

# Plugging paste

## Elpemer<sup>®</sup> VF 2469 SM-HF

The plugging paste **Elpemer<sup>®</sup> VF 2469 SM-HF** is applied to seal via holes with a diameter of up to 0.5 mm for vacuum adaption during incircuit testing, thus preventing solder from seeping through to the component side and flux agents from settling in the holes.

- Base: Novolak epoxy photo polymer
- application by means of screen printing
- photoimageable
- polyalcohol developable
- generally compatible with solder resists of the Elpemer<sup>®</sup> 2469 SM-HF series
- after printing of the plugging paste and a flash-off phase the subsequent processing is effected together with the solder resist
- halogen-free according to JPCA-ES01-2003/IEC 61249-2-21
- UL-Recognised Component: best flame class V-0 acc. to UL 94, UL File No. E80315 (\$2469 SM-HF)

### Characteristics

<b>Colour / appearance</b>	green
<b>Solids content</b> DIN EN ISO 3251 (1 h/125 °C [257 °F], 1 g weighed)	70 ± 2 % by weight
<b>Viscosity of mixture at 20 °C [68 °F]</b> DIN EN ISO 3219	20 000 ± 3 000 mPas
<b>Density at 20 °C [68 °F], DIN EN ISO 2811-1</b> Componente A Hardener (Comp. B) Mixture	1.47 ± 0.05 g/cm <sup>3</sup> 1.01 ± 0.05 g/cm <sup>3</sup> 1.40 ± 0.05 g/cm <sup>3</sup>
<b>Pot life of mixture</b> (at room temperature; approx. 18 – 23 °C [64.4 – 73.4 °F]; avoid solar and light radiation, yellow light or yellow filters are recommended)	at least 72 hours

\* measured with Haake RS 600, C 20/1°, D = 50 s<sup>-1</sup>,  
viscosity measuring unit supplied by Thermo Fisher Scientific, [www.thermofisher.com](http://www.thermofisher.com)

Indices: SM = silk-mat, HF = halogen-free

## Physical and mechanical properties

Property	Test method	Result
Adhesion	IPC-SM-840E, 3.5.2.1	class H and T
Resistance to solvents/cleaning agents	IPC-SM-840E, 3.6.1.1 Isopropanol Isopropanol : deionised water (75 : 25) D- Limonene 10% alkaline cleaning agents Monoethanolamine Deionized water	passed passed passed passed passed
Resistance to solvents	test boards, dipped in methylene chloride (dichloromethane), 60 min at room temperature	no swelling
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*	20 s at 265 °C [509 °F] 10 s at 260 °C [500 °F] 10 s at 288 °C [550.4 °F] 20 s at 288 °C [550.4 °F]

\* With a solder bath resistance of 20 s at 288 °C [550.4 °F] the plugging paste **Elpemer® VF 2469 SM-HF** fulfils the required temperature resistance for lead-free soldering.

## Electrical properties

Property	Test method	Result
Dielectric strength	IPC-TM-650, 2.5.6.1	≥ 175 kV/mm
	IPC-SM-840E, 3.8.1	passed
Surface resistance	DIN EN 62631-3-2	≥ 3.0 x 10 <sup>14</sup> Ohm
Specific volume resistivity	DIN EN 62631-3-1	≥ 2.0 x 10 <sup>15</sup> Ohm x cm
Moisture and insulation resistance	IPC-SM-840E, 3.9.1	class H and T

## 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>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 15/10</a> "Processing of 2-pack systems"
<b>TI</b>	<a href="#">Technical information TI 15/13</a> "Pretreatment in the pcb fabrication process"

The plugging paste **Elpemer® VF 2469 SM-HF** is applied by means of screen printing.



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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



Component A: Hardener (Component B) = 6 : 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 plugging paste **Elpemer® VF 2469 SM-HF** is adjusted in such a manner that it can normally be processed in the condition supplied. To reduce its viscosity for processing purposes:

**DIL** To be diluted with thinner **V 2469 SD**

## 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® special stripper HP 5710](#)  
for removing photoimageable solder resists (e.g. in case of incorrect exposure) and for cleaning ink developer and resist stripping units.
- [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

## 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 µm.

### Recommended screen printing parameters

Screen fabric	Steel fabric: - 224/100 (80 mesh standard screen) - 245/65 - 265/50 For initial orientation tests a 36 – 90 to 43 - 80 polyester screen is also acceptable
Screen printing stencil	Voids in the fabric > hole diameter (about 0.1 – 0.2 mm larger, depending on size of the printing format)  A high stencil build-up is not necessary because the ink should be printed into the drill holes only. As a rule it is sufficient to close the screen mesh with a thin coat of emulsion or a thin capillary film.
Printing underlay	Thickness of approx. 3 mm, base material that was drilled with the same drill program but where the diameters of the holes are five times the size of the actual via holes. (The printing underlay enables the filling of the holes since there are no air resistances under the holes.)  An undergrid would also be acceptable provided it does not permit the printing substrate to spring.
Snap-off	As low as possible
Flooding	Rubber squeegee 75 Shore A, squeegee profile 90°, push stroke 70°
Printing	Rubber squeegee 75 Shore A, squeegee profile: 30-45°, printing angle 90° squeegee pressure as high as possible (4 bar), printing speed as low as possible

These printing parameters are meant for orientation purposes and, depending on the layout of the printed circuit board, must be optimised and adjusted to the prevailing production conditions.

## Flash-off

After printing of the plugging paste **Elpemer® VF 2469 SM-HF** and a flash-off time of max. 10 min at room temperature the photoimageable solder resist must be applied **directly**.

## Curing

The further processing - pre-drying, exposure, development - and final curing is effected together with the solder resist. The exposure and curing conditions also depend upon the applied quantity of plugging paste.

→ Perform pre-trials to determine the optimum exposure and curing parameters. If possible adjust a ramp-formed curing curve in order to expel any entrapped solvent residues, e.g.:  
**1 - 3 h at 110°C [230 °F], followed by the standard final curing of 1 h at 150°C [302 °F] (object holding time\*).**

\* object holding time: The curing time is measured from the point when panels reach the curing temperature.

## 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]



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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. Labels on containers show shelf life and storage conditions.

## 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.

Lackwerke Peters GmbH & Co. KG  
Hooghe Weg 13, 47906 Kempen, Germany

Internet: [www.peters.de](http://www.peters.de)  
E-Mail: [peters@peters.de](mailto:peters@peters.de)

Phone +49 2152 2009-0  
Fax +49 2152 2009-70

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