

Conformal coatings of the series

ELPEGUARD® SL 1305 AQ-ECO

Base: Polyurethane resins (PUR)

- excellent protection against corrosion (e.g. electro corrosion and migration) for assembled printed circuit boards/flat packs
- **water-borne/aqueous lacquer system**
- no odour annoyance
- very fast drying to tack-free stage
- very good dielectric properties
- very high tracking resistance (CTI > 600)
- UL approval of the fluorescent adjustments as **conformal coatings acc. to UL 746E** (see also item 3)

This technical report is valid for the following adjustments:

- **SL 1305 AQ-ECO**, colourless transparent
- **SL 1305 AQ-ECO/25**, colourless transparent
- **SL 1305 AQ-ECO/55**, colourless transparent
- **SL 1305 AQ-ECO-FLZ**, colourless transparent, fluorescent
- **SL 1305 AQ-ECO-FLZ/25**, colourless transparent, fluorescent
- **dye(stuff) concentrates** for dying the conformal coatings

Indices: **SL** = conformal coating

AQ = water-borne

ECO = ecological

FLZ = fluorescent

/25 = viscosity 25 s according to DIN 53 211, likewise /55

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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 conformal coatings of the series **ELPEGUARD® SL 1305 AQ-ECO** are colourless transparent, **water-borne** 1-pack conformal coatings for assembled printed circuit boards based on polyurethane resins (PUR), where the organic solvents have been almost completely substituted by water. They contain special water-borne binding agents that are dispersed in demineralised water. Merely a small portion of organic solvent (< 10 %) is required for the film formation of the protective coat. They neither contain free volatile isocyanate nor free isocyanate groups.

Since the conformal coatings of the series **ELPEGUARD® SL 1305 AQ-ECO** are available in different viscosity adjustments, practically any type of coating technology is possible without the need for thinning (see item 7 "Processing").

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

2. Application

The conformal coatings of the series **ELPEGUARD® SL 1305 AQ-ECO**

- protect assembled printed circuit boards even under increased climatic stress against moisture, especially against the effects of condensate,
- insulate electrical equipment, connections, switch panels, terminal boards, etc.
- can be soldered-through at soldering iron temperature for repair purposes and subsequently reapplied.

The conformal coatings of the series **ELPEGUARD® SL 1305 AQ-ECO** are used to protect assembled printed circuit boards that have to fulfil high requirements regarding quality and service life. This is especially valid for assembled printed circuit boards or flat packs for:

- high-performance electronics
- the automotive industry
- lighting electronics/LED technology
- household appliances (hobby tools, washing machines and others)
- electronic/electrical measuring and control units
- electrical appliances equipped with electronic controls (industrial scales, medical appliances, industrial robots, etc.)
- the military sector
- shipbuilding and off-shore technology
- the aerospace industry
- explosion-protected equipment
- appliances for telecommunications.

The conformal coatings of the series **ELPEGUARD® SL 1305 AQ-ECO** are distinguished by their neutral-smelling coating, i.e. the typical inherent smell of conventional conformal coatings that continues for some time after drying does not occur. Therefore, the conformal coatings of the series **ELPEGUARD® SL 1305 AQ-ECO** are particularly suitable for indoor use (e.g. for air conditioning and for automobile electronics installed in the passenger compartment).

Owing to their good yellowing resistance the conformal coatings of the series **ELPEGUARD® SL 1305 AQ-ECO** are also applied in optoelectronics. The non-fluorescent adjustments are particularly suitable for coating optical components such as sensors or LEDs as the colour of the light source is not distorted by the fluorescent indicator.

3. Special notes

The excellent dielectric properties (see item 6.3 "Electrical properties") of the conformal coatings of the series **ELPEGUARD® SL 1305 AQ-ECO** and the high damp-room resistance under thermal stress and tension ensure a safe protection of the coated flat packs.

The UL approval of the fluorescent viscosity adjustments (Index **FLZ**) of the series **ELPEGUARD® SL 1305 AQ-ECO** as conformal coatings has been granted under UL File No. E80315 (Registered trademark of  Underwriters Laboratories Inc., Northbrook, Illinois 60062). The approval contains flame testing according to UL 94 as well as electrical tests in accordance with UL 746E.

The conformal coatings of the series **ELPEGUARD® SL 1305 AQ-ECO** are low-solvent systems, thus they constitute a sensible solution, both from a technical and ecological aspect, also regarding the EU-VOC regulation (**VOC** = **V**olatile **O**rganic **C**ompounds) that aims at recording and reducing the consumption of solvents.

You will find more detailed information regarding the EU-VOC regulation 1999/13/EC in our **Technical Information sheet TI 15/110 "The new EU-VOC Regulation – Contents and consequences for the PCB industry"**. We will gladly send you TI 15/110 upon request. In our report manual, this technical information sheet is filed under group 15. On our report manual CD and on our website you will find technical information sheets in the "Service" section.

The conformal coatings of the series **ELPEGUARD® SL 1305 AQ-ECO** are applicable in a temperature range of -40 up to +130 °C [-40 up to +266 °F], while at the lower and upper ends of this range the performance and capability of the materials can be negatively influenced in some applications. In these cases additional pretests and examinations are necessary.

The lacquer layers achieved with the conformal coatings of the series **ELPEGUARD® SL 1305 AQ-ECO** are extremely tracking resistant. Even in case of pcbs made of a base material with tracking values of CTI 275 or in case of lacquer surfaces with values of CTI 300/400 tracking values of CTI > 600 can be achieved by applying the conformal coatings of the series **ELPEGUARD® SL 1305 AQ-ECO**.

The conformal coatings of the series **ELPEGUARD® SL 1305 AQ-ECO** can be dyed with the dyestuff concentrate **FK 1335 AQ-ECO**, red, and the dye concentrates **FK 1365 AQ-ECO**, green, **FK 1345 AQ-ECO**, black, and **FK 1355 AQ-ECO**, blue. This way, the coating can be easily examined for completeness due to the clear colour contrast to the substrate. The physical and electrical properties are not or only minimally affected by adding a dye(stuff) concentrate. The fluorescent adjustments can be controlled under UV light (black light).

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.

5. Characteristics

	SL 1305 AQ-ECO SL 1305 AQ-ECO-FLZ	SL 1305 AQ-ECO/25* SL 1305 AQ-ECO-FLZ/25*	SL 1305 AQ-ECO/55*
Colour/appearance	colourless transparent, colourless transparent, fluorescent	colourless transparent, colourless transparent, fluorescent	colourless transparent
Solids content, ISO 3251 1 h, 125 °C [257 °F], 1 g weighed quantity	30 ± 2 % by weight	33 ± 2 % by weight	34 ± 2 % by weight
Viscosity at 20 °C [68 °F] flow time acc. to ISO 2431 4 mm ISO flow cup	26 ± 2 s		
5 mm ISO flow cup		34 ± 3 s	
6 mm ISO flow cup			43 ± 5 s
Viscosity at 20 °C [68 °F] flow time acc. to DIN 53211 4 mm DIN flow cup	15 ± 1 s	25 ± 2 s	55 ± 5 s
Density at 20 °C [68 °F] ISO 2811-1	1.04 ± 0.05 g/cm ³	1.04 ± 0.05 g/cm ³	1.04 ± 0.05 g/cm ³

* The DIN 53211 has been replaced by the international norm ISO 2431. However, on account of the widespread usage of the 4 mm DIN flow cup we continue indicating the viscosity acc. to DIN 53211 just as we continue with the product name with the index /25 and /55 that indicates the flow time measured with the 4 mm flow cup.

5.1 Characteristics of the dye(stuff) concentrates

	FK 1335 AQ-ECO	FK 1345 AQ-ECO	FK 1355 AQ-ECO	FK 1365 AQ-ECO
Colour/appearance	red	black	blue	green
Density at 20 °C [68 °F] ISO 2811-1	1.03 ± 0.05 g/cm ³	1.05 ± 0.05 g/cm ³	1.03 ± 0.05 g/cm ³	1.03 ± 0.05 g/cm ³

6. Properties

The conformal coatings of the series **ELPEGUARD® SL 1305 AQ-ECO** are particularly 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) that aims for a reduction in the use of certain substances that are hazardous to the environment and health.
- water-borne/aqueous lacquer systems, i.e. no odour annoyance by solvents and no incipient dissolution of solvent-sensitive plastics and marking inks
- practically no solvent emission in the drying phase
- due to the high flash point no special storage or transportation regulations for inflammable substances need to be observed
- no odour annoyance during coating or further processing, the typical inherent smell of conventional oxidatively curing conformal coatings that continues for some time after drying does not occur
- very high emersion velocity when processed by dipping meaning short cycle times, i.e. high productivity
- excellent wetting, even of angular component leads, ensures safe coating of these critical areas
- if used properly a very good flow results and a uniform tightly pored film after drying is obtained
- very fast drying at room temperature
- the non-fluorescent conformal coatings of the series **ELPEGUARD® SL 1305 AQ-ECO** can be dyed with the dyestuff concentrate **FK 1335 AQ-ECO**, red, and the dye concentrates **FK 1365 AQ-ECO**, green, **FK 1345 AQ-ECO**, black, and **FK 1355 AQ-ECO**, blue. This way, the coating can be easily examined for completeness due to the clear colour contrast to the substrate.
- fluorescent adjustments (Index FLZ) can be controlled under UV light (black light with a UV-A impulse at 350-375 nm)
- excellent dielectric properties and very high tracking resistance (see item 6.3)
- high damp-room resistance under thermal stress and tension
- high surface hardness of the dried coating; this considerably reduces the danger of mechanical damage when further processing the assembled printed circuit boards
- suitable for coating flexible circuits ("flex-to-install", bend stress during assembly only)
- good yellowing resistance, thus particularly suitable for application in optoelectronics
- excellent protection against corrosion owing to the very good resistance against moisture, particularly condensation
- excellent adhesion and high abrasion resistance
- meet requirements of IPC-CC-830B
- UL approval of the fluorescent adjustments (Index FLZ) as conformal coatings** (see item 3)
- can be soldered-through at soldering iron temperature for repair purposes.

6.2 Physical and mechanical properties

Property	Test method	Result
Cross hatch	EN ISO 2409 on copper on FR4 base material	Gt 2 Gt 0
Resistance to solvents/cleaning agents	IPC-TM-650, 2.3.42 Isopropanol Isopropanol : water (75 : 25) deionised water D-Limonene	passed passed passed passed
Flexibility	IPC-CC-830B, 3.5.5	passed
Glass transition temperature Tg	thermo mechanical analysis	approx. 27 °C [80.6 °F]
Coefficient of thermal expansion (CTE)	thermo mechanical analysis	90 ppm/°C < Tg 400 ppm/°C > Tg

6.3 Electrical properties

These values are achieved after 14 days' storage at room temperature.

Property	Test method	Result
Dielectric strength	VDE 0303, part 21 DIN EN 60243-1	75 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	1.0 x 10 ¹³ 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.	9.0 x 10 ⁸ Ohm Class A and B
Moisture and insulation resistance	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.	3.0 x 10 ⁸ Ohm
Thermal shock	IPC-CC-830B, 3.7.2	class 2 passed
Comparative Tracking Index (CTI, tracking resistance)	DIN EN 60112 on base material with CTI 275 CTI 600	CTI > 600 CTI > 600
Resistance to condensation	based on ISO 6270-2 (BIAS 12 V, 40 °C [104 °F], 100 % r. h.)	5.0 x 10 ⁸ Ohm
Dielectric constant ϵ_r	DIN 53483 100 kHz	3.2
	1 MHz	3.0
	1 GHz	2.5
Dielectric loss factor tan δ	DIN 53483 100 kHz	0.02
	1 MHz	0.02
	1 GHz	0.03
TI (temperature index)	DIN EN 60 216 (IEC 60216) issue 2001	130 °C [266 °F] (20 000 h)* 150 °C [302 °F] (5 000 h)*

* Limit values for classification were a 25 % loss in mass and/or dielectric strength in comparison to the appropriate reference values.



Depending upon the layer thickness the lacquer film will take longer to achieve its maximum property values.
Check the property values according to DIN 46 449 "Conformal coatings/test methods" no earlier than 96 hours after tack-free stage has been reached (see also Item 8 "Drying/curing").

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. In our report manual the Application Information sheet AI 1/1 is filed under group 1. On our report manual CD and on our website you will find application information sheets in the "Service" section.

→ Please **also** pay particular attention to the advice given under item 8.3 of the Application Information sheet **AI 1/1 "Specialties when using the water-borne conformal coatings of the series ELPEGUARD® SL 1305 AQ"**.

The conformal coatings of the series **ELPEGUARD® SL 1305 AQ-ECO** can be processed by brushing on, dipping, spraying or in 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. 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 Recommended viscosity adjustments for the various application processes

The adjustments **SL 1305 AQ-ECO**, **SL 1305 AQ-ECO-FLZ**, **SL 1305 AQ-ECO/25** and **SL 1305 AQ-ECO-FLZ/25** are suitable for brush application, compressed air spraying and dip coating. **SL 1305 AQ-ECO/55** is suitable for dip coating, but must be adjusted to the processing viscosity.

Different to the specifications in the Application Information sheet AI 1/1 we recommend the following processing viscosities for the conformal coatings of the series **ELPEGUARD® SL 1305 AQ-ECO**:

Application process	Processing viscosity Flow time at processing temperature DIN 53 211, 4 mm flow cup
Compressed air spraying*	15 – 25 s
Dipping	15 – 30 s
Automatic selective coating process	A universal processing viscosity cannot be indicated for automatic, selective coating. Therefore, determine the optimum viscosity by means of pre-trials. In case of further queries our application technology department (ATD) will be glad to assist you.

* The lacquer viscosity to be adjusted is also dependent upon the spray nozzle diameter used. When

using small spray nozzle diameters (see also Item 5.4 of the Application Information sheet **AI 1/1**) lacquer with a low viscosity can be better processed. Thus, depending on the spray nozzle diameter used the viscosity may have to be adjusted.



When applying the lacquer by means of compressed-air spraying the safety precautions of national regulations must be observed, as for example Chapter 2.29 "Processing of Coating Materials" of the German Trade Association Regulation BGR 500 "Operation of Work Equipment" (formerly VDG 23 and BGV D 25), in particular Section 3 "Operation". Moreover, obey the operating and maintenance instructions of the spraying cabin and filter mat manufacturers.

- Different to the specifications in the Application Information sheet **AI 1/1** the emersion velocity **when dip coating** can be increased from 1 mm/s up to 3 mm/s. But reduce the dipping and emersion velocity if air bubbles or foam forms.
- Take appropriate measures in order to slow down skin formation caused by the lacquer drying at the surface or the bath edge, e.g. by covering the dip tank with moist air when not in use.

7.2 Viscosity adjustment

With the exception of **ELPEGUARD® SL 1305 AQ-ECO/55**, the conformal coatings of the series **ELPEGUARD® SL 1305 AQ-ECO** are adjusted in such a manner that they can normally be processed in the condition supplied (see also item 7.1 "Recommended viscosity adjustments for the various application processes").

- Please take into account that the viscosity of **ELPEGUARD® SL 1305 AQ-ECO/25** and **ELPEGUARD® SL 1305 AQ-ECO/55** may decrease when they are mixed with dye(stuff) concentrates.

A reduction in viscosity is equally possible by adding deionised/distilled water. The added quantity must not exceed 5 %, since the drying time will otherwise increase considerably and the solids content will decrease too much.



Use only deionised/distilled water, not tap water to reduce the viscosity.

7.3 Auxiliary products

• Cleaning agents

Warm water is suitable for cleaning workplace and tools. Cleaning should be effected as soon as possible since the cleaning process becomes more difficult as curing progresses. For dried ink residues that have become insoluble to water we recommend the use of our cleaning agent **R 5817**.

Cleaning of coating units:

Before it is permitted to use solvent mixtures such as **R 5817** as cleaning agents the coating units must first be rinsed thoroughly with deionised/distilled water or a 5% solution of ammonia. Otherwise, any conformal coating residues left in the unit will coagulate. It may be possible to dissolve these coagulations with a 5% ammonia solution.



Rinse the coating unit thoroughly with deionised/distilled water before refilling to ensure removal of all components that are not part of the ink systems (e.g. cleaning agents).



Do not use cleaning agent as a thinner or for washing hands since solvents remove the natural grease from skin.

- **Peelable protective skin EH 13.150 AQ-T**

blue transparent, solvent-free, water-borne 1-pack system for the protection of smooth surfaces, e. g. of lacquer coating machines and scales, against soiling from ink splashes or other contaminations. After drying, a highly elastic and tear resistant film results that can be peeled-off and renewed as required.

Special technical reports on these products are available upon request. In our report manual these technical reports are filed under group 5 and 13. On our report manual CD, technical reports can be accessed in the "Products" section.

7.4 Processing of dye(stuff) concentrates



Stir before using

Mix the conformal coating and dye(stuff) concentrates in a ratio of **10 parts conformal coating : 1 part dye(stuff) concentrate (parts by weight)**.

→ Prepare 10 parts of conformal coating, add the dye(stuff) concentrate while stirring and continue to stir until the conformal coating and dye(stuff) concentrate are homogeneously mixed.

→ If possible, mix only the quantity immediately required.

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

In order to attain an opaque black surface, in case of **FK 1345 AQ-ECO** the mixing ratio can be increased to **10 parts conformal coating : 2 parts dye concentrate (parts by weight)**.

→ Perform trial coatings to verify the opacity.

The dyed conformal coatings of the series **ELPEGUARD® SL 1305 AQ-ECO** can be further processed as described in the Application Information sheet **AI 1/1**.



The viscosity of the dye(stuff) concentrates increases during storage, but they can still be processed without difficulty and homogeneously mixed with the conformal coatings of the series ELPEGUARD® SL 1305 AQ-ECO. Due to the slight thixotropy caused by storage the dye(stuff) concentrates can be liquefied a little by shaking them before they are added to the conformal coatings. The exact original viscosity cannot be restored, but it facilitates an even dispersion.

7.5 Duplicate coating

→ Please pay attention to our Application Information sheet **AI 1/1**, item 8.1 "Application of too high layer thicknesses/duplicate coating".

If higher layer thicknesses are nevertheless required, a duplicate coating is possible. Application of the second layer can be effected at any time after the first layer has reached the tack-free stage.

8. Drying/Curing

Drying is effected at room temperature and/or in hot-air drying units. Already after a short drying time at room temperature the coated flat packs are tack-free. However, the properties specified in item 6 are only attained after complete drying.

In case of insufficient drying there is the risk that water left in the lacquer coating in combination with potential contaminations may form a conductive medium.

→ Follow the advice given in item 7 of the Application Information **AI 1/1** "Drying/curing".

→ Cure the assembly without the casing in order to ensure sufficient air circulation.

The drying time depends strongly upon the applied coating thickness. The following rates serve as a guideline:

Drying at room temperature (approx. 23 °C [73.4 °F])	Wet film thickness 50 µm	Wet film thickness 125 µm
Initial drying (dust-free)	approx. 5 min	approx. 15 min
Drying (tack-free) based on DIN EN 60464 (IEC 60464)	approx. 15 min	approx. 70 min

Furthermore, the ambient humidity, temperature and fresh air volume may partly affect the drying rate considerably.

Due to the high layer thickness, oven drying is definitely recommended to ensure complete drying under components, e.g. approx. 4 h drying at room temperature, with subsequent oven drying at 80 °C [176 °F] for a duration of 8 - 16 h.

→ Pay attention to the temperature resistance of the flat packs and assemblies.

→ Check the electrical properties (see item 6.3) to ensure complete drying. The required drying time in a circulating air oven depends, among other things, on the geometry of the components, film thickness, oven loading, etc.

9. Standard packaging

The conformal coatings of the series **ELPEGUARD® SL 1305 AQ-ECO** are packed for delivery as follows:

	Packaging	Selling unit
SL 1305 AQ-ECO SL 1305 AQ-ECO/25 SL 1305 AQ-ECO/55 SL 1305 AQ-ECO-FLZ SL 1305 AQ-ECO-FLZ/25	Can of 25 kg	25 kg
FK 1335 AQ-ECO, red FK 1345 AQ-ECO, black FK 1355 AQ-ECO, blue FK 1365 AQ-ECO, green	1 plastic bottle of 1 kg	1 kg

Partial lots of the selling unit for the conformal coatings 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 at least 6 months



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



Protect against frost

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.

11. Further literature/ technical documentation

In addition to the recommendations given in this technical report, we can provide technical papers and information sheets written and compiled by members of our staff. A list of the technical publications available can be found in **TI 15/101 E** (technical papers) and **TI 15/100 E** (technical information sheets).

In our report manual all **technical information sheets (TI's)** are filed under group 15. Alternatively, visit our website at <http://www.peters.de> or click on the "Service" section on our report manual CD.

12. Further products for the production of pcbs

We offer a wide range of **etch resists (photoimageable, UV curing, conventional curing), plating resists, solder resists (photoimageable, UV curing, conventional curing) as well as peelable solder masks, marking inks (photoimageable, UV curing, conventional curing), carbon-conductive inks, via hole fillers (purely thermal curing), thick film fillers, plugging pastes, heatsink pastes, special strippers for solder resists and further auxiliary products for screen printing (e. g. cleaning agents, thinners).**

Special technical reports are also available for these products and can be provided on request. On our report manual CD you will find technical reports in the "Products" section.

13. Further products for the electronics/electrical engineering industries

We boast a wide range of **conformal coatings, thick film lacquers, casting compounds, casting resins, electro pastes, insulating lacquers, impregnating varnishes, adhesive lacquers and auxiliary products for electronics.**

Special technical reports are also available for these products and can be provided on request. On our report manual CD you will find technical reports in the "Products" section.

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.

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