

# Conformal coatings of the series **ELPEGUARD® SL 1301 ECO-FLZ**

The conformal coatings of the series **ELPEGUARD® SL 1301 ECO-FLZ**, **SL 1301 ECO-BA-FLZ** and **SL 1301 ECO-FLZ/9** are used to protect and insulate electronic assemblies 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 electrochemical corrosion and migration) is possible.

These conformal coatings are very environmentally friendly as they are absolutely free from aromatic solvents such as benzene, toluene, xylene and C9 aromatics. Furthermore, they contain neither free or volatile isocyanates nor free groups of isocyanates.

The specific composition of the series **ELPEGUARD® SL 1301 ECO-BA-FLZ** and **SL 1301 ECO-FLZ/9** contributes to a particularly uncritical drying behaviour below the components. In terms of odour, the series **ELPEGUARD® SL 1301 ECO-FLZ/9** is equivalent to the series **SL 1301 ECO-FLZ**.

- Base: modified polyurethane resins (UR)
- used by leading automotive suppliers
- UL Recognized Component acc. to UL 94: best flame class V-0 (UL file no. E80315)
- suitable for coating flexible circuits ("flex-to-install", exposure to bend stress limited to time of assembly)
- very good ageing resistance
- temperature range **-40 to +140 °C** [-49 to 284 °F]
- protect against corrosive gases at highest level acc. to ISA-71.04
- "ready-to-use" viscosity adjustments for different coating methods
- can be soldered through or mechanically removed (blasting method) for repair purposes and reapplied after repair.

## 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 (nozzle diameter in brackets)	

### Series SL 1301 ECO-FLZ

SL 1301 ECO-FLZ	colour- less, fluores- cent	48 ± 2 % by weight	55 ± 5 s	75 ± 7 s (5 mm)	0.89 ± 0.02 g/cm <sup>3</sup>
<del>SL 1301 ECO-FLZ/17</del>		<del>30 ± 2 % by weight</del>	<del>17 ± 1 s</del>	<del>34 ± 3 s (4 mm)</del>	<del>0.86 ± 0.02 g/cm<sup>3</sup></del>
SL 1301 ECO-FLZ/20		42 ± 2 % by weight	20 ± 1 s	46 ± 4 s (4 mm)	0.86 ± 0.02 g/cm <sup>3</sup>
SL 1301 ECO-FLZ/23		43 ± 2 % by weight	23 ± 1 s	60 ± 5 s (4 mm)	0.86 ± 0.02 g/cm <sup>3</sup>
<del>SL 1301 ECO-FLZ/40</del>		<del>46 ± 2 % by weight</del>	<del>40 ± 4 s</del>	<del>52 ± 5 s (5 mm)</del>	<del>0.89 ± 0.02 g/cm<sup>3</sup></del>

### Series SL 1301 ECO-BA-FLZ

SL 1301 ECO-BA-FLZ	colour- less, fluores- cent	50 ± 2 % by weight	55 ± 5 s	75 ± 7 s (5 mm)	0.90 ± 0.02 g/cm <sup>3</sup>
<del>SL 1301 ECO-BA-FLZ/17</del>		<del>41 ± 2 % by weight</del>	<del>17 ± 1 s</del>	<del>30 ± 4 s (4 mm)</del>	<del>0.90 ± 0.02 g/cm<sup>3</sup></del>
SL 1301 ECO-BA-FLZ/20		43 ± 2 % by weight	20 ± 1 s	46 ± 4 s (4 mm)	0.90 ± 0.02 g/cm <sup>3</sup>
SL 1301 ECO-BA-FLZ/23		45 ± 2 % by weight	23 ± 1 s	60 ± 5 s (4 mm)	0.90 ± 0.02 g/cm <sup>3</sup>

### Series SL 1301 ECO-FLZ/9

SL 1301 ECO-FLZ/239		44 ± 2 % by weight	23 ± 3 s	60 ± 10 s (4 mm)	0.88 ± 0.02 g/cm <sup>3</sup>
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Indices: SL = conformal coating, ECO = ecological, FLZ = fluorescent, BA = butyl acetate /17 = viscosity 17 s acc. to DIN 53 211, likewise /20, /23 and /40, /9 = specific solvent composition

## 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	DMA	≈ 4 °C
Coefficient of thermal extension (CTE) from -20 °C to 110 °C [-4 to 230 °F]	TMA	≈ 190 ppm/°C

## 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 achieved after 6 h at 80 °C [176°F] or 14 days' storage at room temperature.

Property	Test method	Result
Dielectric strength	IPC-TM-650, 2.5.6.1 DIN EN 60243-1	≥ 80 kV/mm
	IPC-CC-830C, 3.6.1	passed
Specific volume resistivity	VDE 0303, part 30/DIN IEC 60093 IPC-TM-650, 2.5.17.1	≥ 10 <sup>15</sup> Ohm x cm
Surface resistance	VDE 0303, part 30/DIN IEC 60093 IPC-TM-650, 2.5.17.1	≥ 2 x 10 <sup>14</sup> Ohm
Moisture and insulation resistance	IPC-CC-830C, 3.7.1 (65 °C/90 % r. F.)	passed
	85/85-Test; ramp formed storage at high air moisture and high temperature, including 3 days at 85 °C and 85 % R.H.	> 1 x 10 <sup>8</sup> Ohm
Thermal shock resistance	IPC-CC-830C, 3.7.2 -65 to +125 °C [-85 °F to 257 °F]	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.)	≥ 3 x 10 <sup>9</sup> Ohm
Permittivity ε <sub>r</sub>	DIN 53483    100 kHz	≈ 3.6
	1 MHz	≈ 3.5
	1 GHz	≈ 2.8
Dielectric loss factor tan δ	DIN 53483    100 kHz	≈ 0.042
	1 MHz	≈ 0.049
	1 GHz	≈ 0.049
TI (temperature index)	DIN EN 60216 (IEC 60216) issue 2001	≥ 140 °C [284 °F] (20 000 h)* ≥ 160 °C [320 °F] (5 000 h)*

\* can be used in a temperature range of **-40 up to at least + 140 °C** [-49 up to at least 284 °F]; a use down to -65 °C is possible. 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 1301 ECO-FLZ** can be applied by dipping, brushing 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 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.

### **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 or European directives.

**When oxidative curing coating systems cross-link with atmospheric oxygen, reaction heat is generated that may ignite cleaning cloths, filter mats in spraying cabins impregnated with coating and solvent residues, or similar.**

- **Collect and keep soiled cleaning cloths etc. in tightly closing non-flammable containers; remove them from the operating room after the works have been completed.**
- **When processing conformal coatings it is mandatory to observe the safety instructions of the corresponding national guidelines on explosion protection.**
- **When processing coatings by means of spraying it is mandatory to take protection measures in order to avoid the formation of solvent vapour mixtures that might explode.**
- **Use water-irrigated spraying cabins to avoid the risk of the filter mats self-igniting. Moreover, follow the operating and maintenance instructions of the spraying cabin / filter mat manufacturers.**

## Viscosity adjustment

→ Adjust the viscosity for processing you have selected according to the application method by adding the dedicated thinner (see [Application information sheet AI 1/1](#), item “adjustment of the processing viscosity”).

**DIL** To be diluted with thinner **V 1301 ECO**:

SL 1301 ECO-FLZ  
~~SL 1301 ECO-FLZ/17~~  
 SL 1301 ECO-FLZ/20  
 SL 1301 ECO-FLZ/23  
~~SL 1301 ECO-FLZ/40~~  
 SL 1301 ECO-FLZ/239

To be diluted with thinner **V 1301 ECO-BA**:

SL 1301 ECO-BA-FLZ  
~~SL 1301 ECO-BA-FLZ/17~~  
 SL 1301 ECO-BA-FLZ/20  
 SL 1301 ECO-BA-FLZ/23

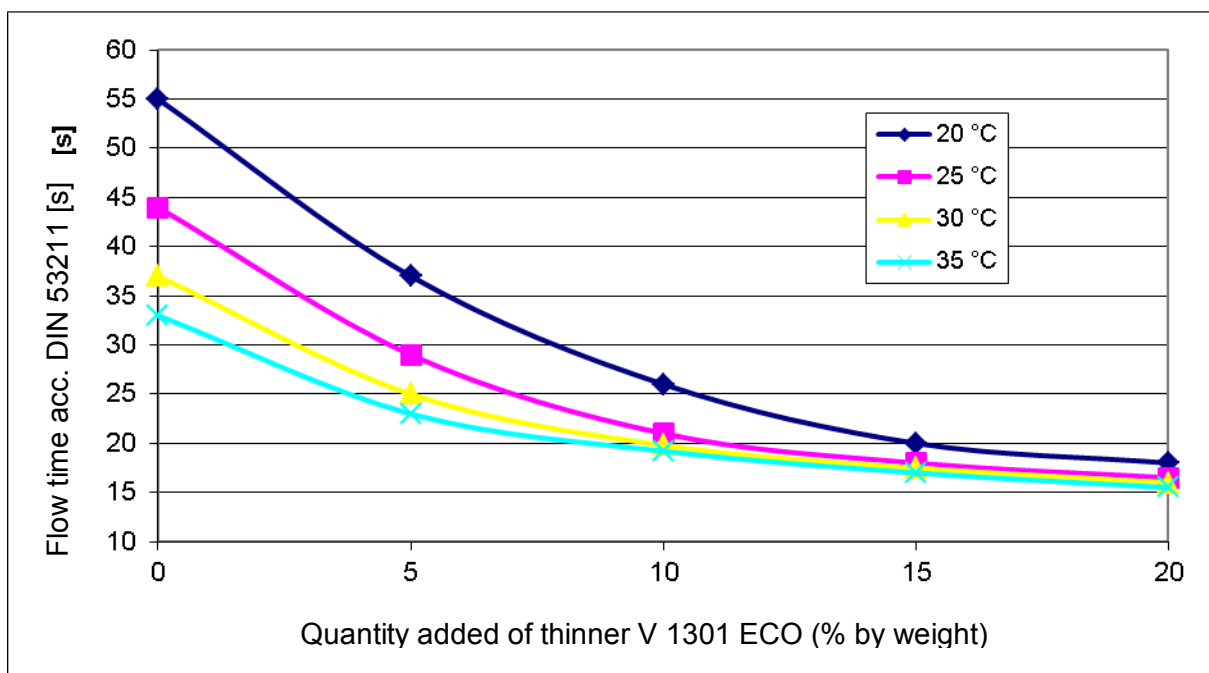


Fig. 1: Example of a viscosity diagram – viscosity depending on the quantity of thinner added to the conformal coating ELPEGUARD® SL 1301 ECO-FLZ at various temperatures

## Auxiliary products recommended

- [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
- [Flow cups for determination of viscosity \(flow time\) acc. to DIN 53211](#)  
Polyamide cup with nozzle of stainless steel for fast approximate determination of coating viscosity, easy to handle, ideal for production and incoming goods inspection

## Double coating

→ Follow the instructions of the [Application information sheet AI 1/1](#), see item „Application of too high layer thicknesses/duplicate coating“.

**Double coating** is possible if thick layers are required. In this case the second layer can be applied at the following times:

- after a short drying time of the first layer applied
  - after 30 minutes of drying at 80 °C
  - after at least 24 hours of drying at room temperature.
- Never apply the second layer in between the drying steps specified since this may cause cracking.

## Drying/curing

Drying/curing is completed in two steps: physical drying (evaporation of solvents) and oxidative curing (absorption of oxygen).

→ Follow the instructions of the [Application information sheet AI 1/1](#), see item “Drying/curing”.

### • Physical drying

The following data related to a wet film thickness of approx. 50 µm (equivalent to a dry film thickness of approx. 25-30 µm) serves as a guideline.

		<b>At room temperature (approx. +23 °C [73.4 °F])</b>	<b>In circulating hot air units with exhaust air</b>
Series SI 1301 ECO-FLZ	Drying (dust-dry)	approx. 45 min	—
	Drying (tack-free) acc. to DIN EN 60464 (IEC 60464)	approx. 80 min	approx. 15 min at 80 °C [176 °F]
Series SL 1301 ECO-BA-FLZ SL 1301 ECO-FLZ/9	Drying (dust-dry)	approx. 35 min	—
	Drying (tack-free) acc. to DIN EN 60464 (IEC 60464)	approx. 60 min	approx. 15 min at 80 °C [176 °F]


### • Oxidative curing

Owing to the absorption of necessary oxygen, oxidative curing takes longer at room temperature; however, it can be accelerated by heat, e.g. 6 h at 80 °C [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	
	for the series <b>SL 1301 ECO-FLZ</b> :	12 months
	for the series <b>SL 1301 ECO-BA-FLZ</b> :	9 months
	for the series <b>SL 1301 ECO-FLZ/9</b> :	6 months



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