

# The ELPEGUARD® conformal coating family SL 1307 FLZ

Here the technical reports of the ELPEGUARD® conformal coatings of the series **SL 1307 FLZ** are available for an overall download. To receive individual technical reports please send your request to [peters@peters.de](mailto: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				
		colourless, fluorescent	colourless	red	green	selective coating	dip coating	brushing	spray coating	spray can	UL 94	UL 746	IPC-CC-830B	MIL-I-46058C	IEC 61086
	Base: Acrylate resins (AR) fast drying at room temperature good yellowing resistance can be completely removed for repair purposes with the corresponding thinner														
<a href="#">SL 1307 FLZ</a>	the “allround“ solution	X	X	X	X	X	X	X	X		X	X	X	X	
<a href="#">SL 1307 FLZ/2</a>	improved dipping application	X	X	X	X	X	X	X	X		X	X	X	X	
SL 1307 FLZ/3	thixotropised adjustment to ensure optimum edge coverage even on sharp-angled component leads for higher climatic resistance	X				X		X	X		X	X	X	X	
<a href="#">SL 1307 FLZ/4</a>	very good adhesion even on critical substrates	X				X		X	X		X	X	X	X	X
<a href="#">SL 1307 FLZ/5</a>	halogen-free acc. to JPCA-ES01-2003 / IEC 61249-2-21	X				X	X	X	X		X	X	X	X	
<a href="#">SL 1307 FLZ/S</a>	conformal coating spray supplied in spray cans, ideal for pilot and low-volume series or for repair	X								X	X	X	X	X	

# Conformal coatings of the series ELPEGUARD® SL 1307 FLZ

The 1-pack conformal coatings of the series **ELPEGUARD® SL 1307 FLZ** are used to protect and insulate assembled pcbs so that they can fulfil higher requirements regarding reliability and service life. Owing to their very good resistance against moisture and condensation an excellent protection against corrosion (such as electro corrosion and migration) is possible.

- Base: acrylate resins (AR)
- fast physical drying
- SL 1307 FLZ/& tested by Trace Laboratories East according to **IPC-CC-830B** and **MIL-I-46058C**
- UL approval of SL 1307 FLZ/& according to **UL 94** and **UL 746E** (UL File No. E80315)
- can be soldered-through at soldering iron temperature for repair purposes or completely removed with the help of the corresponding thinner (see item "Viscosity adjustment") and reapplied after repair
- used by leading automotive suppliers
- very good ageing and yellowing resistance
- temperature range from -65 to at least +125 °C [-85 up to at least +257 °F]
- very good TCT (thermal cycling test) resistance:  
-40 to +150 °C [-40 to 302 °F] or -65 to +125 °C [-85 to 257 °F] respectively
- fungus resistant in acc. with IPC-TM-650, 2.6.1.1. with growth index = 0  
(SL 1307: growth coefficient = 1)
- resistant in 4-part noxious gas test according to DIN EN 60068-2-60 or BMW GS 95003-4 respectively
- "ready-to-use" viscosity adjustments available for various coating methods
- suitable for flexible circuit boards ("flex-to-install", exposure to bend stress limited to the time of assembly)
- the adjustments free from fluorescent agents are particularly suitable for lighting electronics/LEDs
- when using the green or red adjustment the coating can be easily examined for completeness, thanks to the clear contrast with the substrate

## Characteristics

	Colour/ appearance	Solids content DIN EN ISO 3251 1 h, 125 °C [257 °F], 1 g weighed quantity	Viscosity at 20 °C (flow time)		Density at 20 °C [68 °F] DIN EN ISO 2811-1
			DIN 53211 4 mm DIN flow cup	DIN EN ISO 2431 ISO flow cup (diameter of nozzle given in brackets)	
SL 1307	colourless	31 ± 3 % by weight	60 ± 6 s	41 ± 4 s (6 mm)	0.96 ± 0.02 g/cm <sup>3</sup>
SL 1307/18		22 ± 2 % by weight	18 ± 2 s	38 ± 4 s (4 mm)	0.94 ± 0.02 g/cm <sup>3</sup>
SL 1307 FLZ	colourless, fluorescent	30 ± 3 % by weight	55 ± 5 s	75 ± 7 s (5 mm)	0.96 ± 0.02 g/cm <sup>3</sup>
SL 1307 FLZ/18		22 ± 2 % by weight	18 ± 2 s	38 ± 4 s (4 mm)	0.94 ± 0.02 g/cm <sup>3</sup>
SL 1307 FLZ/21		24 ± 2 % by weight	21 ± 2 s	50 ± 5 s (4 mm)	0.95 ± 0.02 g/cm <sup>3</sup>
SL 1307 FLZ/23		25 ± 2 % by weight	23 ± 2 s	60 ± 5 s (4 mm)	0.95 ± 0.02 g/cm <sup>3</sup>
SL 1307 FLZ/25		27 ± 3 % by weight	25 ± 2 s	70 ± 7 s (4 mm)	0.95 ± 0.02 g/cm <sup>3</sup>
SL 1337	red	31 ± 3 % by weight	60 ± 6 s	41 ± 4 s (6 mm)	0.96 ± 0.02 g/cm <sup>3</sup>
SL 1367	green	31 ± 3 % by weight	60 ± 6 s	41 ± 4 s (6 mm)	0.96 ± 0.02 g/cm <sup>3</sup>

Indices: SL = conformal coating, FLZ = fluorescent, /18 = viscosity 18 s acc. To DIN 53 211, likewise /21, /23, /25

## 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-830B, 3.5.5	passed
Glass transition temperature T <sub>g</sub>	DMA TMA	≈ -4 °C [24.8°F] ≈ 45 °C [113 °F]
Coefficient of thermal expansion (CTE)	TMA	≈ 160 ppm/°C ≤ RT

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

Property	Test method	Result
Dielectric strength	IPC-TM-650, 2.5.6.1 DIN EN 60243-1	60 kV/mm
	IPC-CC-830B, 3.6.1	passed
Specific volume resistivity	VDE 0303, part 30/DIN IEC 60093 IPC-TM-650, 2.5.17.1	1.5 x 10 <sup>15</sup> Ohm x cm
Surface resistance	VDE 0303, part 30/DIN IEC 60093 IPC-TM-650, 2.5.17.1	2.0 x 10 <sup>14</sup> Ohm
Moisture and insulation resistance	IPC-CC-830B, 3.7.1 (65 °C [149 °F]/90 % r. h.)	passed
	85/85 test; ramp formed storage at high air moisture and high temperature, amongst others 3 days at 85 °C [185 °F] / 85 % r. h.	1.0 x 10 <sup>9</sup> Ohm

Property	Test method	Result
Thermal shock	IPC-CC-830B, 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, tracking resistance)	DIN EN 60112 on FR4 base material with CTI 275 CTI 600	CTI > 600 CTI > 600
Resistance to condensation	based on DIN EN ISO 6270-2 (BIAS 12 V, 40 °C [104 °F], 100% r. h.)	1.0 x 10 <sup>10</sup> Ohm
Salt spray test	BMW GS 95003-4	passed
Permittivity $\epsilon_r$	VDE 0303, part 4	50 Hz: 3.8 1 MHz: 3.2
Dielectric loss factor $\tan \delta$	VDE 0303, part 4	50 Hz: 0.052 1 MHz: 0.036
TI (temperature index)	DIN EN 60216 (IEC 60216) issue 2001	125 °C [257 °F] (20 000 h)* 150 °C [302 °F] (5 000 h)*

\* can be used in a temperature range of **-65 up to at least +125 °C [-85 up to at least 257 °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 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"

The conformal coatings of the series **ELPEGUARD® SL 1307 FLZ/2** can be applied by dipping, brushing, spraying or by means of automatic selective coating units.

Before the coating process, either the (highly) thixotropic conformal coating **ELPEGUARD® SL 1307 FLZ-T** or the **SL 1307 FLZ-HT** can be applied for building dams around connectors, components and pads easily and precisely, in order to prevent the penetration or spreading of the subsequently applied conformal coating (dam and fill).

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.



## Double coating

The conformal coatings of the series **ELPEGUARD® SL 1307 FLZ** are suitable for double coating to a limited extent since they are dissolved by the solvent contained in the coating.

## 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 it depends 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)	15-20 min	—
Drying time before packaging	approx. 1-2 h	5-20 min at 50-80 °C [122 to 176 °F]

## Standard packaging

Can of 15 kg. Partial lots of the selling unit available against surcharge.

## Shelf life and storage conditions



Shelf life: In sealed original containers at least 18 months



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



Protect against humidity

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.

# Conformal coatings of the series ELPEGUARD® SL 1307 FLZ/2

The 1-pack conformal coatings of the series **ELPEGUARD® SL 1307 FLZ/2** are used to protect and insulate assembled pcbs 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 electro corrosion and migration) is possible.

The conformal coatings of the series **ELPEGUARD® SL 1307 FLZ/2** are distinguished by a special solvent composition which results in prolonged processing/drying times and a higher flash point (>40 °C [104 °F]). They may therefore be processed at higher temperatures which is especially useful in dip coating units.

- Base: acrylate resins (AR)
- fast physical drying
- SL 1307 FLZ/& tested by Trace Laboratories-East according to **IPC-CC-830B** and **MIL-I-46058C**
- UL approval of SL 1307 FLZ/& as **Permanent Coating according to UL 94** and as **Conformal Coating according 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 1307 FLZ/2 and reapplied after repair
- used by leading automotive suppliers
- very good ageing and yellowing resistance
- temperature range from -65 up to +125 °C [-85 up to 257 °F]
- very good TCT resistance (thermal cycling test):  
-40 to +150 °C [-40 to 302 °F] or -65 to +125 °C [-85 to 257 °F] respectively
- fungus resistant according to IPC-TM-650, 2.6.1.1. with growth index = 0
- resistant in 4-part noxious gas test according to DIN EN 60068-2-60 or BMW GS 95003-4 respectively
- “ready-to-use“ viscosity adjustments available for various coating methods
- suitable for coating flexible circuit boards („flex-to-install“, exposure to bend stress limited to the time of assembly)
- the adjustments free from fluorescent agents are particularly suitable for lighting electronics
- when dyed with one of the dye-stuff concentrates the coating can be easily examined for completeness, thanks to the clear contrast with the substrate

## Characteristics

	Colour/ appearance	Solids content DIN EN ISO 3251 1 h, 125 °C, [257 °F], 1 g weighed qty.	Viscosity at 20 °C [68 °F] (flow time)		Density at 20 °C [68 °F] DIN EN ISO 2811-1
			DIN 53211 4 mm DIN flow cup	DIN EN ISO 2431 ISO flow cup (diameter of nozzle given in brackets)	
SL 1307/182	colourless	23 ± 2 % by weight	18 ± 2 s	38 ± 4 s (4 mm)	1.00 ± 0.02 g/cm <sup>3</sup>
SL 1307/342		29 ± 3 % by weight	34 ± 3 s	46 ± 5 s (5 mm)	1.00 ± 0.02 g/cm <sup>3</sup>
SL 1307 FLZ/2	colourless, fluorescent	32 ± 3 % by weight	55 ± 5 s	73 ± 7 s (5 mm)	1.00 ± 0.02 g/cm <sup>3</sup>
SL 1307 FLZ/182		23 ± 2 % by weight	18 ± 2 s	38 ± 4 s (4 mm)	1.00 ± 0.02 g/cm <sup>3</sup>
SL 1307 FLZ/232		27 ± 2 % by weight	23 ± 2 s	60 ± 5 s (4 mm)	1.00 ± 0.02 g/cm <sup>3</sup>
SL 1307 FLZ/342		29 ± 3 % by weight	34 ± 3 s	46 ± 5 s (5 mm)	1.00 ± 0.02 g/cm <sup>3</sup>
SL 1337 FLZ/182	red, fluorescent	23 ± 2 % by weight	18 ± 2 s	38 ± 4 s (4 mm)	1.00 ± 0.02 g/cm <sup>3</sup>
SL 1367 FLZ/182	green, fluo- rescent	23 ± 2 % by weight	18 ± 2 s	38 ± 4 s (4 mm)	1.00 ± 0.02 g/cm <sup>3</sup>
FK 1337/2	red	—	—	—	1.00 ± 0.05 g/cm <sup>3</sup>
FK 1367/2	green	—	—	—	1.00 ± 0.05 g/cm <sup>3</sup>

Indices: SL = conformal coating, FLZ = fluorescent, /2 = special solvent composition with flash point > 40 °C, /182 = viscosity of 18 s acc. to DIN 53211, likewise /232 and /342, FK = dyestuff concentrate

## 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-830B, 3.5.5	passed
Glass transition temperature Tg	Dynamic mechanical analysis (DMA)	approx. -4 °C [24.8 °F]
Coefficient of thermal expansion (CTE)	Thermo mechanical analysis (TMA)	160 ppm/°C ≤ RT

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

Property	Test method	Result
Dielectric strength	IPC-TM-650, 2.5.6.1 DIN EN 60243-1	60 kV/mm
	IPC-CC-830B, 3.6.1	passed
Specific volume resistivity	VDE 0303, part 30/DIN IEC 60093 IPC-TM-650, 2.5.17.1	1.5 x 10 <sup>15</sup> Ohm x cm
Surface resistance	VDE 0303, part 30/DIN IEC 60093 IPC-TM-650, 2.5.17.1	2.0 x 10 <sup>14</sup> Ohm

Property	Test method	Result
Moisture and insulation resistance	IPC-CC-830B, 3.7.1 (65 °C [149 °F]/90 % r. h.)	passed
	85/85 test; ramp formed storage at high air humidity and high temperature, incl. 3 days at 85 °C [185 °F] and 85 % r.h.	1.0 x 10 <sup>9</sup> Ohm
Thermal shock	IPC-CC-830B, 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 <sup>10</sup> Ohm
Permittivity $\epsilon_r$	VDE 0303, part 4	50 Hz: 3.8 1 MHz: 3.2
Dielectric loss factor $\tan \delta$	VDE 0303, part 4	50 Hz: 0.052 1 MHz: 0.036
TI (temperature index)	DIN EN 60216 (IEC 60216) issue 2001	125 °C [257 °F] (20 000 h)* 150 °C [302 °F] (5 000 h)*

\* can be used in a temperature range of **-65 up to at least + 125 °C** [-49 up to at least 392 °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 25 % loss in mass and/or dielectric strength in comparison to the appropriate reference values.

## Processing



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### MSDS

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### 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 1307 FLZ/2** can be applied by dipping, brushing, spraying or by means of automatic selective coating units.

Before the coating process, either the (highly) thixotropic conformal coating **ELPEGUARD® SL 1307 FLZ-T** or the **SL 1307 FLZ-HT** can be applied for building dams around connectors, components and pads easily and precisely, in order to prevent the penetration or spreading of the subsequently applied conformal coating (dam and fill).

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.

## Safety recommendations

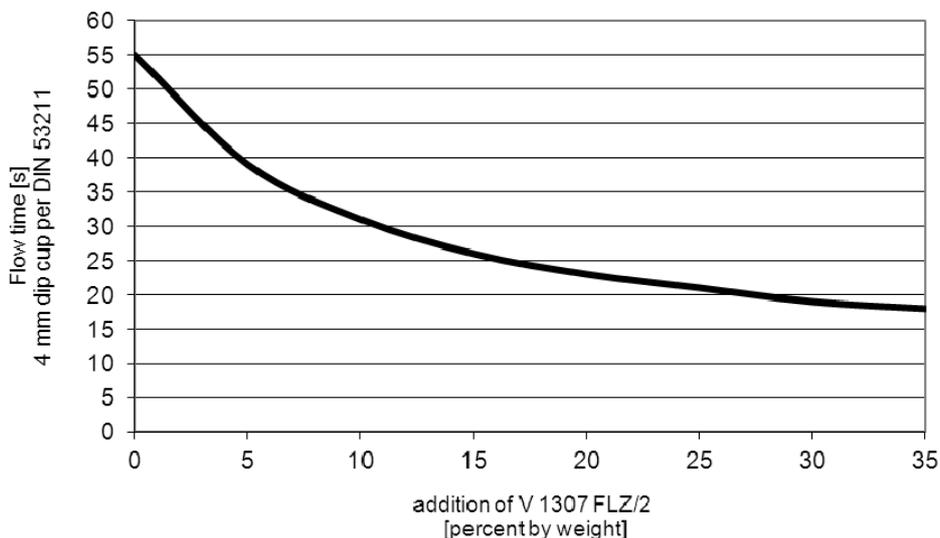
- When using chemicals, the common precautions should be carefully noted.
- Ensure that extractor units of workplace ventilation arrangements are positioned at solvent source level.
- Please also pay attention to national guidelines or directives concerning operating safety such as the German TRBS (technical rules for operating safety) and those concerning the handling of flammable liquids as for example the German TRbF (technical rules for flammable liquids) or European directives.

## Viscosity adjustment

- Adjust the processing viscosity for each application process by means of thinner **V 1307 FLZ/2** (see also “Adjustment of the processing viscosity” in the Application information sheet **AI 1/1**).

**DIL** to be thinned with thinner V 1307 FLZ/2

**Deviating from the parameters given in the Application information sheet AI 1/1** we recommend a dipping viscosity of 30-40 s. On account of the special solvent composition, processing temperatures of 20-35 °C [68–95 °F] are possible.



**Fig. 1: Viscosity depending on the quantity of thinner added at 20 °C for the conformal coating ELPEGUARD® SL 1307 FLZ/2**

## Auxiliary products recommended

- **Thinner V 1307 FLZ/2**  
for removing the conformal coating within repair jobs
- **Cleaning agent R 5817**  
for the cleaning of work place and tools

## Processing of dyestuff concentrates



Stir before using



Conformal coating : dyestuff concentrate = 20 : 1 (parts by weight)

- Prepare 20 parts conformal coating, add the dyestuff concentrate while stirring, to prevent sedimenting, and continue to stir until the conformal coating and dyestuff concentrate are homogeneously mixed.
- Note that the viscosity of the conformal coatings decreases when they are mixed with the dyestuff concentrates.
- If possible, mix only the quantity immediately required.

It is imperative that previously prepared mixtures are stirred thoroughly again before use.

The physical and electrical properties will not change or only slightly change by adding a dyestuff concentrate.

## Double coating

The conformal coatings of the series **ELPEGUARD® SL 1307 FLZ/2** 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)	20-30 min	—
Drying time before packaging	approx. 1.5 h	10-20 min at 80 °C [176 °F]

## Standard packaging

	Packaging	Selling unit
SL 1307/182 SL 1307/342 SL 1307 FLZ/2 SL 1307 FLZ/182 SL 1307 FLZ/232 SL 1307 FLZ/342 SL 1337 FLZ/182 SL 1367 FLZ/182	Can of 15 kg	15 kg
FK 1337/2 FK 1367/2	1 plastic bottle of 1 kg	1 kg
V 1307 FLZ/2	Can of 15 kg	15 kg

Smaller quantities are available against surcharge.

## Shelf life and storage conditions



Shelf life in sealed containers:

conformal coatings at least 18 months  
dyestuff concentrates 3 months



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



Protect against humidity

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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**peters**  
Coating Innovations  
for Electronics

# Conformal coatings of the series ELPEGUARD® SL 1307 FLZ/4

The 1-pack conformal coatings of the series **ELPEGUARD® SL 1307 FLZ/4** are used to protect and insulate assembled pcbs 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 electro corrosion and migration) is possible.

The conformal coatings of the series **ELPEGUARD® SL 1307 FLZ/4** are distinguished by a very good adhesion even on critical substrates. Achieved through a chemical reaction with the substrate, the improved adhesion gives excellent results in the cross hatch test according to DIN EN ISO 2409 that is uncommon for conformal coatings.

- Base: modified acrylate resins
- colourless-transparent, fluorescent
- fast physical drying
- very good adhesion to critical substrates
- tested by Trace Laboratories East acc. to **IPC-CC-830B**, **MIL-I-46058C** and **IEC 61086-2** (class II for "high reliability")
- UL approval of SL 1307 FLZ/& as **Permanent Coating according to UL 94** and as **Conformal Coating according 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 1307 FLZ/2** and reapplied after repair
- approved and in use at leading automotive suppliers
- suitable for flexible circuits ("flex-to-install", bend stress during assembly only)
- very good ageing and yellowing resistance
- very good TCT (thermal cycling test) resistance
- can be used in a temperature range of **-65 up to +125 °C** [-85 up to 257 °F]
- resistant in 4-part noxious gas test according to DIN EN 60068-2-60 or BMW GS 95003-4

## Characteristics

	SL 1307 FLZ/184	SL 1307 FLZ/234
Colour/appearance	colourless-transparent, fluorescent	colourless-transparent, fluorescent
Solids content, DIN EN ISO 3251 1 h, 125 °C [257 °F], 1 g weighed quantity	23 ± 2 % by weight	27 ± 2 % by weight
Viscosity at 20 °C [68 °F], flow time acc. to DIN 53211, 4 mm DIN flow cup	18 ± 2 s	23 ± 2 s
Viscosity at 20 °C [68 °F], flow time acc. to DIN EN ISO 2431, 4 mm ISO flow cup	38 ± 6 s	60 ± 10 s
Density at 20 °C [68 °F], DIN EN ISO 2811-1	1.00 ± 0.02 g/cm <sup>3</sup>	1.00 ± 0.02 g/cm <sup>3</sup>

Indices: SL = conformal coating, FLZ = fluorescent, /184 = of the series /4 with a viscosity of 18 s acc. to DIN 53211, likewise /234

## 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	DIN EN ISO 2409 on copper on FR4 base material	Gt 0 Gt 0
Flexibility	IPC-CC-830B, 3.5.5	passed
Glass transition temperature Tg	thermo mechanical analysis (DMA)	approx. -4 °C [24.8°F]
Coefficient of thermal expansion (CTE)	thermo mechanical analysis (TMA)	160 ppm/°C ≤ RT

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

Property	Test method	Result
Dielectric strength	IPC-TM-650, 2.5.6.1 DIN EN 60243-1	100 kV/mm
	IPC-CC-830B, 3.6.1	passed
Specific volume resistivity	VDE 0303, part 30/DIN IEC 60093 IPC-TM-650, 2.5.17.1	6.4 x 10 <sup>15</sup> Ohm x cm
Surface resistance	VDE 0303, part 30/DIN IEC 60093 IPC-TM-650, 2.5.17.1	2.0 x 10 <sup>14</sup> Ohm
Moisture and insulation resistance	IPC-CC-830B, 3.7.1 (65 °C [149 °F]/90 % r. h.)	passed
	85/85 test; ramp formed storage at high air moisture and high tem- perature, amongst others 3 days at 85 °C [185 °F] and 85 % r.h.	1.0 x 10 <sup>9</sup> Ohm

Property	Test method	Result
Thermal shock	IPC-CC-830B, 3.7.2 -65 to +125 °C [- 85 °F to 257 °F]	passed
Hydrolytic stability	IPC-CC-830B, 3.7.3	passed
Comparative Tracking Index (CTI = tracking resistance)	DIN EN 60112 on FR4 base material with CTI 225	CTI > 600
Resistance to condensation	based on DIN EN ISO 6270-2 (BIAS 12 V, 40 °C [104 °F], 100% r.h.)	1.0 x 10 <sup>9</sup> Ohm
Dielectric constant $\epsilon_r$	VDE 0303, part 4	50 Hz: 3.8 1 MHz: 3.2
Dielectric loss factor $\tan \delta$	VDE 0303, part 4	50 Hz: 0.052 1 MHz: 0.036
TI (temperature index)	DIN EN 60216 (IEC 60216) issue 2001	125 °C [257 °F] (20 000 h)* 150 °C [302 °F] (5 000 h)*

\* can be used in a temperature range of **-65 up to at least + 125 °C** [-85 up to at least 257 °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 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"

The conformal coatings of the series **ELPEGUARD® SL 1307 FLZ/4** can be applied by automatic selective coating units, by brushing or spraying. When applied by dipping, this product must be handled under dry protective gas owing to its moisture sensitivity.



Protect against humidity

Before the coating process, either the (highly) thixotropic conformal coating **ELPEGUARD® SL 1307 FLZ-T** or the **SL 1307 FLZ-HT** can be applied for building dams around connectors, components and pads easily and precisely, in order to prevent the penetration or spreading of the subsequently applied conformal coating (dam and fill).

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.

### Safety recommendations

- When using chemicals, the common precautions should be carefully noted.
- Ensure that extractor units of workplace ventilation arrangements are positioned at solvent source level.
- Please also pay attention to national guidelines or directives concerning operational safety such as the German TRBS (technical regulations for operational safety) and those concerning the handling of flammable liquids as for example the German TRbF (technical regulations for flammable liquids) or European directives.

### Adjustment of viscosity

- Adjust the processing viscosity for each application process by means of thinner **V 1307 FLZ/2** (see also item 3.1 of the Application information sheet **AI 1/1** „Adjustment of the processing viscosity“).

**DIL** to be thinned with thinner V 1307 FLZ/2

On account of the special solvent composition processing temperatures of 20-35 °C [68-95 °F] are possible.

### Auxiliary products recommended

- **Thinner V 1307 FLZ/2**  
for removing the conformal coating within repair work
- **Reinigungsmittel R 5817**  
for cleaning work place and tools

### Double coating

The conformal coatings of the series **ELPEGUARD® SL 1307 FLZ/4** 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.

- Observe the advice given in Section 7 of the **Application Information sheet AI 1/1** "Drying/Curing".

The drying parameters depend, among 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:

	<b>At room temperature (ca. +23 °C [73.4°F])</b>	<b>in circulating hot air units</b>
Drying (tack-free) based on DIN EN 60464 (IEC 60464)	20-30 min	—
Drying time until packaging	ca. 1.5 h	10–20 min at 80 °C [176 °F]

The maximum adhesion is achieved after 7 days of storage at room temperature; it is possible to accelerate the process by heat storage.

## Standard packaging

	Packaging	Selling unit
SL 1307 FLZ/184 SL 1307 FLZ/234	Plastic can of 15 kg	15 kg
V 1307 FLZ/2	Plastic can of 15 kg	15 kg

Smaller packing units against surcharge.

## Shelf life and storage conditions



Shelf life: In sealed original containers at least 4 months



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



Protect against humidity

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. Free samples and technical literature are available upon request.

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Coating Innovations  
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# Conformal coatings of the series ELPEGUARD® SL 1307 FLZ/5

The 1-pack conformal coatings of the series **ELPEGUARD® SL 1307 FLZ/5** are used to protect and insulate assembled pcbs 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 electro corrosion and migration) is possible.

The conformal coatings of the series **ELPEGUARD® SL 1307 FLZ/5** are distinguished by a special solvent composition which results in prolonged processing/drying times and a higher flash point (>40 °C [104 °F]). They may therefore be processed at higher temperatures which is especially useful in dip coating units.

- Base: acrylate resins (AR)
- halogen-free according to JPCA-ES01-2003 / IEC 61249-2-21
- fast physical drying
- SL 1307 FLZ/& tested by Trace Laboratories-East according to **IPC-CC-830B** and **MIL-I-46058C**
- UL approval of SL 1307 FLZ/& as **Permanent Coating according to UL 94** and as **Conformal Coating according 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 1307 FLZ/2 and reapplied after repair
- very good ageing and yellowing resistance
- temperature range from -65 up to +125 °C [-85 up to 257 °F]
- very good TCT (thermal cycling test) resistance:  
-40 to +150 °C [-40 to 302 °F] or -65 to +125 °C [-85 to 257 °F] respectively
- fungus resistant according to IPC-TM-650, 2.6.1.1. with growth index = 1
- resistant in 4-part noxious gas test according to DIN EN 60068-2-60 or BMW GS 95003-4, respectively
- “ready-to-use“ viscosity adjustments available for various coating methods
- suitable for coating flexible circuit boards („flex-to-install“, exposure to bend stress only during assembly)

## Characteristics

	Colour/ appearance	Solids content DIN EN ISO 3251 1 h, 125 °C, [257 °F], 1 g weighed qty.	Viscosity at 20 °C [68 °F] (flow time)		Density at 20 °C [68 °F] DIN EN ISO 2811-1
			DIN 53211 4 mm DIN flow cup	DIN EN ISO 2431 ISO flow cup (diameter of nozzle given in brackets)	
SL 1307 FLZ/5	colourless, fluorescent	32 ± 3 % by weight	55 ± 5 s	73 ± 7 s (5 mm)	1.00 ± 0.02 g/cm <sup>3</sup>
SL 1307 FLZ/185		23 ± 2 % by weight	18 ± 2 s	38 ± 4 s (4 mm)	1.00 ± 0.02 g/cm <sup>3</sup>
SL 1307 FLZ/235		27 ± 2 % by weight	23 ± 2 s	60 ± 5 s (4 mm)	1.00 ± 0.02 g/cm <sup>3</sup>

Indices: SL = conformal coating, FLZ = fluorescent, /5 = halogen-free according to JPCA-ES01-2003 / IEC 61249-2-21, /185 = viscosity of 18 s acc. to DIN 53211, likewise /235

## 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-830B, 3.5.5	passed
Glass transition temperature Tg	Dynamic mechanical analysis (DMA)	approx. -4 °C [24.8 °F]
Coefficient of thermal expansion (CTE)	Thermo mechanical analysis (TMA)	160 ppm/°C ≤ RT

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

Property	Test method	Result
Dielectric strength	IPC-TM-650, 2.5.6.1 DIN EN 60243-1	60 kV/mm
	IPC-CC-830B, 3.6.1	passed
Specific volume resistivity	VDE 0303, Teil 30/DIN IEC 60093 IPC-TM-650, 2.5.17.1	1.5 x 10 <sup>15</sup> Ohm x cm
Surface resistance	VDE 0303, Teil 30/DIN IEC 60093 IPC-TM-650, 2.5.17.1	2.0 x 10 <sup>14</sup> Ohm
Moisture and insulation resistance	IPC-CC-830B, 3.7.1 (65 °C [149 °F]/90 % r. h.)	passed
	85/85 test; ramp formed storage at high air humidity and high tem- perature, incl. 3 days at 85 °C [185 °F] and 85 % r.h.	1.0 x 10 <sup>9</sup> Ohm
Thermal shock	IPC-CC-830B, 3.7.2, -65 to +125 °C [-85 to 257 °F]	passed
Hydrolytic stability	IPC-CC-830B, 3.7.3	passed

Property	Test method	Result
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 <sup>10</sup> Ohm
Permittivity $\epsilon_r$	VDE 0303, part 4	50 Hz: 3.8 1 MHz: 3.2
Dielectric loss factor $\tan \delta$	VDE 0303, part 4	50 Hz: 0.052 1 MHz: 0.036
TI (temperature index)	DIN EN 60216 (IEC 60216) issue 2001	125 °C [257 °F] (20 000 h)* 150 °C [302 °F] (5 000 h)*

\* can be used in a temperature range of **-65 up to at least + 125 °C** [-49 up to at least 392 °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 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"

The conformal coatings of the series **ELPEGUARD® SL 1307 FLZ/5** can be applied by dipping, brushing, spraying or by means of automatic selective coating units.

Before the coating process, either the (highly) thixotropic conformal coating **ELPEGUARD® SL 1307 FLZ-T** or the **SL 1307 FLZ-HT** can be applied for building dams around connectors, components and pads easily and precisely, in order to prevent the penetration or spreading of the subsequently applied conformal coating (dam and fill).

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.

## Safety recommendations

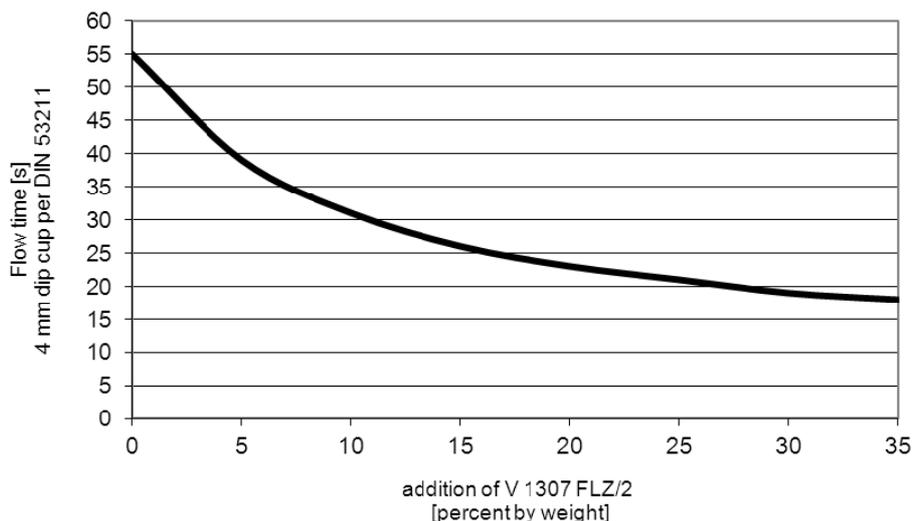
- When using chemicals, the common precautions should be carefully noted.
- Ensure that extractor units of workplace ventilation arrangements are positioned at solvent source level.
- Please also pay attention to national guidelines or directives concerning operating safety such as the German TRBS (technical rules for operating safety) and those concerning the handling of flammable liquids as for example the German TRbF (technical rules for flammable liquids) or European directives.

## Viscosity adjustment

- Adjust the processing viscosity for each application process by means of thinner **V 1307 FLZ/2** (see also "Adjustment of the processing viscosity" in the Application information sheet **AI 1/1**).

**DIL** to be thinned with thinner V 1307 FLZ/2

**Deviating from the parameters given in the Application information sheet AI 1/1** we recommend a dipping viscosity of 30-40 s. On account of the special solvent composition, processing temperatures of 20-35 °C [68-95 °F] are possible.



**Fig. 1: Viscosity depending on the quantity of thinner added at 20 °C for the conformal coating ELPEGUARD® SL 1307 FLZ/5**

## Auxiliary products recommended

- **Thinner V 1307 FLZ/2**  
for removing the conformal coating within repair jobs
- **Cleaning agent R 5817**  
for the cleaning of work place and tools

## Double coating

The conformal coatings of the series **ELPEGUARD® SL 1307 FLZ/5** are suitable for double coating to a limited extent since they are dissolved by the solvent contained in the coating.

## 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 °F])	in circulating hot air units
Drying (tack-free) according to DIN EN 60464 (IEC 60464)	20-30 min	—
Drying time before packaging	approx. 1.5 h	10-20 min at 80 °C [176 °F]

## Standard packaging

	Packaging	Selling unit
SL 1307 FLZ/5 SL 1307 FLZ/185 SL 1307 FLZ/235	Can of 15 kg	15 kg
V 1307 FLZ/2	Can of 15 kg	15 kg

Smaller quantities are available against surcharge.

## Shelf life and storage conditions



Shelf life: In sealed containers at least 18 months



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



Protect against humidity

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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### 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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# Conformal coating spray

## ELPEGUARD® SL 1307 FLZ/S

The conformal coating spray **ELPEGUARD® SL 1307 FLZ/S** is used to protect and insulate assembled pcbs so that they can fulfil higher requirements regarding reliability and service life. Owing to their very good resistance against moisture and condensation an excellent protection against corrosion (such as electro 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
- SL 1307 FLZ/& tested by Trace Laboratories-East acc. to **IPC-CC-830B** and **MIL-I-46058C**
- UL approval of SL 1307 FLZ/& acc. to **UL 94** and **UL 746E** (UL file no. E80315)
- can be soldered through at soldering iron temperature for repair or removed with the help of thinner **V 1307 FLZ** and reapplied afterwards
- used by leading suppliers of the automotive industry
- very good ageing and yellowing resistance
- temperature range from -65 to at least +125 °C [-85 to at least +257 °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]
- mould resistant acc. to IPC-TM-650, 2.6.1.1., coefficient of growth: 0
- 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)
- suitable for lighting electronics/LED technology provided that the fluorescent agent does not interfere

## Characteristics

Colour/aspect: colourless, fluorescent

Indices: SL = conformal coating, FLZ = fluorescent, /S = spray can

## Physical and mechanical properties

Property	Test method	Result
Flexibility	IPC-CC-830B, 3.5.5	passed
Glass transition temperature T <sub>g</sub>	DMA TMA	≈ -4 °C [24.8 °F] ≈ 45 °C [113 °F]
Coefficient of thermal expansion (CTE)	TMA	≈ 160 ppm/°C ≤ RT

## 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 DIN EN 60243-1	60 kV/mm
Dielectric strength	IPC-CC-830B, 3.6.1	passed
Specific volume resistivity	VDE 0303, part 30/DIN IEC 60093 IPC-TM-650, 2.5.17.1	4.3 x 10 <sup>14</sup> Ohm x cm
Surface resistance	VDE 0303, part 30/DIN IEC 60093 IPC-TM-650, 2.5.17.1	2.0 x 10 <sup>14</sup> Ohm
Moisture and insulation resistance	IPC-CC-830B, 3.7.1 (65 °C [149 °F]/90 % R. H.)	passed
	85/85 test (3 d, 85 °C [185 °F], 85 % R.H.)	1.0 x 10 <sup>9</sup> Ohm
Thermal shock	IPC-CC-830B, 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, tracking resistance)	DIN EN 60112 on FR4 base material with CTI 250 CTI 600	CTI > 600 CTI > 600
Resistance to condensation	based on ISO 6270-2 (BIAS 12 V, 40 °C [104 °F], 100% R. H.)	1.0 x 10 <sup>9</sup> Ohm
Salt spray test	BMW GS 95003-4	passed
Permittivity ε <sub>r</sub>	VDE 0303, part 4	50 Hz: 3.8 1 MHz: 3.2
Dielectric loss factor tan δ	VDE 0303, part 4	50 Hz: 0.052 1 MHz: 0.036
TI (temperature index)	DIN EN 60216 (IEC 60216) issue 2001	125 °C [257 °F] (20 000 h)* 150 °C [302 °F] (5 000 h)*

\* can be used in a temperature range of **-65 up to at least +125 °C** [-85 up to at least 257 °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
<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>	Application information AI 1/1 "Processing instructions for ELPEGUARD® conformal coatings (thin film coatings)"
<b>TI</b>	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 1307 FLZ/S** depends on the population density of the printed circuit board and the thickness of the coating layer applied; experience has shown that one spray can is sufficient for coating 3-3.5 m<sup>2</sup>.

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.

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- Please also pay attention to national guidelines or directives concerning operating safety such as the German TRBS (technical rules for operating safety) and those concerning the handling of flammable liquids as for example the German TRbF (technical rules for flammable liquids) or European directives.

### Auxiliary products recommended

- **Thinner V 1307 FLZ**  
for removing the coating within repair
- **Cleaning agent R 5817**  
for the cleaning of work place and tools/equipment

### 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 circulating hot air units
Drying (tack-free) acc. to DIN EN 60464 (IEC 60464)	approx. 25 min	—
Drying time prior to packaging	1-2 h	5-20 min at 50-80 °C [122–176 °F]

## Standard packaging

12 spray cans of 400 mL. Partial lots of the selling unit available against surcharge.

## Shelf-life and storage conditions



Shelf life: In sealed original containers at least 12 months



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



Protect against humidity

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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