

Protection of Electronic Devices in Automotive Industry



New technologies and the demand for improved productivity levels have a direct impact on today's markets and materials used. Electronic devices are often very sensitive and require protection against humidity, chemical agents, mechanical impact, temperature changes, UV-Radiation, dust and dirt.

ELANTAS portfolio includes conformal coatings, potting & encapsulation materials as well as adhesives for circuit boards, sensors and other electronic components. Materials cover almost all chemistries including epoxy, polyurethane, silicones, acrylics and polyolefines and mixed hybrids.

We are deemed to provide excellent quality and performance of our products based on our extensive technical expertise. Challenging customer demands and extensive testing facilities support us in developing our products and supplying comprehensive support.

Throughout our processes we implement sustainability policies to protect the environment, health, and safety. All of our products are RoHS-compliant.

The demand of automotive electronics depends very much on the area of use. To offer best solutions we directed our portfolio into the main categories Automotive Interior, Automotive Exterior and the Engine Compartment.

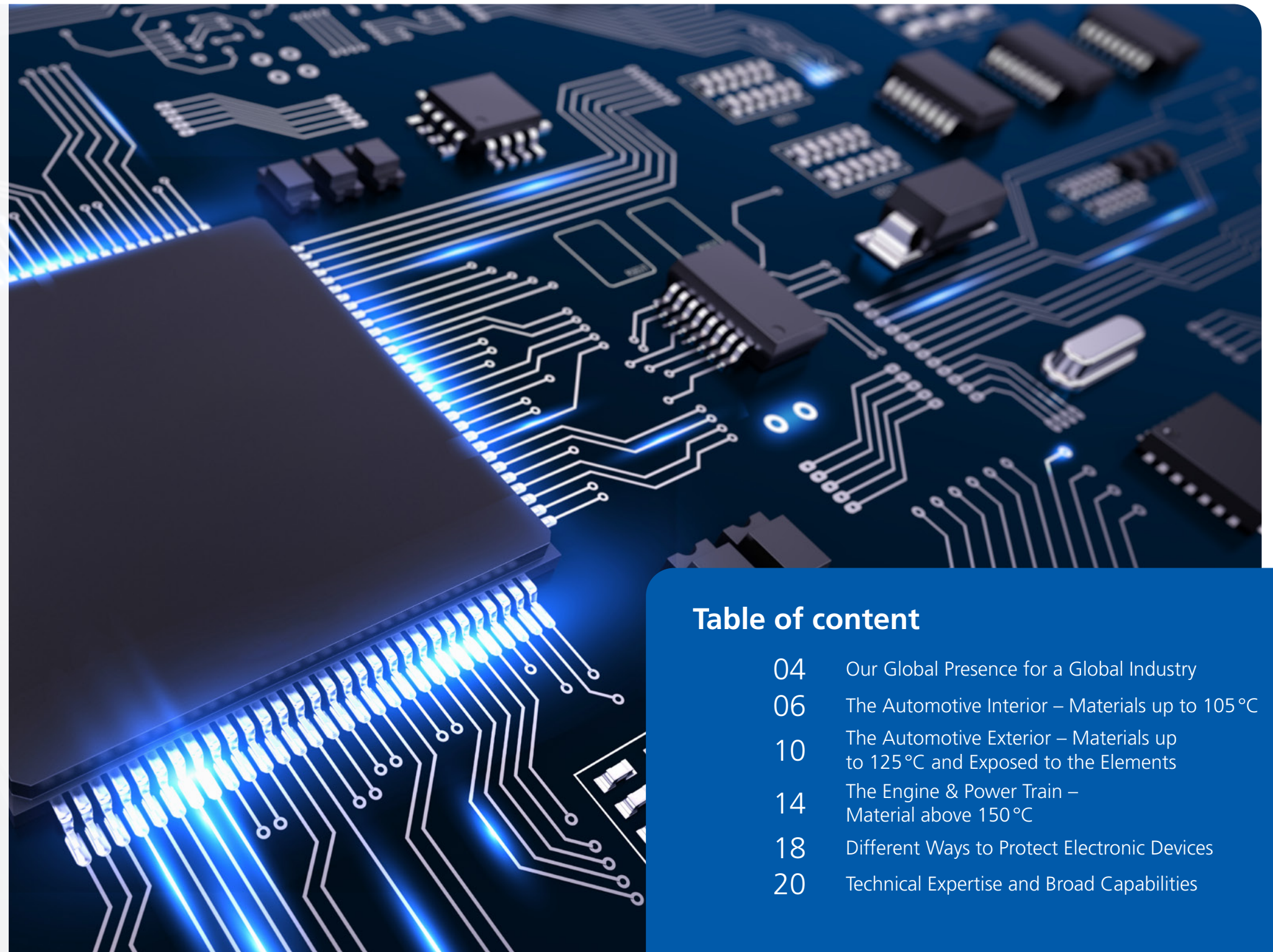


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Our Global Presence for a Global Industry

We adhere to the following industry standards:

- + IATF 16949
- + GS 95011-5 and other OEM approvals
- + IEC 60664-3
- + IPC-CC-830-B
- + IEC 61086 A
- + UL 94
- + UL 746E

ELANTAS is as global as the automotive industry. With a worldwide network of production facilities, we can supply customers locally wherever they are. Our local expertise is backed by a worldwide network of R&D, application, and testing laboratories.

Our customer support is no less global. We have a worldwide Key Account Management System in place to ensure that you get full service across all locations. Wherever you need us, we're close by, with local contacts familiar with local conditions.

This extensive international presence gives us the flexibility and resilience needed to serve global automotive manufacturers.

At the same time, as a manufacturer with facilities across the globe, we place great emphasis on consistent and standardized production. We are certified according to DIN EN ISO 9001, DIN EN ISO 14001. Most of our sites are certified according to IATF 16949.

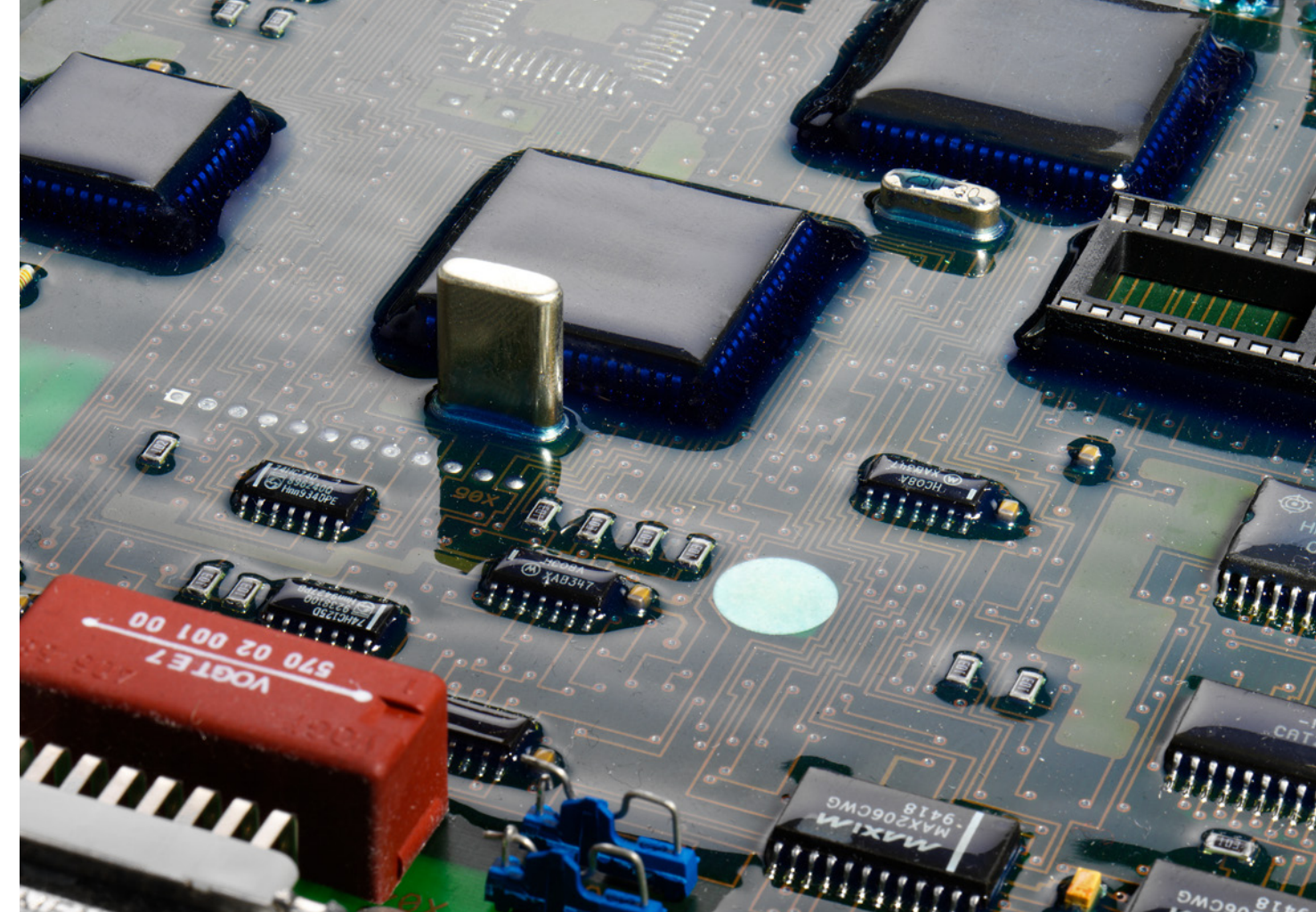
The Automotive Interior – Materials up to 105 °C

Today's automotive interiors are packed with electronic devices used to visualize, communicate, and entertain. Electronics control motors that perform multiple functions, while sensors detect the temperature and position at various points, and monitor the status of doors and seatbelts. These devices are expected to work flawlessly.

All these electronics need protection from shock, vibration, moisture and temperature, and that's where we come in.

Our products have the characteristics needed for the challenging environment of the passenger compartment:

- Protection against shock and vibration
- Safety class and no-hazardous materials available
- Environmental stability against temperature extremes, rapid temperature changes and UV radiation
- Protection against humidity and condensation
- Protection from oil, grease, water and acids in soft drinks
- No health risk from the use of the chemical product



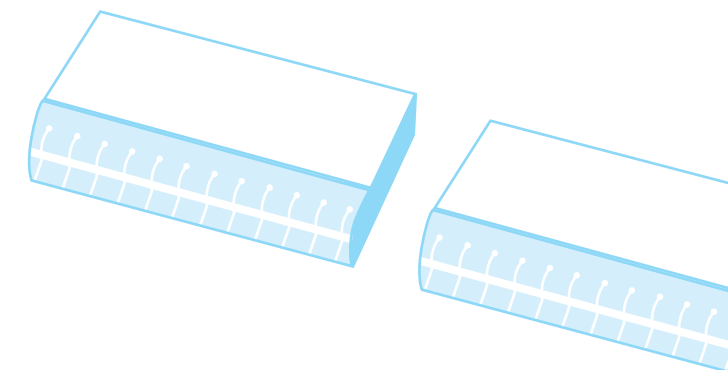
We offer a wide range of conformal coatings (thin and thick film), potting compounds, glues and adhesives, and materials for optical bonding. Materials range from hard elastomers to soft gels, and include innovative combined chemistries.

Examples for applications in the automotive interior where our products are in use:

- Electronic Control Units (mirror, window, seat, roof)
- Entertainment Systems
- High Frequency Devices (Antenna, WLAN, Drive by Wire)
- Touchscreen Displays (Printed Electronics)
- Head Up Displays
- Dash Board Electronics
- Door Lock System
- Steering Control Device
- AC Control Unit
- USB Chargers
- Sensors

+ CHARACTERISTICS

- + Moisture and Liquid Media Protection
- + Low Odor Material
- + Flexible at Low Temperature



Product Series	Benefit	Typical Application	Productname Examples	film / spray coating	dip coating	Potting Selective Potting Dispensing	Hardness / Shore	Viscosity / mPa-s	Tg
Bectron® PL 4122 series Alkyd urethane varnish	Reliable Automotive coating standard Good chemical and thermal resistance Aromatic free Good edge coverage Proven very long field experience	Dash board electronics Door lock systems Head up display	Bectron® PL 4122-37E BLF FLZ Bectron® PL 4122-40E BLF FLZ Bectron® PL 4122-45E BLF FLZ Bectron® PL 4122-40T Bectron® PL 4122-45T	✓	✓		Medium hard	50 to 500	+ 35°C
Bectron® BZ series solvented rubber	Excellent electrical insulation Elastic coating with low Tg Excellent humidity resistance	Dash board electronics Air condition control unit	Bectron® BZ 1807	✓	✓		Medium hard	30 to 150	-40°C
Bectron® PT series Acrylic-urethane coating	Fast process – UV and moisture cure VOC-free, 100 % material High elasticity	USB charger Door lock systems Steering control system	Bectron® PT 4600 Bectron® PT 4601 Bectron® PT 4606 Bectron® PT 4700 N	✓		✓	A 40–A 75	100 to 125000	down to -20°C
Bectron® Silicone Coating series Silicone varnish Silicone coating	Fast humidity cure Soft & eleastic coating High thermal resistant VOC-free, 100% material available Safety class free	Electronic control units (window, seats, mirrow) Fixing of electronic components	Bectron® SDC 76V1-18 Bectron® SC 76V1-21 Bectron® SC 76V1-36	✓	✓	✓	A 15–A 25	450 to 1300	< -50°C
Bectron® PK series 1K- Polyurethane	VOC-free, 100 % material Easy handling, easy process, fast cure Safety class free Elastic material Proven very long field experience	Sensor encapsulation Door lock systems Fixing of electronic components	Bectron® PK 4332 Bectron® PK 4340 Bectron® PK 4344 Bectron® PK 4364b	✓		✓	A 35–D 70	1150 to 9500	-50°C to 5°C
Bectron® MR series Polyolefin melting resin	VOC-free, 100 % material Excellent water resistance Resistance against acids and bases Reworkable No safety classification Excellent dielectric properties	High frequency devises (antenna) Entertainment systems Potting of electronics	Bectron® MR 3402 Bectron® MR 3405 FR Bectron® MR 3406 Bectron® MR 3406 FR	✓	✓	✓	A 10–A 75	500 to 6000	-40 to -25°C
Bectron® PU + CONAP® EN series 2K Polyurethane	Good combination between mechanical flexibility Chemical resistance Wide variation of mechanical properties Different mixing rate also 1:1 available UV stable version	Electronic control units (window, seats, mirrow) Sensor potting	Bectron® PU 4501/PH 4901 Bectron® PU 4526 K5/ PH 4912			✓	A 30–A 40	450 to 3500	-40°C to 10°C
Conashield^{TS} CS series 2-K Floodcoating (Polyurethane)	Substitution of of potting → weight reduction Fast process no waiting time for flipping Fast cure	Ventilation control units	Conashield ^{TS} CS 313 A+B	✓		✓	A 85	10000	-45°C
Bectron® SK series 2K-Silicone resin	High temperature resistance Flexible even at low temperatures Intrinsic UV stability Elastic potting material with very low Tg	Sensors potting	Bectron® SK 75V2-45/ SH 79V2-45			✓	A 40	3200	< -50°C



The Automotive Exterior – Materials up to 125°C and Exposed to the Elements

The outer skin of a car is its interface to the world. It takes in information and relays it to the driver, and sends information out to other drivers. This involves many electronic devices, which all have to stand up to harsh environmental effects. Temperatures vary widely and put mechanical strain on components, solar radiation, water and wind are ubiquitous. Cooling is creating condensation and exposure to moisture. Saltwater from winter roads and detergent from car wash sites seep into slots, and dust and dirt are ever-present.

Each application requires specific protection properties. We address them with a wide range of conformal coatings (thin and thick film), potting compounds, glues and adhesives. Materials range from hard elastomers to soft gels, and include innovative combined chemistries and applications.

CHARACTERISTICS

- + Thermal Flexibility
- + Protection Against UV Radiation
- + Salt Spray Resistance
- + Resistance to High Humidity and Temperature Variations (e.g. “Toyota Test”)

Examples for applications in the automotive exterior where our products are in use:

- Sensors (e.g. LIDAR, Parking, Rotation, etc)
- Tire Pressure Sensors
- Door Locking Systems
- Electronic Control Units (ABS, Light, Brake, Mirror)



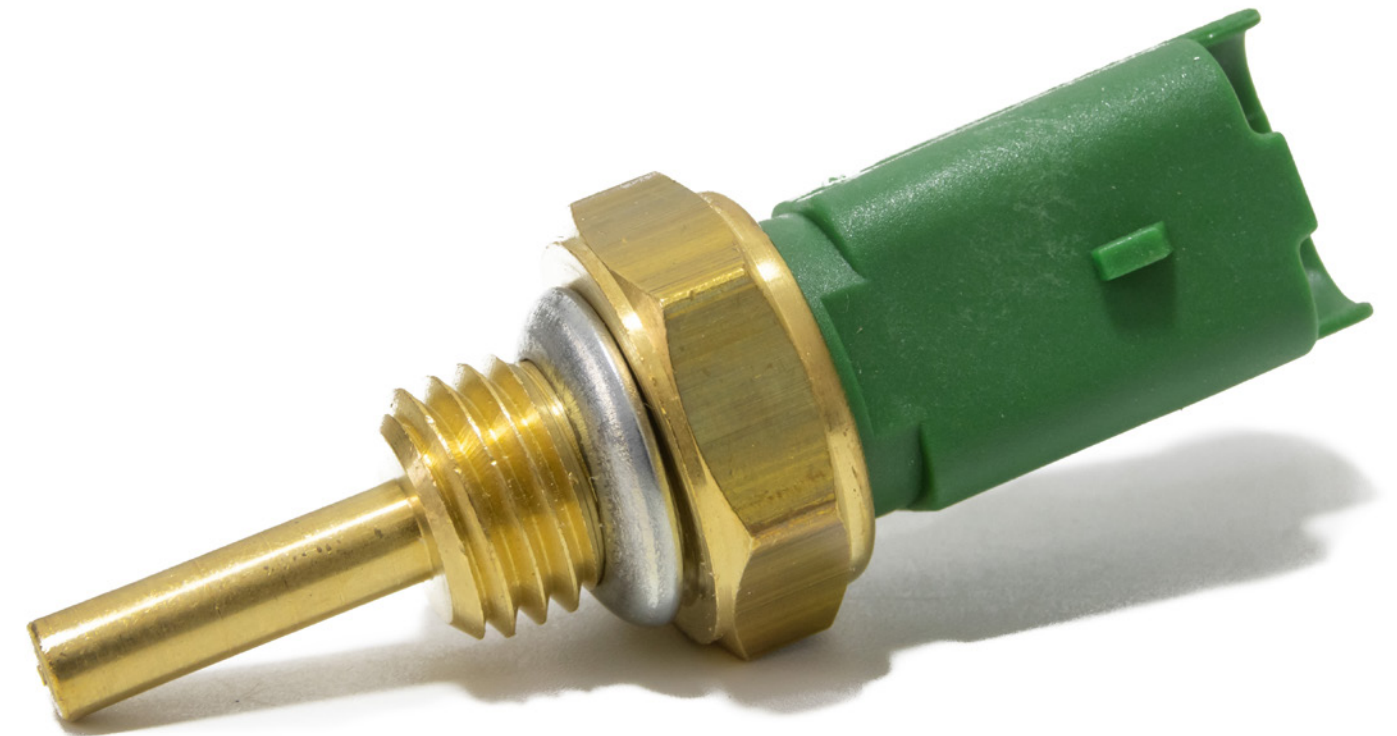
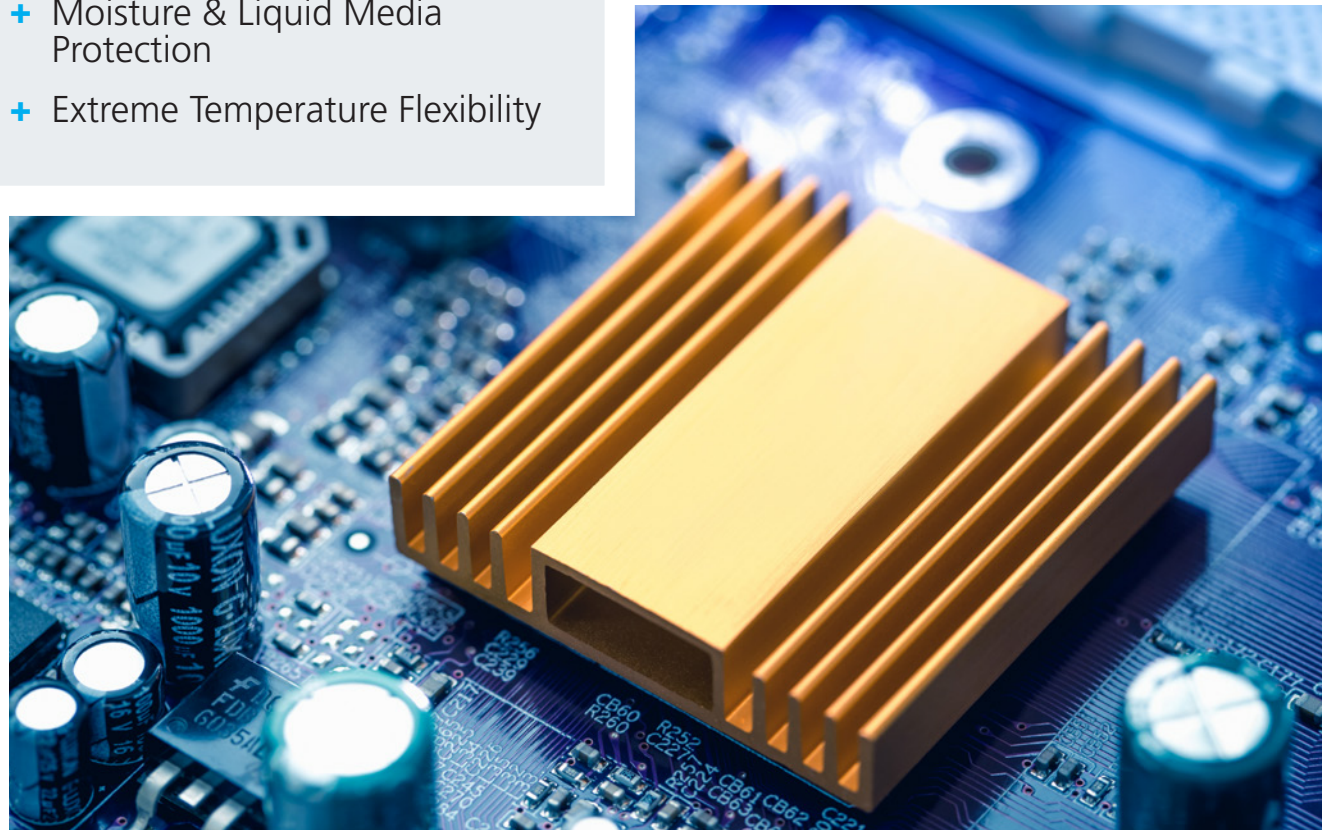
Product Series	Benefit	Typical Application	Productname Examples	film / spray coating	dip coating	Potting Selective Potting Dispensing	Hardness / Shore	Viscosity / mPa·s	Tg
Bectron® PL 4122 series Alkyd urethane varnish	Reliable Automotive coating standard Good chemical and thermal resistance Aromatic free Good edge coverage Proven very long field experience	ECU (ABS, Light, Break, Steering) Door lock systems	Bectron® PL 4122-37E BLF FLZ Bectron® PL 4122-40E BLF FLZ Bectron® PL 4122-45E BLF FLZ Bectron® PL 4122-40T Bectron® PL 4122-45T	✓	✓		Medium hard	50 to 500	+35 °C
Bectron® BZ series solvented rubber	Excellent electrical insulation Elastic coating with low Tg Excellent humidity resistance	ECU (ABS, Light, Break, Steering)	Bectron® BZ 1807	✓	✓		Medium hard	30 to 150	-40 °C
Bectron® Silicone Coating series Silicone varnish Silicone coating	Fast humidity cure Soft & elastic coating High thermal resistant VOC-free, 100 % material available Safety class free	Fixing of electronic components ECU (Light)	Bectron® SDC 76V1-18 Bectron® SC 76V1-21 Bectron® SC 76V1-36	✓	✓	✓	A 15–A 25	450 to 1300	<-50 °C
Bectron® PK series 1K- Polyurethane	VOC-free, 100 % material Easy handling, easy process, fast cure Safety class free Elastic material Proven very long field experience	Car body sensor & Sensors Door lock systems Fixing of electronic components	Bectron® PK 4364b Bectron® PK 5542 FLZ	✓		✓	A 70 to D 40	5000	-50 °C to 5 °C
Bectron® MR series Polyolefin melting resin	VOC-free, 100% material Excellent water resistance Resistance against acids and bases Reworkable No safety classification Excellent dielectric properties	Mirror and door application Potting of electronics	Bectron® MR 3402 Bectron® MR 3405 FR Bectron® MR 3406 Bectron® MR 3406 FR	✓	✓	✓	A 10–A 75	500 to 6000	-40 °C to -25 °C
Bectron® PB series 2K Polybutadiene	Flexible even at extremely low temperatures Excellent shock absorption Excellent water resistance Very good hydrolysis resistance CMR free versions available Good dielectric properties	ECU Potting Sensor potting	Bectron® PB 4540/PH 4940 Bectron® PB 4562/PH 4962			✓	A 40–A 50	2900 to 4700	-60 °C to -40 °C
Bectron® PU + CONAP® EN series 2K Polyurethane	Good combination between mechanical flexibility Chemical resistance Wide variation of mechanical properties Different mixing rate also 1:1 available UV stable version	ECU potting Sensor potting	Bectron® PU 4501/PH 4901 Conap® EN 5852 A+B			✓	A 30–A 85	450 to 9000	-40 °C to 10 °C
Conashield^{TS} CS series 2-K Floodcoating (Polyurethane)	Substitution of of potting → weight reduction Fast process no waiting time for flipping Fast cure	ECU encapsulation	Conashield ^{TS} CS 313 A+B	✓		✓	A 85	10000	-45 °C
Elan-tim® series 2K PU–2K EP–2K SI	Thermally conductivity 1.2 W/mK Good flowability Good chemical resistance	Encapsulation and potting Room temperature and thermal cure	ELAN-tim® CE12 A+B			✓	A 90/D 40	20000	-50 °C to 5 °C
Conapoxy® FR + Damival E series 2K Epoxide	Mixing rate 1:1 Excellent chemical resistance Thermal conductivity 0,8W/mK Low exothermic UL 94 V0 (3 mm)	Sensor potting	Conapoxy® FR 1274 A+B			✓	D 80	40000	≥ 5 °C
Bectron® SK series 2K-Silicone resin	High temperature resistance Flexible even at low temperatures Intrinsic UV stability Elastic potting material with very low Tg	Sensors potting	Bectron® SK 75V2-35/ SH 79V5-35 Bectron® SK 75V2-45/ SH 79V2-45			✓	A 35–A 40	1000 to 3200	<-50 °C

The Engine & Power Train – Material above 150 °C

The ELANTAS product portfolio offers a broad range of protection and electrical insulation materials that can be found in the motor, powertrain, battery and other electronic components of a vehicle. A combustion engine is a hot piece of machinery, leading to high temperatures not limited to the engine. Charging of eMobility cars creates significant heat when electrical power is converted from AC/DC or DC/AC or charged/discharged quickly. Therefore thermal management brings relieve of heat stress to vital electronic components in the engine / eMotor compartment. In addition, high electrical voltages may appear, demanding superior electrical insulation properties.

+ CHARACTERISTICS

- + Shock & Vibration Protection
- + Automotive Liquid Resistance
- + Moisture & Liquid Media Protection
- + Extreme Temperature Flexibility



Consequently, engine compartment electronics require specific protection against thermal stress.

We provide conformal coatings (thin and thick film), potting compounds, glues and adhesives, from hard elastomers to soft gels, including innovative combined chemistries, to meet the following requirements:

- Thermal conductivity
- High electrical insulation
- Resistance to automotive liquids
- Balanced combination of mechanical rigidity and flexibility to withstand high shock and vibrations
- Temperature compatibility from -60 °C to +230 °C

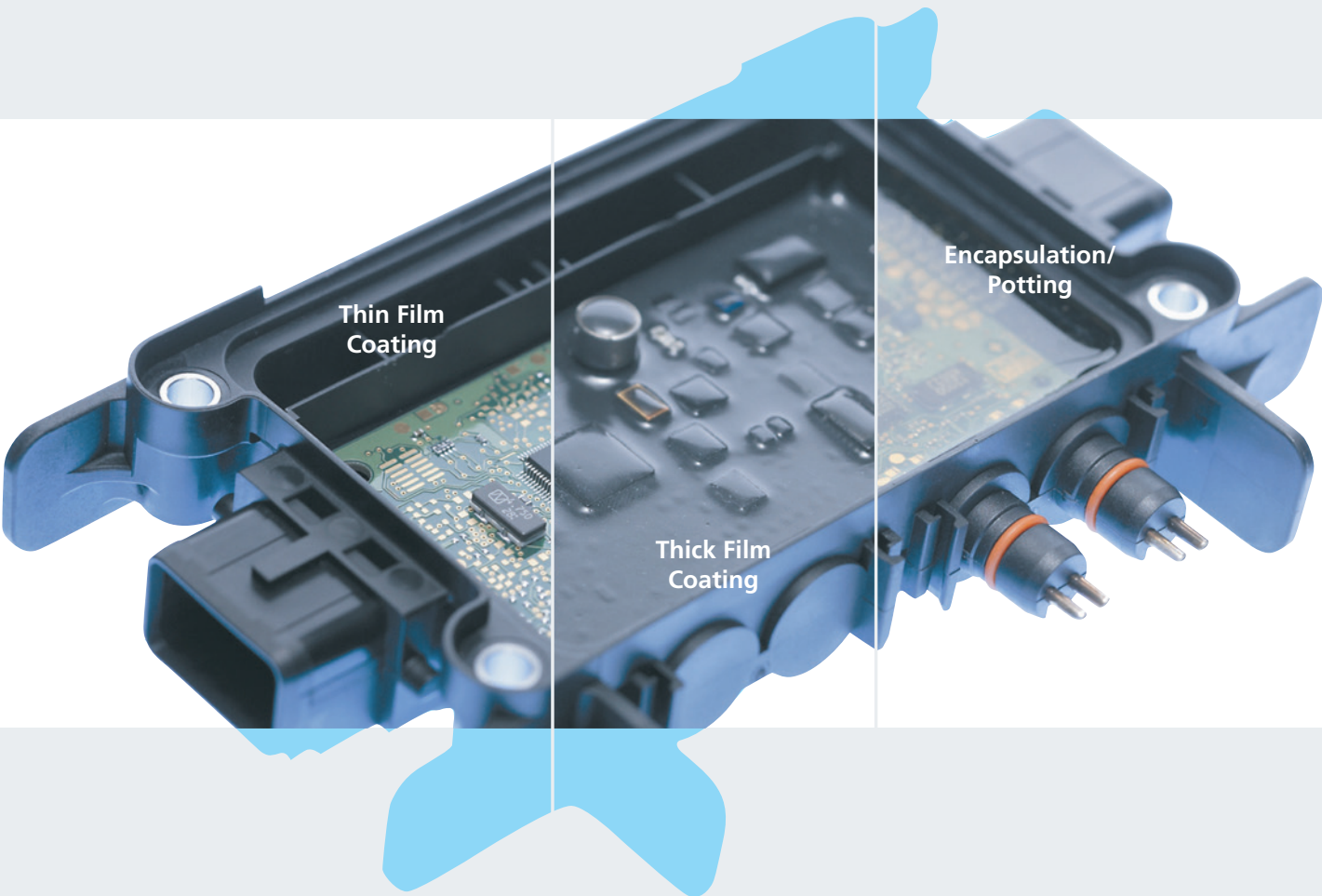
Examples for applications where our products are in use:

- IGBT
- Gearbox Control System
- Electronic Control Unit
- OBC
- Inverter
- BMS
- Battery Systems
- Sensors (Temperature, Vibration, Pressure, NOx)

Product Series	Benefit	Typical Application	Productname Examples	film / spray coating	dip coating	Potting Selective Potting Dispensing	Hardness / Shore	Viscosity / mPa·s	Tg
Bectron® PL 4122 series Alkyd urethane varnish	Reliable Automotive coating standard Good chemical and thermal resistance Aromatic free Good edge coverage Proven very long field experience	ECU BMS OBC + Inverter	Bectron® PL 4122-40E BLF FLZ Bectron® PL 4122-45E BLF FLZ Bectron® PL 4122-40T Bectron® PL 4122-45T	✓	✓		Medium hard	50 to 500	+35 °C
Bectron® BZ series solvented rubber	Excellent electrical insulation Elastic coating with low Tg Very good temperature resistance Excellent humidity resistance	ECU BMS OBC + Inverter	Bectron® BZ 1807	✓	✓		Medium hard	30 to 150	-40 °C
Bectron® PT series Acrylic-urethane coating	Fast process – UV and moisture cure VOC-free, 100 % material High elasticity	Batterie systems Batterie Coating Bus bar coating	Bectron® PT 4601 Bectron® PT 4606 Bectron® PT 4612	✓		✓	A 40–A 75	1000 to 125000	down to -20 °C
Bectron® PK series 1K- Polyurethane	VOC-free, 100 % material Easy handling, easy process, fast cure Safety class free Elastic material	Sensor encapsulation Fixing of electronic components Engine compartment sensor Nox sensor	Bectron® PK 5540* Bectron® PK 5542 FLZ*	✓		✓	A 70	5000–10000	-50 °C to 5 °C
Bectron® PB series 2K Polybutadiene	Flexible even at extremely low temperatures Excellent shock absorption Excellent water resistance Very good hydrolysis resistance CMR free versions available Good dielectric properties	ECU Potting Sensor potting OBC + Inverter	Bectron® PB 4510/PH 4910 Bectron® PB 4562/PH 4962			✓	A 45–D 40	2300 to 4700	-60 °C to -40 °C
Bectron® PU + CONAP® EN series 2K Polyurethane	Good combination between mechanical flexibility Chemical resistance Wide variation of mechanical properties Different mixing rate also 1:1 available UV stable version	ECU potting Sensor potting OBC + Inverter BMS	Bectron® PU 4536 PH 4936 Conap® EN 5852 A+B			✓	A 50–A 85	2500 to 9000	-40 °C to 10 °C
Conashield^{TS} CS series 2-K Floodcoating (Polyurethane)	Substitution of of potting → weight reduction Fast process no waiting time for flipping Fast cure	BMS ECU encapsulation OBC + Inverter	Conashield ^{TS} CS 313 A+B	✓		✓	A 85	10000	-45 °C
Elan-tim® series 2K PU - 2K EP - 2K SI	Thermally conductivity up to 2.6 W/mK Thermally conductivity 1.2 W/mK Good flowability Good chemical resistance	Encapsulation and potting Room temperature and thermal cure OBC + Inverter	ELAN-tim® CE12 A+B ELAN-tim® CS26 A+B			✓	A 60–A 90 D40	10000 to 20000	-50 °C to 5 °C
Bectron® SG series 2K-Silicone gel	High voltage and high temperature resistance Instant and thermal cure Low ion content UL 94HB	AC/DC inverter IGBT	Bectron® SG 75V1-75/ SG 79V1-75			✓	PEN 75	1000	< -50 °C
Bectron® SK series 2K-Silicone resin	High temperature resistance Flexible even at low temperatures Intrinsic UV stability Elastic potting material with very low Tg	Sensors potting Batterie management	Bectron® SK 75V2-45/ SH 79V2-45			✓	A 40	3200	< -50 °C

* max.140°C

Different Ways to Protect Electronic Devices



Typical Application Areas for Bectron® Products



Technical Expertise and Broad Capabilities

In-House Raw Material Production

We process the bulk of our raw materials ourselves, in-house. This gives us full control throughout the development and manufacturing chain.

Crucially for our customers, this makes us a more reliable partner. Because we make our own raw materials, we are more independent from variations in supply. This means that we can deliver consistent quality, in the required quantity, at the required time.

Furthermore, the resulting backward integrated synthesis of many different types of chemistries gives us the edge in innovation. We start product development higher upstream, for higher-performance solutions.



State-of-the-Art Research Laboratories

Our product innovations build on a state-of-the-art laboratory infrastructure and an extensive knowledge of a full range of chemistries. Our researchers combine a deep understanding of acrylics, epoxides, polyurethanes, silicones, and melting resins with expertise in chemistry, engineering, design, and processing.

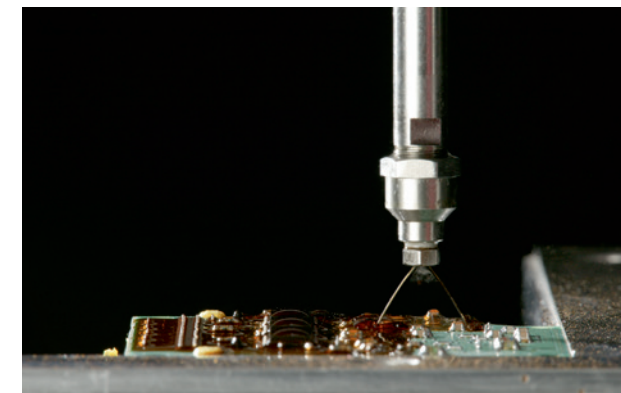
This enables us to develop solutions that combine different chemical properties. It allows us to make customized solutions for specific customer needs, as market requirements grow.

We are aware of our environmental responsibility, and our product development focuses on environmental solutions.

Application Laboratories

The knowledge how to use our material is an important value-add that we provide. We have deep technical expertise in the application of conformal coatings, pottings and glues. Our application laboratories feature industrial, state-of-the-art UV-curing furnaces, thermal curing, dispensing, and automated lacquering and coating equipment, so that we can test and refine the performance of our products under conditions of actual use.

This lets customers know that our products will fit into their production lines without issues. To make sure of it, we provide extensive support in material selection, as well as technical backup to ensure the proper operation of production equipment. Our training in application methods helps customers get the most out of our solutions. We are also supporting customers in applying our materials on their test printed circuit boards.



Quality Testing Laboratories

ELANTAS quality testing laboratories perform a wide range of chemical, mechanical, thermal and electrical tests, on low and high voltage specimens. Our test labs replicate the conditions under which our products will be used, during production as well as later during use. We don't just test our products, we also test devices that use our products, for thermal shock, physical properties, dimensional variation, adhesion, resistance to humidity, resistance against fluids and all other relevant criteria including extended chemical analysis. Our labs do long-term testing such as SIR, climate, thermal shock and salt spray tests.

ELANTAS is a member of, and active contributor to, international standardization committees (ISO, IEC).

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