

## 2-pack marking ink

# SD 2696 TSW

- **white opaque**
- application by means of screen printing
- excellent adhesion
- excellent yellowing resistance even after lead-free reflow soldering and tempering processes
- high reflectivity
- very good weathering resistance (QUV accelerated weathering test)
- especially suitable for application in optoelectronics and the automotive sector
- halogen-free acc. to JPCA-ES01-2003/IEC 61249-2-21

Indices: **SD = screen printing**  
**TSW = thermally stable white**

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Please read this technical report, the corresponding material safety data sheet and the technical information sheets TI 15/3, TI 15/11 and TI 15/13 (see Item 4 and 7) carefully before using the product.p

## 1. General information

The 2-pack marking ink **SD 2696 TSW** is a thermally curing 2-pack system with excellent printing properties.

All symbols that are used in this technical data sheet and on our containers, such as **DIL**, are explained on our website [www.peters.de](http://www.peters.de) in the section “Service – Technical publications – Label symbols“.

## 2. Application

The marking ink **SD 2696 TSW** is applied by screen printing to annotate information for assembly, testing and service purposes, e.g. letters, figures, symbols, blocks and lines (barcodes). Owing to its good solder bath resistance **SD 2696 TSW** can also be applied as a service print to the solder side of the printed circuit board.

The marking ink **SD 2696 TSW** is distinguished by its excellent adhesion to all solder resists and common base materials, also to selected flexible base materials, and thus is suitable for so-called “static flex” circuits.

On account of its exceptional colour stability compared to common marking inks, both under UV/sunlight exposure and after lead-free soldering processes, and of its high reflectivity, the marking ink **SD 2696 TSW** is also used in optoelectronics and automotive electronics. It is especially suitable as a reflective background for LED applications (e. g. dashboards, headlights). Underneath white LEDs it prevents the substrate from influencing the light colour.

## 3. Special notes

**Due to the large number of fluxes on the market preliminary tests are mandatory to check the compatibility, in particular in the case of no-clean fluxes.**



**When using chemical finish processes, perform pre-trials to verify the resistance of SD 2696 TSW. Dry film thicknesses > 20 µm are recommended.**

**Take into account that the marking ink SD 2696 TSW is not resistant to aggressive cleaning agents and solvents.**

**However, the solvent resistance acc. to IPC-TM-650, 2.3.42 is fulfilled (see also section 6.2 ” Physical and mechanical properties“).**

## 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.
- Please also pay attention to national guidelines or directives concerning the handling of flammable liquids as for example the German TRbF (technical regulations for flammable liquids) or European directives.
- 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

Colour/appearance	white opaque
Solids content of mixture ISO 3251 (1 h, 125 °C [257 °F], 1 g weighed quantity)	70 ± 2 % by weight
Viscosity of mixture at 20 °C [68 °F] ISO 3219	31,500 ± 4,500 mPas
Density of mixture at 20 °C [68°F], ISO 2811-1 Component A Component B Mixture	1.43 ± 0.05 g/cm <sup>3</sup> 1.01 ± 0.05 g/cm <sup>3</sup> 1.41 ± 0.05 g/cm <sup>3</sup>
Pot life of mixture (18–23 °C) [64.4-68 °F], set-up quantity 500 g	approx. 8 hours

\* measured with Haake RS 600, C 20/1°, D = 100 s<sup>-1</sup>, viscosity measuring unit supplied by:  
Thermo Electron (Karlsruhe) GmbH (formerly Haake-Messtechnik GmbH + Co)  
Dieselstraße 4, 76227 Karlsruhe, Germany  
Phone +49 (0) 721 - 40 94 - 0; Fax +49 (0) 721 - 40 94 - 300  
www.thermo.com

## 6. Properties

The marking ink **SD 2696 TSW** is distinguished by the following properties:

### 6.1 General properties

- 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
- excellent printing properties
- suitable for rigid and "static flex" printed circuit boards
- outstanding adhesion both to photoimageable solder resists like **Elpemer**<sup>®</sup> of the series **2467** and **2469** and to conventional solder resists like **SD 2462 NB** as well as to all common base materials
- very good weathering and chalking resistance (QUV accelerated weathering test), thus suitable for outdoor use
- high reflectivity and excellent yellowing resistance in lead-free soldering and tempering processes, also during reflow soldering, thus can also be applied as a service print to the solder side of the printed circuit board
- owing to the exceptional yellowing resistance and good light reflection suitable for use in optoelectronics and the automotive sector
- halogen-free acc. to JPCA-ES01-2003 und IEC 61249-2-21.

### 6.2 Optical properties

Property	Test method	Result
Reflectivity at 460 nm	Light source type D65, 45°/0°, 10° standard observer, 40 µm layer thickness	91 %
Brightness (L index)		95
ΔE after thermal stress (1000 h at 125 °C)	ISO 7724-3	< 1*
ΔL after thermal stress (1000 h at 125 °C)		< 1*
ΔE after UV stress (1000 h xenon arc radiation, 550 W/cm <sup>2</sup> )		< 1*

\* The highest quality (least yellowing) corresponds to a colour change of  $\Delta E < 1$ . The grades in descending order to the lowest quality correspond to colour changes in  $\Delta E$  as follows:

- $\Delta E = 0-1$ : normally not visible
  - $\Delta E = 1-2$ : slight yellowing, only visible to the trained eye
  - $\Delta E = 2-3.5$ : medium change, visible to the untrained eye
  - $\Delta E = 3.5-5$ : marked change
- (applies in the same manner to  $\Delta L$  for changes in brightness)

### 6.3 Physical and mechanical properties

Property	Test method	Result
Adhesion	IPC-TM-650, 2.4.28.1	class H and T
	IPC-TM-650, 2.4.28.1/2.4.29 (ink on ink)	class H and T
Flexibility	Mandrel bending acc. to DIN 53152 polyimide film, thickness: 50 $\mu\text{m}$	1.5 mm mandrel
Resistance to solvents	IPC-TM-650, 2.3.42	passed
	Isopropanol	passed
	Isopropanol : deionised water (75 : 25)	passed
	D-Limonene	passed
	10% alkaline cleaning agents	passed
	Monoethanolamine	passed
	Deionised water	passed
Solder bath resistance	IPC-TM-650, 2.6.8	passed: 20 s at 265 °C [509 °F] passed: 10 s at 288 °C* [550.4 °F]

\* With a solder bath resistance of 10 s at 288 °C [550.4 °F] the marking ink **SD 2696 TSW** fulfils the required temperature resistance for lead-free soldering,

## 7. Processing



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 Mixing

The two components are already packed in the correct mixing ratio. The volume of the container of component A is sufficient to accommodate the total quantity of component B and to allow perfect mixing.

→ Mix both components in the specified mixing ratio:



**Component A : Component B = 100 : 2 (parts by weight)**

For stirring we recommend mechanical stirring equipment. For more detailed information on correct mixing please read our **Technical Information sheet TI 15/10: "Processing of 2-pack systems"**. Special technical reports on these products are available on our website for download.

After thorough mixing the lacquer can be processed immediately.

## 7.2 Adjustment of viscosity

The 2-pack marking ink **SD 2696 TSW** is adjusted in such a manner that it normally can be processed in the condition supplied. If necessary, its viscosity can be reduced for processing purposes by adding the universal thinner **UV 5000** or the universal retarder **UZ 5100**. When the retarder is used the screen open time is extended.

**DIL** = To be thinned with universal thinner **UV 5000** or universal retarder **UZ 5100**

## 7.3 Auxiliary products

- **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.

- **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 ( $> 100\text{ °C}$  [ $> 212\text{ °F}$ ]) it is especially suitable for use in screen washing equipment. The cleaning agent **R 5899** is particularly distinguished by a low vapour pressure ( $< 0.1\text{ hPa}$  at  $20\text{ °C}$  [ $68\text{ °F}$ ]) 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  $+32\text{ °C}$  [ $89.6\text{ °F}$ ], 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.**

## 7.4 Screen printing

→ Please read our **Technical Information sheet TI 15/11 "The screen printing stencil in the pcb industry"**. On our website, you will find technical information sheets in the section "Service – Technical publications".

→ Ensure that the surface to be coated is clean, dry and grease-/oxide-free.

### recommended screen printing parameters

Screen fabric	Polyester 100-40 to 120-34 (acc. to old nomenclature polyester 100-120 T [lines/cm]) or corresponding steel fabric
Screen tension	at least 25 N/cm or according to the instructions of the screen mesh manufacturer
Squeegee	75-80 Shore-A hardness
Squeegee profile	right angled
Squeegee angle	approx. 75-80°

## 8. Drying/Curing

→ Cure the marking ink **SD 2696 TSW** in a convection dryer under the following conditions:  
**30 min\* at 150 °C [302 °F] or 60 min\* at 130 °C [266 °F].**

\* Object holding time: The curing time starts when the panels reach the curing temperature.

**SD 2696 TSW** is suitable for curing in conveyorised IR lines.

→ Perform pre-tests to determine the optimum temperature profile of the equipment used to cure **SD 2696 TSW**.

## 9. Standard packaging

The 2-pack marking ink **SD 2696 TSW** is packed for delivery as follows:

Component A	Component B	Selling unit
10 tins of 1 kg	10 glass bottles of 0.02 kg	10.2 kg

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

## 10. Shelf life and storage conditions

Labels on containers show shelf life and storage conditions.



**Shelf life: In sealed original containers at least 4 months**



**Storage conditions: +5 °C to +25 °C [+41 °F to +77 °F]**

For warehousing reasons, isolated cases may occur where the shelf life upon shipment is less than the shelf life indicated in this technical report. However, it is ensured that our products have **at least** two-thirds of their shelf life remaining when they leave our company.

## 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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