The ELPEGUARD® conformal coating family SL 1800 FLZ

Here the technical reports of the ELPEGUARD® conformal coatings of the series **SL 1800 FLZ** are available for an overall download.
To receive individual technical reports please send your request to peters@peters.de

There is a variety of special adjustments available for different coating methods and fields of application; we will gladly assist you in finding the right adjustment for your application.

Series	**Properties / special characteristics**	**Colour**		**Application**					**Standards**		
	Base: Acrylate resins (AR) fast drying at room temperature good yellowing resistance can be completely removed for repair purposes with the corresponding thinner optimized for Temperature Shock Test	colourless, fluorescent	colourless	selective coating	dip coating	brushing	spray coating	spray can	UL 94	UL 746 E (outdoor)	IPC-CC-830C
SL 1800 FLZ	the “allround“ solution, improved Acrylic formulation; available as fluorescent and non fluorescent type	X	X	X	X	X	X		X	X	X
SL 1800 FLZ/50	researched for repair purposes	X						X	X	X	X
SL 1801 FLZ	due to specific adjustments a perfect wetting even on silicone LEDs is given	X		X	X	X	X		X	X	X
SL 1801/50	researched for repair purposes		X					X	X	X	X

ELPEGUARD®
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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
- tested by NTS according to **IPC-CC-830C**
- 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	25 % ± 2	900 ± 150 mPas	0.97-1.01 g/cm³
SL 1800 FLZ/500		23 % ± 2	500 ± 150 mPas	0.97-1.01 g/cm³
SL 1800 FLZ/50		13 % ± 2	50 ± 15 mPas	0.96-1,00 g/cm³
SL 1800/900	colourless	25 % ± 2	900 ± 150 mPas	0.97-1.01 g/cm³
SL 1800/500		23 % ± 2	500 ± 150 mPas	0.97-1.01 g/cm³
SL 1800/50		13 % ± 2	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 241109 E-6 / 301436e_001

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-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
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

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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.

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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TR TECHNICAL REPORT

Conformal coating spray ELPEGUARD® SL 1800 FLZ/50

The conformal coating spray **ELPEGUARD® SL 1800 FLZ/50** is used to protect and insulate electronic assemblies so that they can fulfil higher requirements regarding reliability and service life. Owing to its very good resistance against moisture and condensation, an excellent protection against corrosion (such as electrochemical corrosion and migration) is possible.

- Base: acrylate resins (AR)
- fast physical drying
- practical **spray can**: ideal for pilot and low-volume series or for repair
- Recognized component for outdoor use acc. to **UL 746E** (UL file no. E80315)
- fulfils the requirements of IPC-CC-830C
- can be soldered through at soldering iron temperature for repair or removed with the help of thinner **V 1800** and reapplied afterwards
- very good ageing and yellowing resistance
- temperature range from -65 to at least +140 °C [-85 to at least +284 °F]
- very good TCT (thermal cycling test) resistance:
  -40 to +150 °C [-40 °F to +302 °F] or -65 to +125 °C [-85 to +257°F]
- resistant to the 4-part noxious gas test acc. to DIN EN 60068-2-60 and BMW GS 95003-4
- suitable for coating flexible circuits (“flex-to-install“, exposure to bend stress limited to time of assembly)

Characteristics

Colour/appearance: SL 1800 FLZ/50: colourless, fluorescent

Indices: SL = conformal coating, FLZ = fluorescent, 50 = viscosity 50 mPas

LP 242106 E-0 / 301644e_000

Physical and mechanical properties

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

Electrical properties

These values are reached after 7 days' storage at room temperature.

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-830C, 3.7.3	passed
Comparative Tracking Index (CTI, tracking resistance)	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 ε_r	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 the classification of the TI were a 25 % loss in mass and/or 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"

➔ Follow the instructions given on the spray can.

The yield of the conformal coating spray **ELPEGUARD® SL 1800 FLZ/50** depends on the population density of the electronic assembly and the thickness of the coating layer applied; experience has shown that one spray can is sufficient for coating 3-3.5 m².

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

- Thinner V 1800
  for removing the coating within repair
- 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

Drying/curing

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

	At room temperature (approx. +23 °C [73.4 °F])	**In hot exhaust air units**
Drying (tack-free) acc. 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 12 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.

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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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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. 22 %	500 ± 150 mPas	0.95-1.05 g/cm³
SL 1801 FLZ/50		approx. 13 %	50 ± 15 mPas	0.93-1.03 g/cm³
SL 1801/50	colourless	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 241109 E-2 / 301435e_002

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	TMA	≈ 53 °C [127.4 °F]
Coefficient of thermal expansion (CTE)	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-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
Permittivity ε_r	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"
TI	Technical information TI 15/18 "Handling of silicones"

The conformal coatings of the series **ELPEGUARD® SL 1801 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 1801 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]

Stir before use

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.

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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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PTR PRELIMINARY TECHNICAL REPORT

Conformal coating spray ELPEGUARD® SL 1801/50

The conformal coating spray **ELPEGUARD® SL 1801/50** is used to protect and insulate electronic assemblies so that they can fulfil higher requirements regarding reliability and service life. Owing to its very good resistance against moisture and condensation, an excellent protection against corrosion (such as electrochemical corrosion and migration) is possible.

- Base: acrylate resins (AR)
- fast physical drying
- practical **spray can**: ideal for pilot and low-volume series or for repair
- fulfils the requirements of IPC-CC-830C
- can be soldered through at soldering iron temperature for repair or removed with the help of thinner **V 1800** and reapplied afterwards
- very good ageing and yellowing resistance
- temperature range from -65 to at least +140 °C [-85 to at least +284 °F]
- very good TCT (thermal cycling test) resistance:
  -40 to +150 °C [-40 °F to +302 °F] or -65 to +125 °C [-85 to +257°F]
- resistant to the 4-part noxious gas test acc. to DIN EN 60068-2-60 and
  BMW GS 95003-4
- suitable for coating flexible circuits (“flex-to-install“, exposure to bend stress limited to time of assembly)

Characteristics

Colour/appearance: SL 1800 FLZ/50: colourless

Indices: SL = conformal coating, 50 = viscosity 50 mPas

LP 241209 E-0 / 301653e_000

Physical and mechanical properties

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

Electrical properties

These values are reached after 7 days' storage at room temperature.

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-830C, 3.7.3	passed
Comparative Tracking Index (CTI, tracking resistance)	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 ε_r	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 the classification of the TI were a 25 % loss in mass and/or 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"

➔ Follow the instructions given on the spray can.

The yield of the conformal coating spray **ELPEGUARD® SL 1801/50** depends on the population density of the electronic assembly and the thickness of the coating layer applied; experience has shown that one spray can is sufficient for coating 3-3.5 m².

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

- Thinner V 1800
  for removing the coating within repair
- 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

Drying/curing

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

	At room temperature (approx. +23 °C [73.4 °F])	**In hot exhaust air units**
Drying (tack-free) acc. 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.

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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