ELPEGUARD®
peters

TR TECHNICAL REPORT

Conformal coatings of the series ELPEGUARD® SL 1800 FLZ

The conformal coatings of the series **ELPEGUARD® SL 1800 FLZ** are used to protect and insulate electronic assemblies so that they can fulfil higher requirements regarding quality, reliability and service life. Owing to their very good resistance against moisture and condensation an excellent protection against corrosion (such as electrochemical corrosion and migration) is possible.

- Base: acrylate resins (AR)
- physical drying
- Recognized component for outdoor use acc. to **UL 746E** (UL file no. E80315)
- can be soldered-through at soldering iron temperature for repair purposes or removed with the help of thinner V 1800 and reapplied after repair
- very good ageing and yellowing resistance
- temperature range from -65 up to +140 °C [-85 up to 284 °F]
- very good TST resistance (thermal shock test):
  -40 to +150 °C [-40 to 302 °F] or -65 to +125 °C [-85 to 257 °F] respectively
- “ready-to-use“ viscosity adjustments available for all common coating methods
- suitable for coating flexible circuit boards („flex-to-install“, exposure to bend stress limited to the time of assembly)

Characteristics

	Colour/ appearance	**Solids content** DIN EN ISO 3251	**Viscosity** at 20 °C [68 °F] DIN EN ISO 3219*	**Density** at 20 °C [68 °F] DIN EN ISO 2811-1
SL 1800 FLZ/900	colourless, fluorescent	approx. 25 %	900 ± 150 mPas	0.97-1.01 g/cm³
SL 1800 FLZ/500		approx. 23 %	500 ± 150 mPas	0.97-1.01 g/cm³
SL 1800 FLZ/50		approx. 13 %	50 ± 15 mPas	0.96-1,00 g/cm³

* measured with Haake RS 600, C 35/1, D = 100 s^{-1},
viscosity measuring unit supplied by Thermo Fisher Scientific, www.thermofisher.com

LP 240703 E-5 / 301436e_000

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
Flexibility	IPC-CC-830C, 3.5.5	passed
Glass transition temperature Tg	Thermo mechanical analysis (TMA)	≈ 53 °C [127.4 °F]
Coefficient of thermal expansion (CTE)	Thermo mechanical analysis (TMA)	< Tg: ≈ 190 ppm/°C > Tg: not constant Plastic as of approx. 100 °C [212 °F]
Young modulus	Dynamic mechanical analysis (DMA) -60 °C to +40 °C [-76 °F to104 °F] + 40°C to + 80°C [104 °F to 176 °F] > +80 °C [176 °F]	300-100 MPa 10-1 MPa < 0.1 MPa

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	≥ 90 kV/mm
	IPC-CC-830C, 3.6.1	passed
Specific volume resistivity	DIN EN 62631-3-1	≥ 2.0 x 10^{15} Ohm x cm
Surface resistance	DIN EN 62631-3-2	≥ 1.0 x 10^{14} Ohm
Moisture and insulation resistance	IPC-CC-830C, 3.7.1 (65 °C [149 °F]/90 % r. h.)	passed
	85/85 test (3 d, 85 °C [185 °F], 85 % R.H.)	≥ 5.0 x 10^{9} Ohm
Thermal shock	IPC-CC-830C, 3.7.2 -65 to +125 °C [-85 to 257 °F]	passed
Hydrolytic stability	IPC-CC-830B, 3.7.3	passed
Comparative tracking index (CTI)	DIN EN 60112 on FR4 base material with CTI 275 CTI 600	 CTI ≥ 600 CTI ≥ 600
Resistance to condensation	according to DIN EN ISO 6270-2 (BIAS 12 V, 40 °C [104 °F], 100% r. h.)	≥ 1.0 x 10^{9} Ohm
Permittivity εr	according to DIN 53483	100 KHz: 3.4 1 MHz: 3.0 1 GHz: 2.9
Dielectric loss factor tan δ	according to DIN 53483	100 KHz: 0.0168 1 MHz: 0.0160 1 GHz: 0.0248
TI (temperature index)	DIN EN 60216 (IEC 60216)	142 °C [287.6 °F] (20 000 h)* 158 °C [316.4 °F] (5 000 h)*

* can be used in a temperature range of **-65 up to at least + 140 °C** [-85 up to at least 284 °F]. Both at the lower and upper ends of this range the performance and reliability of the material can be negatively affected in some applications. In these cases, additional pre-trials and tests are required. Limit values for classification were a 50 % loss in mass and/or 25 % dielectric strength in comparison to the appropriate reference values.

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.
AI	Application information AI 1/1 ”Processing instructions for ELPEGUARD® conformal coatings (thin film coatings)“
TI	Technical information TI 15/3 “Protective measures when using chemicals including lacquers, casting compounds, thinners, cleaning agents“

The conformal coatings of the series **ELPEGUARD® SL 1800 FLZ** can be applied by dipping, brushing, spraying or by means of automatic selective coating units.

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.

Viscosity adjustment

→ Adjust the processing viscosity for each application process by means of thinner **V 1800** (see also “Adjustment of the processing viscosity” in the Application information sheet **AI 1/1**).

DIL to be thinned with thinner V 1800

Auxiliary products recommended

- **Thinner V 1800**
  for removing the conformal coating within repair jobs
- **ELPESPEC® cleaning agent R 5817**
  for the cleaning of work place and tools/equipment
- **ELPESPEC® cleaning agent R 5888**
  water-soluble, biodegradable cleaning agent for product carriers and tools

Double coating

The conformal coatings of the series **ELPEGUARD® SL 1800 FLZ** are suitable for double coating to a limited extent since they are dissolved by the solvent contained in the lacquer.

Drying/curing

Drying is finished after complete evaporation of the solvents. The drying parameters depend, among others, on the geometry of the assemblies, the population and ink layer thickness. In case of oven drying they depend on the oven loading etc. The following data serves as a guideline:

	At room temperature (approx. +23 °C [73.4 °F])	**in circulating hot air units**
Drying (tack-free) according to DIN EN 60464 (IEC 60464)	120-140 min	20-25 min at 60-80 °C [140-176 °F]

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 18 months

Storage conditions: +5 °C to +35 °C [+41 °F to 95 °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. 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.

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Coating Innovations for Electronics

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PTR PRELIMINARY TECHNICAL REPORT

Conformal coatings of the series ELPEGUARD® SL 1801 FLZ

The conformal coatings of the series **ELPEGUARD® SL 1801 FLZ** are used to protect and insulate electronic assemblies so that they can fulfil higher requirements regarding quality, reliability and service life. Owing to their very good resistance against moisture and condensation an excellent protection against corrosion (such as electrochemical corrosion and migration) is possible.

The conformal coatings of the series **ELPEGUARD® SL 1801 FLZ** are distinguished by a very good low-temperature flexibility. They formulate silicone-modified components to allow a better wetting of assemblies with low surface tension.

- Base: acrylate resins (AR)
- physical drying
- can be soldered-through at soldering iron temperature for repair purposes or removed with the help of thinner V 1800 and reapplied after repair
- very good ageing and yellowing resistance
- temperature range from -65 to +140 °C [-85 to 284 °F]
- very good TST resistance (thermal shock test):
  -40 to +150 °C [-40 to 302 °F] or -65 to +125 °C [-85 to 257 °F] respectively
- “ready-to-use“ viscosity adjustments available for all common coating methods
- suitable for coating flexible circuit boards („flex-to-install“, exposure to bend stress limited to the time of assembly)

Characteristics

	Colour/ appearance	**Solids content** DIN EN ISO 3251	**Viscosity** at 20 °C [68 °F] DIN EN ISO 3219*	**Density** at 20 °C [68 °F] DIN EN ISO 2811-1
SL 1801 FLZ/900	colourless, fluorescent	approx. 25 %	900 ± 150 mPas	0.95-1.05 g/cm³
SL 1801 FLZ/500		approx. 23 %	500 ± 150 mPas	0.95-1.05 g/cm³
SL 1801 FLZ/50		approx. 13 %	50 ± 15 mPas	0.93-1.03 g/cm³

Indices: SL = conformal coating, FLZ = fluorescent

* measured with Haake RS 600, C 35/1° / C 20/1°, D = 50 s^{-1} / D = 100 s^{-1}, viscosity measuring unit supplied by Thermo Fisher Scientific, www.thermofisher.com

LP 232403 E-1 / 301435e.001

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Property	Test method	Result
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Glass transition temperature Tg	TMA	≈ 53 °C [127.4 °F]
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Thermal shock	IPC-CC-830C, 3.7.2 -65 to +125 °C [-85 to 257 °F]	passed
Hydrolytic stability	IPC-CC-830C, 3.7.3	passed
Comparative tracking index (CTI)	DIN EN 60112 on FR4 base material with CTI 275 CTI 600	 CTI ≥ 600 CTI ≥ 600
Resistance to condensation	according to DIN EN ISO 6270-2 (BIAS 12 V, 40 °C [104 °F], 100% r. h.)	≥ 1.0 x 10^{9} Ohm
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TI	Technical information TI 15/18 “Handling of silicones“

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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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