

Solder resists of the series SD 2460/201 UV-FLEX-HF

- Contour sharp application by screen printing
- for “print and etch”
- for cross-over technology as well as organic and printed electronics
- for flexible circuits, excellent adhesion on flexible base materials such as polyester/polyimide/polycarbonate foil, as well as on copper foil
- resistant to hot-air levelling (HAL) and lead-free reflow soldering
- halogen-free according to JPCA-ES01-2003 and IEC 61249-2-21
- the white solder resist SD 2490/201 UV-FLEX-HF optimises the light emission of LEDs due to its very high reflectivity

Characteristics

	SD 2450/201 UV-FLEX-HF	SD 2460/201 UV-FLEX-HF	SD 2490/201 UV-FLEX-HF
Colour / appearance	blue	green	white
Solids content	> 99 %		
Viscosity* of mixture at 20 °C [68 °F] ISO 3219	10,500 ± 2,500 mPas	10,500 ± 2,500 mPas	13,000 ± 2,000 mPas
Density of mixture at 20 °C [68 °F] DIN EN ISO 2811-1	1.25 ± 0.05 g/cm ³	1.29 ± 0.02 g/cm ³	1.34 ± 0.05 g/cm ³
Pot life of mixture	2 weeks (while avoiding direct light and solar radiation)		

* measured with Haake RS 600, C 20/1°, D = 50 s⁻¹

viscosity measuring unit supplied by Thermo Fisher Scientific, www.thermofisher.com

Indices: SD = screen printing ink, /201 = mixing ratio 20 : 1, UV = UV curing, FLEX = for flexible circuits, HF = halogen-free

List of possible physical and mechanical properties

Lackwerke Peters largely verifies its own production range with regard to the products' physical and mechanical properties. Please note that the values may slightly vary depending on the adjustment.

Property	Test method	Result
Cross hatch	EN ISO 2409, ISO 2409 on copper on FR 4 ink on ink	Gt 0 Gt 0 Gt 0
Adhesion	IPC-TM-650, 2.4.1 IPC-TM-650, 2.4.1.6 (after cross hatch)	no delamination classification 5, no delamination
Pencil hardness	IPC-SM-840E, 3.5.1 acc. to Wolff-Wilborn	≈ H ≈ B
Flexibility	Mandrel bend test acc. to DIN 53152 on polyester foil, thickness 200 µm on polyimide foil, thickness: 50 µm	2.5 mm mandrel 1.5 mm mandrel
Solvent resistance	IPC-SM-840E, 3.6.1.1 Isopropanol Isopropanol : water (75 : 25) D-Limonene 10% alkaline cleaning agents Monoethanolamine Deionised water	passed failed failed failed failed passed
Solder bath resistance (depending on the fluxing agent)	IPC-SM-840E, 3.7.2 UL 94	passed: 10 s at 260 °C [500 °F] passed: 10 s at 260 °C [500 °F]
Glass transition temperature T _g	TMA tension mode	≈ 45 °C [113 °F]
Coefficient of thermal expansion (CTE)	TMA tension mode	≈ 100 ppm/°C < T _g ≈ 190 ppm/°C > T _g

List of possible electrical properties

Lackwerke Peters largely verifies its own production range with regard to the products' electrical properties. Please note that the values may slightly vary depending on the adjustment.

Property	Test method	Result
Dielectric strength	IPC-TM-650, 2.5.6.1	≥ 120 kV/mm
	IPC-SM-840E, 3.8.1	passed
Surface resistance	DIN EN 62631-3-2	≥ 2.0 x 10 ¹⁴ Ohm
Volume resistivity	DIN EN 62631-3-1	≥ 1.3 x 10 ¹³ 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 60112 on FR 4 base material with CTI 250 with CTI 600	≥ CTI 250* ≥ CTI 600*

* The CTI value of the coating depends, among others, on the tracking resistance values of the base material.

Optimum electrical insulation values can only be 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.
MSDS	The corresponding material safety data sheet contains detailed information and characteristics on safety precautions, environmental protection, transport, storage, handling and waste disposal.
TI	Technical information TI 15/3 "Protective measures when using chemicals including lacquers, casting compounds, thinners, cleaning agents"
TI	Technical information TI 15/10 "Processing of 2-pack systems"
TI	Technical information TI 15/13 "Precleaning in the pcb fabrication process"

The solder resists of the series **SD 2460/201 UV-FLEX-HF** are applied by means of screen printing. Since UV curing inks do not contain solvents, there is no drying on the screen, but the presence of UV radiation (sun-light or fluorescent lamps) leads to a drying of the ink. The use of yellow light and/or yellow filters/UV protective foils is mandatory.



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.

Mixing



Stir component A before use



Component A : Hardener (Component B) = 20 : 1 (parts by weight)

On the labels of our containers, you will find the volume [L] and weight [kg]. The mixing ratio refers to the weight.

Adjustment of viscosity

The solder resists of the series **SD 2460/201 UV-FLEX-HF** are adjusted in such a manner that they normally can be processed in the condition supplied. If necessary, their viscosity can be reduced



by diluting with 2 % max. of reactive thinner **VR 5008**

Since the reactive thinner **VR 5008** participates in the curing process, it is not possible to use other solvents.

Auxiliary products recommended

- [ELPESPEC® anti-static spray HP 5500](#)
prevents and eliminates electrostatic discharge occurring during screen printing; silicone- and grease-free
- [ELPESPEC® 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 ($> 100\text{ °C}$ [$> 212\text{ °F}$]), low vapour pressure $< 0.1\text{ hPa}$ at 20 °C [68 °F], thus not affected by the EU-VOC regulation 1999/13/CE
- [ELPESPEC® cleaning agent R 5821](#)
for the cleaning of equipment and work tools, high flash point ($+32\text{ °C}$ [89.6 °F])
- [ELPESPEC® cleaning agent R 5817](#)
for the manual cleaning of screens and tools

Screen printing

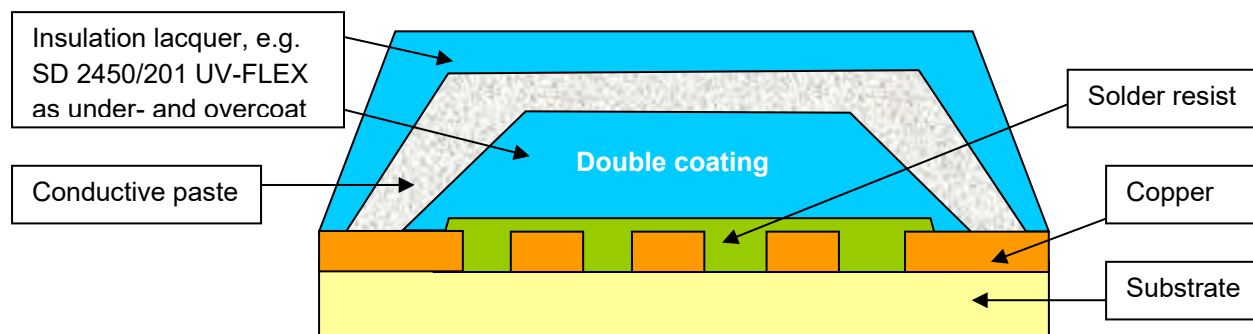
→ Ensure that the surface to be coated is clean, dry and grease-/oxide-free and that copper surfaces preferably have an average surface roughness of $2\text{ }\mu\text{m}$.

recommended screen printing parameters

Screen fabric	polyester 68-55 up to 120-37 [according to old nomenclature 68 – 120 T (lines/cm)] or corresponding steel fabric
Screen tension	at least 25 N/cm or as specified by the screen mesh manufacturer
Squeegee	75–80 shore A hardness, right angled
Squeegee angle	approx. 75°

Cross-over technology

The cross-over technology allows to arrange superimposed conductor planes instead of using costly double-sided printed circuit boards.



Model process parameters:

	Process step	Product	Drying/curing	Screen fabric
1.	UV solder resist	SD 2368 UV-SM	UV curing: 1500 mJ/cm^2	100-40 (old: 100 T)
2.	Undercoat #1	SD 2450/201 UV-FLEX-HF	UV curing: 1500 mJ/cm^2	120-37 (old: 120 T)
3.	Undercoat #2	SD 2450/201 UV-FLEX-HF	UV curing: 1800 mJ/cm^2	120-37 (old: 120 T)
4.	Conductive paste	Silver-conductive paste	according to the manufacturer's specifications	according to the manufacturer's specifications
5.	Overcoat	SD 2450/201 UV-FLEX-HF	UV curing: 2500 mJ/cm^2	120-37 (old: 120 T)

The migration of the silver-conductive paste can be avoided by overprinting with a carbon-conductive ink which, as an option, can then be covered with a layer of solder resist from the **SD 2460/201 UV-FLEX-HF** series.

Drying/Curing

The solder resists of the series **SD 2460/201 UV-FLEX-HF** are cured by means of UV radiation. High pressure mercury vapour lamps with a power rating of 80-100 Watt/cm arc length are suitable.

- Cure the solder resists of the series **SD 2460/201 UV-FLEX-HF** with a UV light energy of min. 2500 mJ/cm².
- In case of multiple printing of the solder resist, cure each of the intermediate layers with an energy of 1500-2000 mJ/cm² and the top layer with an energy of 2500 mJ/cm². This way you achieve a better ink on ink adhesion. Please observe that multiple printing considerably reduces the flexibility of the solder resist.
- Due to its light-reflective properties, cure the white solder resist **SD 2490/201 UV-FLEX-HF** at a **much higher UV light energy** of approx. 3500 mJ/cm². Ascertain the optimum energy by means of pre-trials.

The indicated light energy was measured with a Beltron* UV Integrator. Equipment of other manufacturers may show different values.

* Beltron GmbH, Germany, www.beltron.de, info@beltron.de

- Replace the UV lamps regularly according to the manufacturer's instructions, as the emission spectrum of the lamps changes in the course of their life span.
- Install operating time counters to be able to control the operation period.

Packaging

The packing units available are indicated in our offer which we will send you upon request.

Shelf life and storage conditions



Shelf life: In sealed original containers at least 6 months



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



Protect from UV light

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.

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.

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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