (ENIG) and SMD soldering

## Characteristics

The characteristics are indicated in the product-specific process data sheets. We will provide them with the first shipment of this product or send them to you upon request.

Indices: AS = air spray SD = screen printing, SG = silk-glossy, TSW = thermally stable white, R7 = revision 7

## Optical properties

Property	Test method	Result
Reflectivity at 460 nm	40 µm coating thickness measured on copper with a spectral photometer (measuring geometry: 45/0, light source type: D 65, standard observer: 10°)	≈ 90 %

## Physical and mechanical properties

Property	Test method	Result
Adhesion	IPC-SM-840E, 3.5.2.1	class H and T
Cross hatch	DIN EN ISO 2409 on copper on FR 4	Gt 0 Gt 0
Pencil hardness	IPC-SM-840E, 3.5.1 acc. to Wolff-Wilborn	≈ 6 H ≈ 6 H
Resistance to solvents/ cleaning agents	IPC-SM-840E, 3.6.1 Isopropanol Isopropanol : water (75 : 25) D-Limonene deionized water	passed passed passed passed
Solder bath resistance Solder flux = 2 % adipic acid	IPC-SM-840E, 3.7.2 IPC-TM-650, 2.6.8	20 s at 265 °C [509 °F] 20 s at 288 °C [550.4 °F]*
Simulation lead-free reflow soldering	IPC-SM-840E, 3.7.3.1 5 x 10 s at 260 °C [500 °F]	no cracking no delamination
Temperature shock	IPC-SM 840E, 3.9.3, -65 to +125 °C [-85 to 257 °F], 100 cycles	class H and T
Resistance against acid	10 % H <sub>2</sub> SO <sub>4</sub> , 30 min at 20 °C [68°F]	no change
Resistance against lye	10 % NaOH, 30 min at 20 °C [68 °F]	no change

\* With a solder bath resistance of 20 s at 288 °C [550.4 °F] the solder resist **ELPEMER® SD 2491 SG-TSW-7** fulfils the required temperature resistance for lead-free soldering.


## Electrical properties

Property	Test method	Result
Dielectric strength	VDE 0303, part 21 DIN EN 60243-1	≥ 110 kV/mm
	IPC-SM-840E, 3.8.1	passed
Surface resistance	VDE 0303, Teil 30/DIN IEC 60093 IPC-TM-650, 2.5.17.1	≥ 2 x 10 <sup>14</sup> Ohm
Volume resistivity	VDE 0303, Teil 30/DIN IEC 60093 IPC-TM-650, 2.5.17.1	≥ 10 <sup>15</sup> Ohm x cm
Moisture and insulation resistance	IPC-SM-840E, 3.9.1	class H and T
Comparative Tracking Index (CTI, Tracking resistance)	DIN EN 60 112 on FR 4 base material with CTI 175 with CTI 600	≥ CTI 450* ≥ CTI 600*

\* The CTI value of the coating depends on the CTI value of the base material; this value is at least maintained.

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

## Processing

	Please read this technical report and the publications listed below carefully before using the product. These sheets are enclosed with the first shipment of product or sample.
<b>MSDS</b>	The corresponding material safety data sheet contains detailed information and characteristics on safety precautions, environmental protection, transport, storage, handling and waste disposal.
<b>PD</b>	The process data sheet contains product-specific data such as characteristics and recommendations for processing parameters.
<b>AI</b>	<a href="#">Application information AI 2/1</a> "Processing instructions for photoimageable Elpemer® solder resists" – here you find basic information on the processing of photoimageable systems.
<b>TI</b>	<a href="#">Technical information TI 15/3</a> "Protective measures when using chemicals including lacquers, casting compounds, thinners, cleaning agents"
<b>TI</b>	<a href="#">Technical information TI 15/13</a> "Precleaning in the pcb fabrication process"

→ When applying electroless/galvanic surface finish processes the resistance of **Elpemer® 2491 SG-TSW-R7** has to be verified in pre-trials. In any case, a multiple chemical pre-treatment according to the principle of grain boundary etching (see TI 15/13 for detailed information) is recommended.



Protect from UV light

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 that were determined in laboratory conditions. 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 conditions/test conditions of the mentioned norms and must be verified if necessary while observing suitable test conditions on processed products.

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

### Safety recommendations

- When using chemicals, the common precautions should be carefully noted.
- Ensure that extractor units of workplace ventilation arrangements are positioned at solvent source level.
- Please also pay attention to national guidelines or directives concerning operating safety such as the German TRBS (technical rules for operating safety) and those concerning the handling of flammable liquids as for example the German TRbF (technical rules for flammable liquids) or European directives.

### Auxiliary products recommended

- [Screen opener HP 5200](#)  
highly active spray for dissolving dried screen printing inks from the screen; silicone- and grease-free, thus no surface defect/dewettings or smearing effects to be expected

- [Anti-static spray HP 5500](#)  
prevents and eliminates electrostatic discharge occurring during screen printing; silicone- and grease-free
- [Special stripper HP 5707](#)  
for removing photoimageable solder resists (e.g. in case of incorrect exposure) and for cleaning ink developer and resist stripping units.
- [Defoamant HP 5911](#)  
for defoaming of aqueous-alkaline developer solutions, silicone-free, biologically degradable
- [Cleaning agent R 5899](#)  
for screen washing equipment, simply and safely to handle, no labelling in accordance with the German dangerous goods regulations required, extremely high flash point (> 100 °C [> 212 °F]), low vapour pressure < 0.1 hPa at 20 °C [68 °F], thus not affected by the EU-VOC regulation 1999/13/CE
- [Cleaning agent R 5821](#)  
for the cleaning of equipment and work tools, high flash point (+32 °C [89.6 °F])
- [Cleaning agent R 5817](#)  
for the manual cleaning of screens and tools

## Drying/curing

Further information on drying/curing can be found in the corresponding process data sheets of each solder resist.

## Standard packaging

	Component A	Hardener (component B)	Selling unit
Set AS 2491 SM-TSW-R7	1 bucket of 4.2 kg	1 can of 0.6 kg	4.8 kg
Set SD 2491 SM-TSW-R7	10 tins of 0.91 kg	10 tins of 0.13 kg	10.4 kg
Thinner V 2467-SD	1 can of 15 kg	—	15 kg

Partial lots of the selling unit / smaller quantities available against surcharge.

## 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.

## Disclaimer

All descriptions and images of our goods and products contained in our technical literature, catalogues, flyers, circular letters, advertisements, price lists, websites, data sheets and brochures, and in particular the information given in this literature are non-binding unless expressly stated otherwise in the Agreement. This shall also include the property rights of third parties if applicable.

The products are exclusively intended for the applications indicated in the corresponding technical data sheets. The advisory service does not exempt you from performing your own assessments, in particular as regards their suitability for the applications intended. The application, use and processing of our products and of the products manufactured by you based on the advice given by our Application Technology Department are beyond our control and thus entirely your responsibility. The sale of our products is effected in accordance with our current terms of sale and delivery.



**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!**

Any questions? We would be pleased to offer you advice and assistance in solving your problems. Samples and technical literature are available upon request.

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