



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

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 61086-2	IEC 60664-3
SL 1307 FLZ	the "allround" solution	X	X	X	X	X	X	X	X			X	X	X		X
SL 1307 FLZ/2	improved dipping application	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		
SL 1307 FLZ/4	very good adhesion even on critical substrates	X				X		X	X			X	X	X		X
SL 1307 FLZ/S	conformal coating spray supplied in spray cans, ideal for pilot and low-volume series or for repair	X								X		X	X	X		

Conformal coatings of the series ELPEGUARD® SL 1307 FLZ

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

- 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 recognised component according to **UL 746E** (UL File No. E80315, SL 1307 FLZ/&)
- fulfils the requirements according to IEC 60664-3
- 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 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
- resistant in 4-part noxious gas test according to DIN EN 60068-2-60 or BMW GS 95003-4 respectively
- best resistance class GX against noxious gases according to ISA 71.04-2013
- “ready-to-use” viscosity adjustments available for all common 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 ³
SL 1307 FLZ	colourless, fluorescent	30 ± 3 % by weight	55 ± 5 s	75 ± 7 s (5 mm)	0.96 ± 0.02 g/cm ³
SL 1307 FLZ/18		22 ± 2 % by weight	18 ± 2 s	38 ± 4 s (4 mm)	0.94 ± 0.02 g/cm ³
SL 1307 FLZ/21		24 ± 2 % by weight	21 ± 2 s	50 ± 5 s (4 mm)	0.95 ± 0.02 g/cm ³
SL 1307 FLZ/23		25 ± 2 % by weight	23 ± 2 s	60 ± 5 s (4 mm)	0.95 ± 0.02 g/cm ³
SL 1307 FLZ/25		27 ± 3 % by weight	25 ± 2 s	70 ± 7 s (4 mm)	0.95 ± 0.02 g/cm ³
SL 1337	red	31 ± 3 % by weight	60 ± 6 s	41 ± 4 s (6 mm)	0.96 ± 0.02 g/cm ³
SL 1367	green	31 ± 3 % by weight	60 ± 6 s	41 ± 4 s (6 mm)	0.96 ± 0.02 g/cm ³

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 Tg	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	≥ 60 kV/mm
	IPC-CC-830B, 3.6.1	passed
Specific volume resistivity	DIN EN 62631-3-1	≥ 1.5 x 10 ¹⁵ Ohm x cm
Surface resistance	DIN EN 62631-3-2	≥ 2.0 x 10 ¹⁴ 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 ⁹ 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, 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 ¹⁰ Ohm
Salt spray test	BMW GS 95003-4	passed
Permittivity ϵ_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** 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 recommendation

- 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.

Viscosity adjustment

- Adjust the processing viscosity for each application process by means of the appropriate thinner (see item “Adjustment of the processing viscosity” of the Application Information sheet **AI 1/1**).

	to be thinned with thinner V 1307:	SL 1307 SL 1337 SL 1367
DIL	to be thinned with thinner V 1307 FLZ:	SL 1307 FLZ SL 1307 FLZ/21 SL 1307 FLZ/23 SL 1307 FLZ/25
	to be thinned with thinner V 1307 FLZ-BA:	SL 1307 FLZ/18

Auxiliary products recommended

- **Thinners V 1307, V 1307 FLZ and V 1307 FLZ-BA**
for removing the conformal coating within repair jobs (see item “Viscosity adjustment”)
- [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 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]

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]



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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Coating Innovations
for Electronics

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

The conformal coatings of the series **ELPEGUARD® SL 1307 FLZ/2** 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 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 recognised component according to **UL 746E** (UL file no. E80315, SL 1307 FLZ/&2)
- fulfils the requirements according to IEC 60664-3
- 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
- resistant in 4-part noxious gas test according to DIN EN 60068-2-60 or BMW GS 95003-4 respectively
- best resistance class GX against noxious gases according to ISA 71.04-2013
- “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)
- the adjustments free from fluorescent agents are particularly suitable for lighting electronics/LED technology

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 ³
SL 1307 FLZ/2	colourless, fluorescent	32 ± 3 % by weight	55 ± 5 s	73 ± 7 s (5 mm)	1.00 ± 0.02 g/cm ³
SL 1307 FLZ/182		23 ± 2 % by weight	18 ± 2 s	38 ± 4 s (4 mm)	1.00 ± 0.02 g/cm ³
SL 1307 FLZ/232		27 ± 2 % by weight	23 ± 2 s	60 ± 5 s (4 mm)	1.00 ± 0.02 g/cm ³
SL 1307 FLZ/342		29 ± 3 % by weight	34 ± 3 s	46 ± 5 s (5 mm)	1.00 ± 0.02 g/cm ³

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

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 _g	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 of storage at room temperature.

Property	Test method	Result
Dielectric strength	IPC-TM-650, 2.5.6.1	≥ 60 kV/mm
	IPC-CC-830B, 3.6.1	passed
Specific volume resistivity	DIN EN 62631-3-1	≥ 1.5 x 10 ¹⁵ Ohm x cm
Surface resistance	DIN EN 62631-3-2	≥ 2.0 x 10 ¹⁴ 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 ⁹ 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

Property	Test method	Result
Resistance to condensation	according to DIN EN ISO 6270-2 (BIAS 12 V, 40 °C [104 °F], 100% r. h.)	$\geq 1.0 \times 10^{10}$ Ohm
Salt spray test	BMW GS 95003-4	passed
Permittivity ϵ_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.

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 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

Auxiliary products recommended

- **Thinner V 1307 FLZ/2**
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 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]

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]



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. Samples and technical literature are available upon request.

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Coating Innovations
for Electronics

Conformal coating

ELPEGUARD® SL 1307 FLZ/203

The conformal coating **ELPEGUARD® SL 1307 FLZ/203** 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.

This product is a thixotropic adjustment which permits an optimum edge coverage even on sharp-edged component leads for a high resistance in extreme climatic conditions.

- Base: acrylate resins (AR)
- rapid physical drying
- SL 1307 FLZ/& tested by Trace Laboratories-East in acc. with **IPC-CC-830B** and **MIL-I-46058C**
- UL recognised component according to UL 94 (UL file no. E80315)
- can be soldered through at solder iron temperature for repair purposes, or removed with thinner **V 1307 FLZ/2**, and reapplied after repair
- used by leading automotive suppliers
- very good ageing and yellowing resistance
- operating temperature range from -65 to at least +125 °C [-85 to 257 °F]
- very good TCT resistance:
-40 to +150 °C [-40 to 302 °F] and -65 to +125 °C [-85 to +257 °F]
- resistant in 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	colourless, fluorescent
Solids content, DIN EN ISO 3251, 1 h, 125 °C [257 °F], 1 g weighed quantity	30 ± 2 % by weight
Viscosity* at 25 °C [68 °F], DIN EN ISO 3219	200 ± 50 mPas
Density at 20 °C, DIN EN ISO 2811-1	1.01 ± 0.05 g/cm ³

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

Indices: SL = conformal coating, FLZ = fluorescent, /203 = from the series /3 having a viscosity of 20 dPas

Physical and mechanical properties


Property	Test method	Result
Flexibility	IPC-CC-830B, 3.5.5	passed
Glass transition temperature T _g	TMA	≈ 50 °C [122 °F]
Coefficient of thermal extension (CTE)	TMA	≈ 160 ppm/°C ≤ T _g

Electrical properties

Property	Test method	Result
Dielectric strength	IPC-TM-650, 2.5.6.1	≥ 60 kV/mm
	IPC-CC-830B, 3.6.1	passed
Specific volume resistivity	DIN EN 62631-3-1	≥ 5 x 10 ¹² Ohm x cm
Surface resistance	DIN EN 62631-3-2	≥ 1 x 10 ¹⁴ Ohm
Moisture and insulation resistance	IPC-CC-830B, 3.7.1 (65 °C/90 % R.H.)	passed
	85/85-Test (3 d, 85 °C, 85 % R.H.)	≥ 1.0 x 10 ⁹ Ohm
Thermal shock	IPC-CC-830B, 3.7.2 -65 to +125 °C	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 ⁹ Ohm
Salt spray test	BMW GS 95003-4	passed
Permittivity ε _r	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 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 coating **ELPEGUARD® SL 1307 FLZ/203** has to be processed in the condition supplied. It can be applied by means of all common spray coating methods.



Stir before use

Prior to conformal coating, the (highly) thixotropic conformal coatings **ELPEGUARD® SL 1307 FLZ-T** and **SL 1307 FLZ-HT** can be used to easily and precisely build dams around connectors, components and pads, to prevent the penetration and 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 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.

Auxiliary products recommended

- Thinner V 1307 FLZ/2
for the removal of the coating within repair work
- [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 coating **ELPEGUARD® SL 1307 FLZ/203** is suitable for double coating only to a limited extent since it is dissolved by the solvent contained in the ink.

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 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 with exhaust air
Drying (tack-free) in acc. with DIN EN 60464 (IEC 60464)	20-30 min	—
Drying time prior to packaging	approx. 1-2 h	10-20 min at 80 °C [176 °F]

To ensure a bubble-free coating, it is recommended to dry at room temperature.

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 6 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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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/4

The conformal coatings of the series **ELPEGUARD® SL 1307 FLZ/4** 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 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
- fast physical drying
- very good adhesion to critical substrates
- tested by Trace Laboratories East acc. to **IPC-CC-830B** and **MIL-I-46058C**
- fulfils the requirements according to **IEC 61086-2** (class II for “high reliability”)
- UL recognised component according to **UL 94** (UL file no. E80315, SL 1307 FLZ/4)
- 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
- can be used in a temperature range of **-65 to +125 °C** [-85 to 257 °F]
- very good TCT resistance (thermal cycling test): **-40 to +150 °C** [-40 to 302 °F] resp. **-65 to +125 °C** [-85 to 257 °F]
- resistant in 4-part noxious gas test according to DIN EN 60068-2-60 or BMW GS 95003-4
- “ready-to-use“ viscosity adjustments available for all common coating methods
- suitable for flexible circuits (“flex-to-install“, bend stress during assembly only)

Characteristics

	SL 1307 FLZ/184	SL 1307 FLZ/234
Colour/appearance	colourless, fluorescent	colourless, fluorescent
Solids content, DIN EN ISO 3251 1 h, 125 °C [257 °F], 1 g weighed quantity	24 ± 2 % by weight	29 ± 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 ³	1.00 ± 0.02 g/cm ³

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
Flexibility	IPC-CC-830B, 3.5.5	passed
Glass transition temperature T _g	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 of storage at room temperature.

Property	Test method	Result
Dielectric strength	IPC-TM-650, 2.5.6.1	≥ 100 kV/mm
	IPC-CC-830B, 3.6.1	passed
Specific volume resistivity	DIN EN 62631-3-1	≥ 6.4 x 10 ¹⁵ Ohm x cm
Surface resistance	DIN EN 62631-3-2	≥ 2.0 x 10 ¹⁴ 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 ⁹ Ohm
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

Property	Test method	Result
Resistance to condensation	based on DIN EN ISO 6270-2 (BIAS 12 V, 40 °C [104 °F], 100% r.h.)	$\geq 1.0 \times 10^9$ Ohm
Salt spray test	BMW GS 95003-4 IEC 61086	passed passed
Permittivity ϵ_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 or by brushing.



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.

Adjustment of viscosity

→ Adjust the processing viscosity for each application process by means of thinner **V 1307 FLZ/2** (see also 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
- [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 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. 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 (ca. +23 °C [73.4°F])	in circulating hot air units
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 temperature storage of 30 min at 80 °C.

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 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. Samples and technical literature are available upon request.

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peters
Coating Innovations
for Electronics

Conformal coating sprays of the series ELPEGUARD® SL 1307 FLZ/S

The conformal coating sprays of the series **ELPEGUARD® SL 1307 FLZ/S** 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 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)
- SL 1307 S fulfils the requirements of IPC-CC-830B, MIL-I-46058C, UL 94 and UL 746E (fluorescence excluded)
- 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)
- SL 1307 S (no fluorescent agent) particularly suitable for lighting electronics/LED technology

Characteristics

Colour/appearance: SL 1307 FLZ/S: colourless, fluorescent
SL 1307 S: colourless

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 _g	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 ¹⁴ Ohm x cm
Surface resistance	VDE 0303, part 30/DIN IEC 60093 IPC-TM-650, 2.5.17.1	≥ 2.0 x 10 ¹⁴ 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 ⁹ 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 ⁹ Ohm
Salt spray test	BMW GS 95003-4	passed
Permittivity ε _r	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
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 sprays of the series **ELPEGUARD® SL 1307 FLZ/S** 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.

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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.

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 hot exhaust 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 18 months



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



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