

Solder resists of the series Elpemer® SD 2463 FLEX-HF

On account of their high resolution (up to 30 µm) and excellent dielectric properties, the flexible solder resists of the series **Elpemer® SD 2463 FLEX-HF** which are photoimageable / suitable for conventional or direct imaging are used as progressive alternatives to flexible cover foils in fine and superfine line technology and SMD technology.

- Adjustment SP
- application by horizontal or vertical screen printing
- aqueous-alkaline developable
- excellent adhesion to standard flexible base materials
(Given the multitude of highly specialised base materials/glues available on the market, it is necessary to consider the individual performance over the entire process.)
- excellent flexibility for “static flex“ applications
- halogen-free according to JPCA-ES01-2003 / IEC 61249-2-21
- suitable for laser marking with CO₂ lasers, e.g. for applying AOI readable markings (e.g. datamatrix, bar codes), no adherence of solder to the ablated areas
- thermal cycling resistance:
-65 °C up to +125 °C [-85 °F up to +257 °F] (100 cycles)
- very good resistance to galvanic and electroless Ni/Au (ENIG) and electroless Sn baths (CSN) as well as OSP processes (Organic Solder Preservative)
- high scratch resistance
- compatible with lead-free soldering processes
- fulfil/exceed among others: **IPC-SM-840E**

Characteristics

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

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
Adhesion	IPC-SM-840E, 3.5.2.1	class H and T
	IPC-SM-840E, 3.5.2.6 (ink on ink)	class H and T
Adhesion to flexible circuits	IPC-TM-650, 2.4.29B 10 cycles, bent 20 times around mandrel, 3 mm diameter, 180°	no cracks or delamination
Cross hatch	DIN EN ISO 2409 on copper	Gt 0
Pencil hardness	IPC-SM-840E, 3.5.1	≈ 6 H
Scratch hardness	Simex scratch resistance test device type RH 3, scoring needle with ball-tip (1 mm diameter)	weight load: 1500 g
Flexibility	Mandrel bending DIN 53152 polyimide foil, thickness: 50 µm; ink film thickness: ≤ 15 µm	diameter: ≥ 1.5 mm
Resistance to solvents / cleaning agents	IPC-SM-840D, 3.6.1.1 Isopropanol Isopropanol : deionised water (75 : 25) 10% alkaline cleaning agents Monoethanolamine Deionised water D-Limonene	passed passed passed passed passed
	test boards, dipped in dichloromethane (30 min at room temperature)	no swelling
Resistance to acids	10% H ₂ SO ₄ at 20 °C [68 °F], 30 min	no change
Resistance to lyes	10% NaOH at 20 °C [68 °F], 30 min	no change
Hydrolytic stability	IPC-SM-840E, 3.6.2 28 days/97 ± 2 °C [206.6 ± 35.6 °F] 90 to 98 % rel. humidity	passed
Outgassing	ASTM E595 (limit values: TML < 1,00 %, CVCM < 0,10 %)	TML = 0,34 % CVCM = 0,09 % WVR = 0,42 %
Solder bath resistance	IPC-SM-840E, 3.7.2 IPC-SM-840E, 3.7.3 (lead-free) IPC-TM-650, 2.6.8 UL 94	10 s at 260 °C [500 °F] 10 s at 260 °C [500 °F] 10 s at 288 °C [550.4 °F] 20 s at 288 °C [550.4 °F]*
Simulated lead-free reflow soldering	IPC-SM-840E, 3.7.3.1	≥ 5 x 10 s at 260 °C [500 °F]
Thermal shock	IPC-SM-840E, 3.9.3 -65 °C up to +125 °C [-85 up to 257 °F], 100 cycles, 15 min, shift time < 2 min	class H and T

* With a solder bath resistance of 20 s at 288 °C [550.4 °F] acc. to UL 94 the solder resists of the series **ELPEMER® SD 2463 FLEX-HF** fulfil the required temperature resistance for lead-free soldering.

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 x 10 ¹⁴ Ohm
Specific volume resistivity	DIN EN 62631-3-1	≥ 5,2 x 10 ¹⁵ Ohm x cm
Insulation resistance	IPC-SM-840E, 3.8.2	class H and T
Moisture and insulation resistance	IPC-SM-840E, 3.9.1	class H and T
Electromigration	IPC-SM-840E, 3.9.2	class H and T
Comparative Tracking Index (CTI, Tracking resistance)	DIN EN 60112, on FR 4 base material with CTI 225	≥ CTI 275*
Rel. Permittivity ϵ_r	IPC-TM-650, 2.5.5.13 at 3 GHz	≈ 3.5
	at 10 GHz	≈ 3.5
Dielectric loss factor $\tan \delta$	IPC-TM-650, 2.5.5.13 at 3 GHz	≈ 0.037
	at 10 GHz	≈ 0.025

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

Note: Optimum electrical insulation values can only be achieved when 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.

PD

The process data sheet contains product-specific data such as characteristics and recommendations for processing parameters.

AI

[Application information AI 2/1](#) "Processing instructions for photoimageable Elpemer® solder resists" – here you find basic information on the processing of photoimageable systems.

TI

[Technical information TI 15/3](#) "Protective measures when using chemicals including lacquers, casting compounds, thinners, cleaning agents"

TI

[Technical information TI 15/13](#) "Precogning in the pcb fabrication process"

→ Please note that flexible photoimageable solder resists exhibit some specialties during processing:

The inks are particularly sensitive to contamination (dust, residues from other products on tools, abrasion from gloves etc.) and to static charging of the substrates which may lead to wetting problems and dewetting.

The excellent flexibility and scratch resistance that is necessary for “static flex” applications is reached only after curing.

The flexible circuits must be treated carefully before final curing because otherwise cracks may form.

Generally, thin layers of ink are more flexible than thicker ones. On the other hand, a thick layer (minimum dry layer thickness: 10 µm) is required in order to achieve a sufficient edge coverage, particularly for chemical finish processes. For this purpose, a double coating of two thin layers is recommended instead of printing one single thick layer.



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.

Auxiliary products recommended

- [ELPESPEC® 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
- [ELPESPEC® anti-static spray HP 5500](#)
prevents and eliminates electrostatic discharge occurring during screen printing; silicone- and grease-free
- [ELPESPEC® defoamant HP 5911](#)
for defoaming of aqueous-alkaline developer solutions, silicone-free, biologically degradable
- [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 °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
- [ELPESPEC® cleaning agent R 5821](#)
for the cleaning of equipment and work tools, high flash point (+32 °C [89.6 °F])
- [ELPESPEC® cleaning agent R 5817](#)
for the manual cleaning of screens and tools

Packaging

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

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.

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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