

Silicone thick film coatings series

ELPEGUARD[®] DSL 1706 FLZ

The silicone thick film coatings of the series **ELPEGUARD[®] DSL 1706 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 even under harsh climatic conditions.

- Base: Silicone (SR)
- solvent-free
- fast cross-linking at room temperature
- condensation cross-linking (not recommended for use in encapsulated environments)
- good adhesion to many common substrates even without additional adhesive agents (self-priming)
- excellent chemical resistance
- temperature range from -55 to +200 °C [-67 to 392 °F]*
- correspond to the best flame class V-0 acc. to UL 94
- compliant with China standard GB 30981-2020
- highly elastic, thus suitable for coating flexible circuits
- stress-compensating in case of thermal shock and vibration
- resistant against weathering and UV radiation
- excellent dielectric properties: the dielectric constant and the dissipation factor $\tan \delta$ are almost independent of frequency and temperature
- on account of its high viscosity **ELPEGUARD[®] DSL 1706 HV-FLZ** can also be spot-applied to protect, for instance, solder pads and pins
- thanks to the fluorescent adjustment, the coating can be easily and reliably checked under UV light (black light)
- can be easily removed mechanically or soldered through for repair purposes, and be reapplied to the previously cleaned substrate after the repair work.

* can be used in a temperature range of -55 up to at least + 200 °C [-67 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.

Characteristics

	DSL 1706 FLZ	DSL 1706 NV-FLZ	DSL 1706 HV-FLZ
Colour/appearance	colourless, fluorescent (in the condition supplied colourless to light yellow, slightly milky)		
Solids content	100 %		
Viscosity* at 20 °C [68 °F], ISO 3219	400 ± 100 mPas	140 ± 40 mPas	12 500 ± 2 500 mPas
Density at 20 °C [68 °F], ISO 2811-1	0.99 ± 0.05 g/cm ³	0.96 ± 0.05 g/cm ³	1.02 ± 0.05 g/cm ³

* measured with Haake RS 600, C 35/1°, D = 100 s⁻¹,
resp. DSL 1706 HV-FLZ with RS 600, C 20/1°, D = 100 s⁻¹,
viscosity measuring unit supplied by Thermo Fisher Scientific, www.thermofisher.com

Indices: DSL = thick film coating, FLZ = fluorescent, NV = low viscous, HV = highly viscous

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.

These values are achieved at a coating thickness of 125 µm after 24 hours' storage at room temperature.

Property	Test method	DSL 1706 FLZ DSL 1706 NV-FLZ DSL 1706 HV-FLZ
Flexibility	IPC-CC-830B, 3.5.5	passed

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 at a coating thickness of 125 µm after 24 hours' storage at room temperature.

Property	Test method	DSL 1706 FLZ	DSL 1706 NV-FLZ	DSL 1706 HV-FLZ
Dielectric strength	IPC-TM-650, 2.5.6.1	≥ 63 kV/mm		
	IPC-CC-830B, 3.6.1	passed		
Specific volume resistivity	DIN EN 62631-3-1	≥ 6.3 x 10 ¹⁵ Ohm x cm		
Surface resistance	DIN EN 62631-3-2	≥ 2 x 10 ¹⁴ Ohm		
Moisture and insulation resistance	IPC-CC-830B, 3.7.1 (65 °C [149 °F] /90 % r. h.)	≥ 4.5 x 10 ¹⁰ Ohm class A and B		
	85/85 test (3 d, 85 °C [185 °F], 85 % R.H.)	≥ 6.3 x 10 ⁹ Ohm		
Thermal shock resistance	IPC-CC-830B, 3.7.2 -65 to +125 °C [-85 to 257 °F]	class 3 passed		
Hydrolytic stability	IPC-CC-830B, 3.7.3	passed		
Comparative Tracking Index (CTI, tracking resistance)	DIN EN 60112 on FR 4 base material with CTI 275	CTI ≥ 600		

Property	Test method	DSL 1706 FLZ	DSL 1706 NV-FLZ	DSL 1706 HV-FLZ
Resistance to condensation	based on DIN EN ISO 6270-2 (BIAS 12 V, 40 °C, 100% R.H.)	$\geq 2.0 \times 10^{10}$ Ohm		
Permittivity ϵ_r	based on ASTM D 150 at 100 Hz at 100 kHz	≈ 2.5 ≈ 2.5	≈ 2.5 ≈ 2.5	≈ 2.1 ≈ 2.1
Dissipation factor $\tan \delta$	based on ASTM D 150 at 100 Hz at 100 kHz	≈ 0.0007 < 0.0002	≈ 0.001 < 0.0002	≈ 0.0013 < 0.0002

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.
TI	Technical information TI 15/3 "Protective measures when using chemicals including lacquers, casting compounds, thinners, cleaning agents"
TI	Technical information TI 15/18 "Handling of silicones"

The silicone thick film lacquers **ELPEGUARD® DSL 1706 FLZ** and **DSL 1706 NV-FLZ** can be applied by dipping, brushing, or by means of automatic selective coating units.

On account of its high viscosity the silicone thick film lacquer **ELPEGUARD® DSL 1706 HV-FLZ** can only be applied by means of a dispenser or similar.

→ Ensure an even and bubble-free coating by adjusting suitable application parameters.



Protect against humidity

The silicone thick film lacquers of the series **ELPEGUARD® DSL 1706 FLZ** cure under the influence of moisture. Containers must be tightly closed after use, partially filled containers should be filled up with nitrogen.

The higher the viscosity of the lacquer, the higher the lacquer layers that can be achieved. Please note that the higher the coating layer applied, the longer the curing time, as the moisture required for curing must first diffuse through the entire coating layer.

→ Do not expose the silicone thick film lacquer directly and/or permanently with compressed-air as otherwise it merges with the lacquer and forms bubbles after application.

→ Ensure that the surface to be coated is clean, grease-free and dry.

→ Observe that any form of (ionic) contamination affects the adhesion as well as the electrical properties, especially under extreme climatic conditions. Poor adhesion enables the deposit of water between pcb and conformal coating and thus may lead to corrosion/defects. Therefore, clean the assembly of fluxing agents and other contaminations or ensure that the properties you desire are achieved by performing corresponding tests.

→ Ensure you check the assembly that has been manufactured under your series conditions after coating and curing in the subsequent operating environment.

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.

Viscosity adjustment

The silicone thick film lacquers of the series **ELPEGUARD® DSL 1706 FLZ** must be processed in the condition supplied. The various adjustments can be mixed with each other, so that – according to the desired layer thickness or if required by the process – another viscosity can be adjusted.

→ Do not add any solvents or thinners to reduce the viscosity.

Auxiliary products recommended

- [ELPESPEC® cleaning agent R 5817](#)
for the cleaning of work place and tools/equipment
- [ELPESPEC® cleaning agent R 5807](#)
for the cleaning of equipment

Drying/curing

The silicone thick film lacquers of the series **ELPEGUARD® DSL 1706 FLZ** cure very fast at room temperature under the influence of moisture to a clear transparent coating. For final curing a relative humidity of at least 5 – 10 % is required. Curing can be accelerated by means of a higher humidity (50% relative humidity is ideal) or by means of heat addition (max. 60 °C [140 °F]).

Thicker layers require a longer curing time. The following values shall serve as guidelines:

	at room temperature (approx. 23 °C [73.4 °F]), 50% relative humidity wet layer thickness approx. 125 µm
tack-free	≈ 15 min
dry	≈ 45 min

Dependent upon the substrate and humidity full adhesion is achieved after 24 h or longer.

- Do not encapsulate/pack the coated components prior to complete curing as the silicone thick film lacquers of the series **ELPEGUARD® DSL 1706 FLZ** need atmospheric humidity to cure.
- Please consider that in case of too high atmospheric humidity (approx. 70% relative humidity upwards) during curing, especially in case of higher layers, bubbles may form because the cross-linking reaction progresses too fast.

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

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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