

ELPEGUARD® conformal coatings

SL 1347 and SL 1397

Base: modified acrylate resins

- for the coating of LED assemblies:
SL 1347 for a strong contrast of the LEDs to the substrate
SL 1397 for a high luminous efficacy
- excellent protection against corrosion (for example electro corrosion and migration) for assembled pcbs
- very fast physical drying
- can be soldered-through for repair purposes or removed with the help of thinner **V 1307 FLZ/2**

This technical report is valid for the following adjustments:

- **SL 1347**, black opaque, mat
- **SL 1397**, white opaque, mat

Index: **SL = conformal coating**

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Please read this technical report, the corresponding material safety data sheet and the Application Information sheet AI 1/1 (see Item 7) carefully before using the product.

1. General information

The **ELPEGUARD**[®] conformal coatings **SL 1347** and **SL 1397** are physically drying 1-pack conformal coatings based on modified acrylate resins.

All symbols that are used in this technical data sheet and on our containers, such as **DIL**, are explained on our website www.peters.de in the section “Service – Symbols on labels”.

2. Application

The **ELPEGUARD**[®] conformal coatings **SL 1347** and **SL 1397** are used primarily in the field of optoelectronics to protect LED assemblies.

Selective coating with the white opaque conformal coating **ELPEGUARD**[®] **SL 1397** ensures maximum luminous efficacy: The LEDs are left uncoated while dark components are hidden, thus amplifying the luminous efficacy (reflectivity) considerably. As key characteristics, **ELPEGUARD**[®] **SL 1397** boasts very high reflectivity ratings (> 0.9 at 460 nm) along with high UV and thermal stability.

Application of the black opaque, mat conformal coating **ELPEGUARD**[®] **SL 1347** ensures a strong contrast to the base material. With this material, it is possible to coat selected areas of assemblies (which are usually coated with green solder resist) in black to achieve a strong contrast of the LEDs to the non-reflective base material. This is of particular advantage in applications with emphasis on high optical quality, such as information panels, traffic lights, etc.

The **ELPEGUARD**[®] conformal coatings **SL 1347** and **SL 1397**

- protect assembled pcbs against moisture, even under increased climatic stress
- insulate electrical equipment, connections, switch panels, etc.
- can be soldered-through at soldering iron temperature for repair purposes or removed with the help of thinner **V 1307 FLZ/2** and subsequently reapplied.

3. Special notes

The **ELPEGUARD**[®] conformal coatings **SL 1347** and **SL 1397** are suitable for use over a permanent temperature load (DIN EN 60216; 20,000 h) from –40 to +125 °C [–40 to +257 °F], although at the lower and upper ends of this range the behaviour and performance of the material might be negatively impaired in some applications. Additional tests are recommended.

4. Safety recommendations

- Please read the corresponding material safety data sheet where you will find detailed specifications of safety precautions, environmental protection, waste disposal, storage, handling, transport as well as other characteristics.
- When using chemicals, the common precautions should be carefully noted.
- Solvent vapours are heavier than air, thus when planning workplace ventilation arrangements, ensure that extractor units are positioned at worktop height.
- Please also pay attention to national guidelines or directives concerning the handling of flammable liquids as for example the German TRbF (technical regulations for flammable liquids) or European directives.

5. Characteristics

	SL 1347	SL 1397
Colour/appearance	black opaque, mat	white opaque, mat
Solids content, ISO 3251 1 h, 125 °C [257 °F], 1 g weighed quantity	45 ± 2 % by weight	46 ± 2 % by weight
Viscosity* at 20 °C [68 °F] ISO 3219	200 ± 50 mPas	200 ± 50 mPas
Density at 20 °C [68 °F] ISO 2811-1	1.21 ± 0.05 g/cm ³	1.26 ± 0.05 g/cm ³

* measured with Haake RS 600, C 35/1°, D = 100 s⁻¹, viscosity measuring unit supplied by:
Thermo Electron (Karlsruhe) GmbH (formerly Haake-Messtechnik GmbH + Co)
Dieselstraße 4, 76227 Karlsruhe, Germany
Phone +49 (0) 721 - 40 94 - 0; Fax +49 (0) 721 - 40 94 - 300
www.thermo.com

6. Properties

The **ELPEGUARD**[®] conformal coatings **SL 1347** and **SL 1397** are distinguished by the following properties:

6.1 General properties

- do not contain substances listed in the RoHS directive 2002/95/EC, EU End-Of-Life Vehicle directive 2000/53/EC and WEEE directive 2002/96/EC
- do not contain substances listed in the United States' EPA 33/50 program (Environmental Protection Agency) which aims for a reduction in the use of certain substances that are hazardous to the environment and health
- when applied correctly a very good flow results and after curing an even, closely pored film is obtained
- slightly thixotropic adjustment promotes good edge coverage
- very fast physical drying at room temperature
- good surface hardness of the dried film with simultaneously high elasticity
- suitable for flexible circuits ("flex-to-install", bend stress during assembly only)
- very good ageing resistance
- excellent protection against corrosion on account of the very good resistance to moisture
- meet requirements of IPC-CC-830B
- correspond to the best flame class V-0 acc. to UL 94
- free of halogenated flame retardants
- can be soldered-through at soldering iron temperature for repair purposes or completely removed with the help of thinner **V 1307 FLZ/2**.

6.2 Physical and mechanical properties

Property	Test method	SL 1347	SL 1397
Cross hatch	ISO 2409 on copper on FR4 base material	Gt 0 Gt 0	Gt 0 Gt 0
Glass transition temperature (T _g)	thermo mechanical analysis (DMA)	approx. 45 °C [113 °F]	approx. 33 °C [91.4 °F]
Coefficient of thermal expansion (CTE)	thermo mechanical analysis (TMA)	100 ppm/°C < T _g 150 ppm/°C > T _g	100 ppm/°C < T _g 210 ppm/°C > T _g

6.3 Electrical properties

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

Property	Test method	SL 1347	SL 1397
Dielectric strength	IPC-TM-650, 2.5.6.1 DIN EN 60243-1	90 kV/mm	70 kV/mm
	IPC-CC-830B, 3.6.1	passed	passed
Specific volume resistivity	VDE 0303, part 30 DIN IEC 60093 IPC-TM-650, 2.5.17.1	1.2×10^{14} Ohm x cm	4×10^{14} Ohm x cm
Surface resistance	VDE 0303, part 30 DIN IEC 60093 IPC-TM-650, 2.5.17.1	2.0×10^{11} Ohm	2.0×10^{11} Ohm
Moisture and insulation resistance	IPC-CC-830B, 3.7.1 (65 °C [149 °F]/90 % r. h.)	passed	passed
	85/85 test; ramp formed storage at high air moisture and high temperature, amongst others 3 days at 85 °C [185 °F] and 85 % r. h.	5.0×10^9 Ohm	2.0×10^9 Ohm
Thermal shock	IPC-CC-830B, 3.7.2	class 3 passed	class 3 passed
Hydrolytic stability	IPC-CC-830B, 3.7.3	passed	passed
Comparative Tracking Index (CTI, tracking resistance)	DIN EN 60112 on FR4 base material with CTI 250 CTI 600	CTI > 300 CTI > 600	CTI > 300 CTI > 600
TI (temperature index)	DIN EN 60216 (IEC 60216) issue 2001	125 °C [257 °F] (20 000 h)* 150 °C [302 °F] (5 000 h)*	125 °C [257 °F] (20 000 h)* 150 °C [302 °F] (5 000 h)*

* Tested on transparent, unfilled resin system **ELPEGUARD® conformal coating SL 1307 FLZ/2**. Limit values for classification were a 25 % loss in mass and/or dielectric strength in comparison to the appropriate reference values.

7. Processing

→ Please read our **Application Information sheet AI 1/1 "Processing instructions for the conformal coatings of the series' ELPEGUARD® SL 1300 to SL 1309 N and SL 1400"** where you will find detailed advice on processing. On our report manual CD and on our website you will find application information sheets in the "Service" section.

The **ELPEGUARD®** conformal coatings **SL 1347** and **SL 1397** can be applied by brushing, spraying or by means of automatic selective coating units. Due to the thixotropic adjustment, dip coating is only conditionally possible: If the material is left to stand for longer periods, the perceived viscosity is much higher than when the material is agitated (mixed). Overall, the coats applied by dipping are thicker.



Stir before use

For stirring we recommend using mechanical stirring equipment. Our **Technical Information sheet TI 15/10: "Processing of 2-pack systems"** gives detailed advice. On our report manual CD and on our website you will find technical information sheets in the "Service" section.



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. 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/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.

7.1 Adjustment of viscosity

The **ELPEGUARD**[®] conformal coatings **SL 1347** and **SL 1397** are adjusted in such a manner that they normally can be processed in the condition supplied. If necessary, their viscosity can be reduced for processing purposes by adding the thinner **V 1307 FLZ/2**.

→ Note that adding thinner can reduce the thixotropic effect and thus the high edge coverage.

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

7.2 Auxiliary products

- **Thinner V 1307 FLZ/2**

The coating can be removed for repair purposes with thinner **V 1307 FLZ/2**.

- **Cleaning agent R 5817**

For cleaning work place and tools we recommend our cleaning agent **R 5817**.



Do not use the cleaning agent to clean hands. Solvents extract the natural grease from the skin.

A special technical report on the cleaning agent is available upon request. On our report manual CD you will find technical reports in the "Products" section.

8. Drying/curing

Drying can be effected directly after coating at room temperature or in hot-air or IR drying units or in a combination of both. 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"**.

→ Dry the assembly without the casing to ensure sufficient air circulation.

The time required for drying depends, among others, on the geometry of the assemblies, the population and ink layer thickness. In the case of oven drying it depends on the oven loading, etc. The following data serves as a guideline:

- **Drying at room temperature**

Drying at room temperature (tack-free) based on DIN EN 60464 (IEC 60464)	Drying time until packaging
approx. 25 min	approx. 1.5 h

• **Drying in circulating hot-air units**

Drying can be accelerated in circulating hot-air units.

- Dry the **ELPEGUARD®** conformal coatings **SL 1347** and **SL 1397** for **10–15 min at 80 °C [176 °F]**.
- Consider the temperature resistance of the assembly and the components.
- Check the electrical properties of the coating (see Item 6.3) to ensure drying is completed.
- Pack the assemblies only after they have cooled down to room temperature.

9. Standard packaging

The **ELPEGUARD®** conformal coatings **SL 1347** and **SL 1397** are packed for delivery as follows:

	Packaging	Selling unit
SL 1347 SL 1397	4 plastic buckets of 5 kg	20 kg
V 1307 FLZ/2	Can of 25 kg	25 kg

Partial lots of the selling unit / smaller quantities may be ordered but will entail surcharges to cover repackaging costs.

10. Shelf life and storage conditions

Labels on containers show shelf life and storage conditions.



Shelf life in sealed original containers:
for SL 1397 at least 3 months
for SL 1347 at least 4 months



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



Protect against moisture

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.

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.

The above information as well as advice given by our Application Technology Department whether in verbal or written form or during product evaluations is provided to the best of our knowledge, but must be regarded as non-binding recommendations, also with respect to possible third-party proprietary rights.

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 of our material safety data sheets and technical information sheets, and of our products 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!