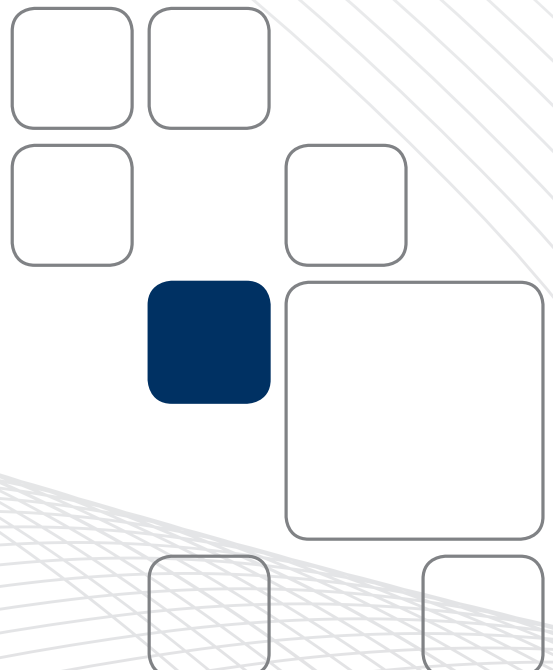


Advanced Materials

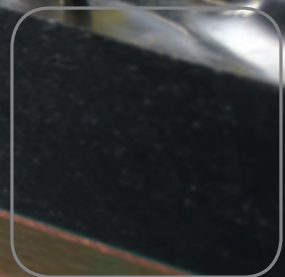
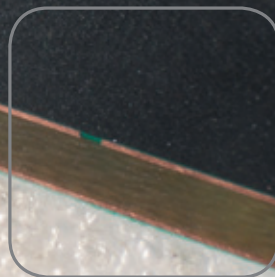
Protection, safety and sustainability

Selector guide
for electronics





Rely on
us with
confidence





Araldite® Arathane® Aratherm®

The original brands
serving worldwide electronics
industry for more than
half a century.

Rely on us with confidence

For more than 60 years, as a global provider, Huntsman Advanced Materials, has developed innovative solutions that are used during virtually every stage in the production of electronic devices. Our know-how and expertise allow us to develop a wide range of solutions that answer the most stringent requirements for electronics applications:

- > High thermal resistance and thermal conductivity
- > Flame-retardancy (UL94 V0/HB listing, Railway NF16/101-102 and EN/TS 45545 qualifications)
- > Excellent mechanical and dielectric properties
- > Variable hardness and high dimensional stability
- > Good chemical resistance and low water uptake
- > Reduced production costs and improved efficiency



More than just products

All products are tested in-house in our electrical and mechanical testing laboratories to ensure they provide the desired properties and comply with environmental requirements. Our own certified UL laboratory can speed up the approval process and minimize time-to-market. Moreover our global manufacturing footprint including ISO/TS 16949 certified plants in Europe, China and the US and our local technical support teams ensure the highest proximity with our customers.



Protection, safety and sustainability

Thermosets such as epoxies and polyurethanes are widely used in the electronics industry to protect devices against chemical, mechanical and electrical loads.

Advantages

Thermosets over thermoplastics

- > Dimensional accuracy and stability
- > Excellent property retention over a broad range of temperatures
- > Solvent resistance
- > Non-melting, flame-retardant & low-smoke density
- > Creep resistant

Epoxy encapsulants

- > Ambient and hot curing systems
- > Long pot life, latency
- > Excellent cross linking
- > Excellent impregnation
- > High voltage behavior on impregnated parts
- > High Tg
- > Thermal endurance, high temperature applications
- > Long-term reliability

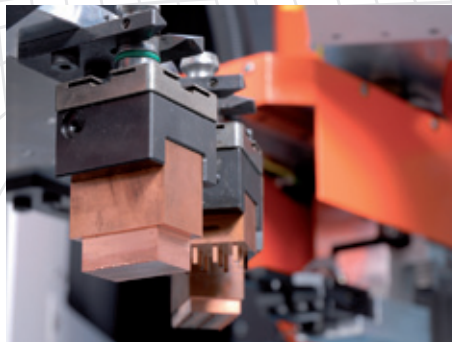
Polyurethane encapsulants

- > Low viscosity and easy processing
- > Low exothermic reaction and low shrinkage
- > Flexibility at medium and low temperatures
- > Suitable for pressure sensitive devices
- > Crack resistance
- > Thermal cycling resistance
- > Casting of big volumes

Our markets



Land transportation



Industrial equipment



Aerospace and defense

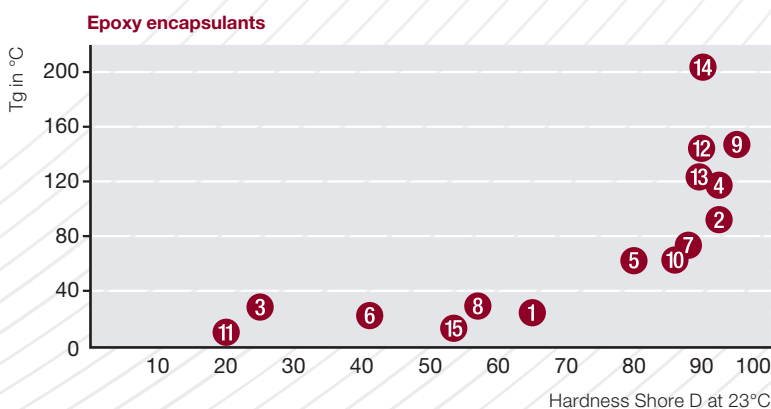
Epoxy and polyurethane encapsulants

The selection of the appropriate encapsulants and the resulting choice of chemistries are dependent on the various requirements of the final application. Huntsman offers ranges of epoxy and polyurethane encapsulant chemistries that provide customers with the best solution possible for their specific applications.

Temperature is very often the dominating ageing factor on insulating materials and is by far the most common stress applied to electronic devices. The ability of parts to withstand cyclical exposures to extremely high and low temperatures is correlated to the thermal endurance profile of the encapsulant.

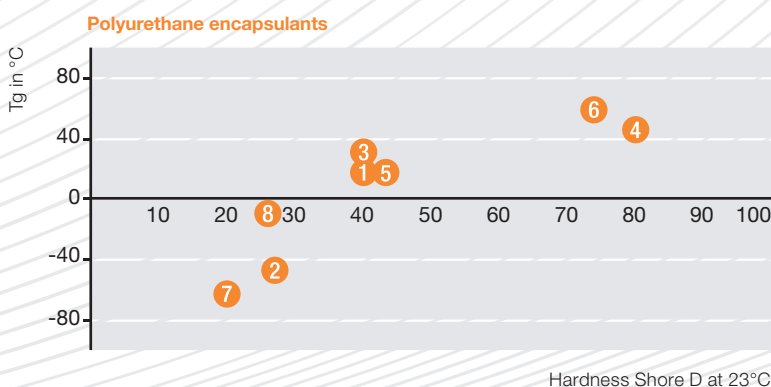
Epoxy resins are proven for long-term thermal endurance, especially for applications at higher temperatures. Polyurethane systems are also available, offering thermal endurance profiles above 100°C and flexibility at low temperatures.

Chemical resistance of polyurethanes and epoxies is strongly related to the crosslinked density of the polymer network. As a rule of thumb, the harder the material, the better the chemical resistance.



Typical Araldite® systems

- 1 Araldite® CW 5730N / Aradur® HY 5731
- 2 Araldite® CW 1446 BDF / Aradur® HY 2919
- 3 Araldite® CY 221 / Aradur® HY 2966
- 4 Araldite® CW 2710-1 / Araldite® HW 2711-1
- 5 Araldite® DBF / Aradur® HY 956 EN
- 6 Araldite® CW 2243-2 L / Aradur® HY 842
- 7 Araldite® CW 1302 / Aradur® HY 1300
- 8 Araldite® CW 1312 / Aradur® HY 1300
- 9 Araldite® CW 1195-1 / Aradur® HW 1196
- 10 Araldite® XB 2252 / Aradur® XB 2253
- 11 Araldite® CW 2243-2 / Aradur® HY 1872
- 12 Araldite® CW 5725-3 / Aradur® HY 5726
- 13 Araldite® CW5763 / Aradur® HY 5726
- 14 Araldite® CW1116-1 / Aradur® XW1257-1



Typical Arathane® systems

- 1 Arathane® CW 5620 / Arathane® HY 5610
- 2 Arathane® CW 5650 / Arathane® HY 5610
- 3 Arathane® XB 5633 / Arathane® HY 5610
- 4 Arathane® CW 5631 / Arathane® HY 5610
- 5 Arathane® VBU 6942 / Arathane® VBU 001/B
- 6 Arathane® VBU 6920 / Arathane® HY 5611-1
- 7 Arathane® XW 949-1 / Arathane® HY 5610
- 8 Arathane® CW 5660 / Arathane® HY 5610



Consumer electronics



Renewable energies



Medical

Reliable and comprehensive solutions for e-mobility

Our involvement in e-mobility

For producers of e-mobility and e-drives concepts who require innovation partnership with a global resin supplier and have a strong focus on processing costs, Huntsman Advanced Materials delivers unique encapsulating solutions to harness temperature management, resistance to harsh conditions and other key challenges faced by the industry. Greater reliability, higher power density and smaller designs become then achievable. Our innovation capabilities based on 60 years successful track records with pioneering companies make us a trusted partner for sustainable automobile and industrial solutions.

1 Wire harness /connectors

Your needs

- > Excellent chemical resistance
- > Excellent dielectric properties
- > Long-lasting sealing
- > Choice of color
- > Cost efficiency

Our solutions

Araldite® and Arathane® potting and impregnation resin systems
Euremelt® hotmelt adhesives
Araldite® DW coloring pastes

2 Inverters and converters

Your needs

- > High voltage resistance
- > Heat dissipation
- > Chemical resistance
- > High vibration damping
- > Fast processability

Our solutions

UL 94 registered Araldite® and Arathane® potting and casting resin systems with excellent flowability and low Tg

3 Motors

Your needs

- > High operating temperature and thermal endurance
- > Excellent heat dissipation
- > Vibration and noise damping
- > High crack resistance
- > Enhanced motor performance

Our solutions

UL 94 registered Araldite® and Arathane® casting and impregnating resin systems up to class H and a thermal conductivity of 3 W/mK
Araldite® adhesives for magnet bonding with fast fixture time and high shear strength

4 Sensors and switches

Your needs

- > High flexibility / crack resistance
- > Low exotherm
- > Excellent adhesion
- > Excellent chemical resistance
- > Excellent thermal endurance

Our solutions

Araldite® and Arathane® potting, casting and impregnation resin systems with low temperature flexibility
Araldite® adhesives

5 Electronic control units

Your needs

- > Electrical insulation
- > Chemical resistance
- > Reliability
- > Low exotherm
- > Low production costs

Our solutions

UL 94 registered Araldite® and Arathane® potting and casting resin systems with cold curing and good flexibility
Euremelt® hotmelt adhesives

6 Batteries

Your needs

- > High voltage resistance
- > Excellent chemical resistance
- > Long-lasting and reliable sealing
- > Lightweight end-product
- > Low cost alternatives

Our solutions

Araldite® potting and housing sealing systems



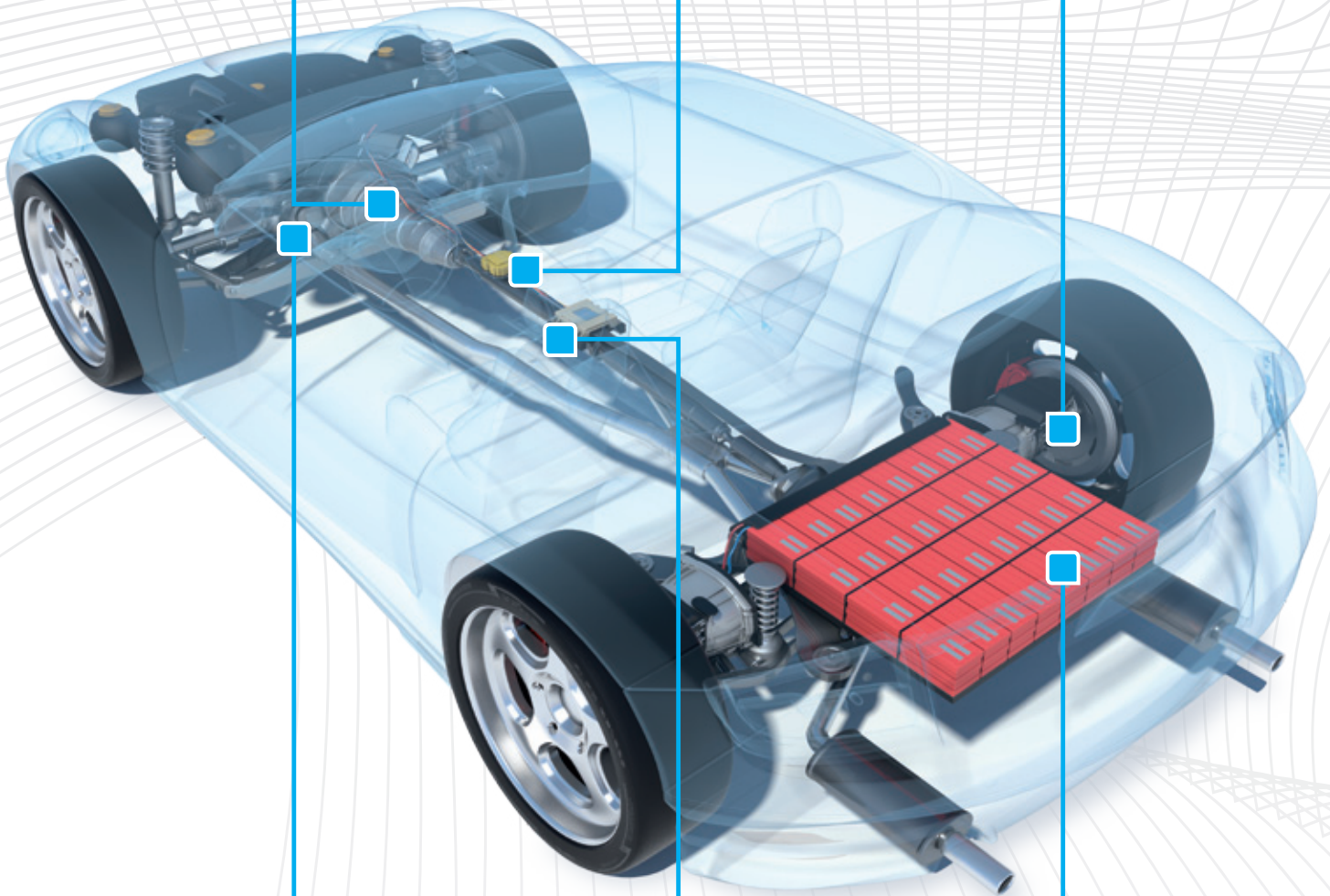
1 Wire harness / connectors



2 Inverters and converters



3 Motors



4 Sensors and switches



5 Electronic control units



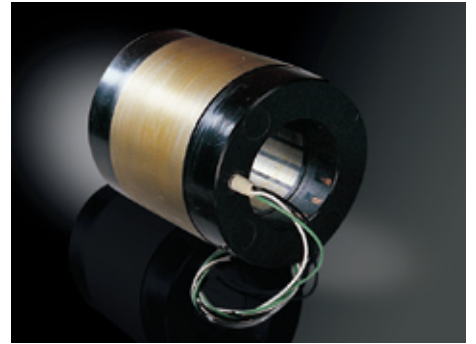
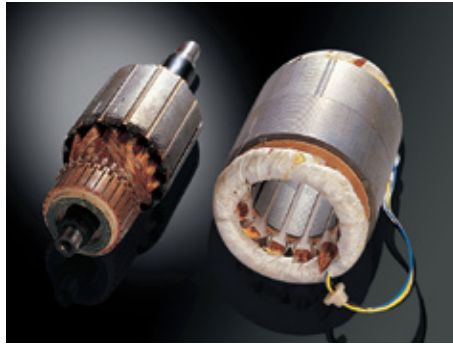
6 Batteries

Our solutions for encapsulation

Electric motors



| Product designation | Applications | | | Process | | | Mix ratio | Impregnation capability | Curing conditions | Glass transition temperature (Tg) | Coefficient of thermal expansion (CTE) | Thermal class |
|--|--------------|------------|-------|----------------|-------------------|-----------------------------|-----------|-------------------------|-------------------|-----------------------------------|--|---------------|
| | Power tools | Automotive | Pumps | Vacuum casting | Casting / Potting | Trickle impregnation or VPI | | | | | | |
| Conditions | | | | | | | | | | DSC | Below Tg / Above Tg | |
| Norm | | | | | | | | | | ISO 11357-2 | | IEC 60085 |
| Unit | | | | | | | pbw | | hot / cold | °C | 10 ⁻⁶ K ⁻¹ | |
| Aratherm® CW 2731 | | • | | • | | | - | o | hot | 165 | 24 / 48 | H |
| Araldite® CW 2710-1 / Araldite® HW 2711-1 NEW | | • | | • | • | | 100:100 | + | hot | 120 | 24 / 67 | H |
| Araldite® CW 1312 / Aradur® HY 1300 | | • | | • | • | | 100:9 | ++ | cold | 30 | 103 | B |
| Araldite® CW 1302 / Aradur® HY 1300 | | • | | • | • | | 100:11 | + | cold | 75 | 42 / 105 | H |
| Araldite® CW 229-3 / Aradur® HW 229-1 | | • | | • | • | | 100:100 | + | hot | 110 - 125 | 30 / 100 | H |
| Araldite® CW 229 NPC / Aradur® HW 229 NPC | | • | | • | • | | 100:100 | + | hot | 110 - 125 | 30 | H |
| Araldite® CW 1446 BDF / Aradur® HY 2919 | | • | | • | • | | 100:24 | ++ | hot | 95 | 48 / 134 | H |
| Araldite® XB 2252 / Aradur® XB 2253 | | • | • | • | • | | 100:13 | ++ | cold | 68 | 60 / 100 | F |
| Araldite® CW 5725-3 / Aradur® HY 5726 | | • | | • | • | | 100:28 | ++ | hot | 144 | 35 | H |
| Arathane CW 5631 / Arathane HY 5610 | | • | | • | | | 100:25 | ++ | cold | 47 | 70 / 135 | F |
| Araldite® CY 246 / Aradur® XB 5911 | • | | | | • | • | 100:35 | +++ | hot | 124 | 70 / 130 | - |
| Araldite® CY 236 / Aradur® XB 5979 | • | | | | • | • | 100:30 | +++ | hot | 100 | 70 / 130 | - |



| Thermal conductivity | Flammability | Benefits |
|----------------------|--|--|
| 25°C | | |
| ISO 8894-1 | | |
| W/mK | Class | |
| 3.00 | UL 94, V-0 (12 mm) | Very high thermal conductivity. Good thermal resistance. Good resistance to atmospheric and chemical degradation. Stable at room temperature. Monocomponent. |
| 1.70 | UL 94, V-0 (12 mm) | High thermal conductivity. |
| 1.10 | UL 94, V-0 (3,2 mm) | Resilient casting system exhibiting good resistance to thermal ageing and good thermal shock resistance. |
| 0.88 | UL 94, V-0 (3 mm), HB NF 16-101/102, I2F1/4 | Excellent thermal endurance. Recommended for electrical devices working in potentially explosive environments. Thermal Index (TI) of 181°C. Railway qualification: EN 45545-2 R23 HL2 / R24 HL3. |
| 0.70 | UL 94, V-1 (12 mm), HB (4 mm), NF 16-101/102, I3F0/2 | Outstanding mechanical and electrical properties combined with very high crack and thermal shock resistance due to the low CTE. Qualified for encapsulation of large metal parts. Thermal Index (TI) of 204°C. |
| 0.70 | UL 94, V-1 (12 mm), HB (4 mm), NF 16-101/102, I3F0/2 | Outstanding mechanical and electrical properties combined with very high crack and thermal shock resistance due to the low CTE. Qualified for encapsulation of large metal parts. No post-curing after demoulding. |
| 0.67 | UL 94, V-0 (6 mm) | Multipurpose epoxy impregnation system. Good dielectric properties. Good thermal shock resistance. Excellent impregnation. Thermal Index (TI) of 200°C. |
| 0.66 | UL 94, V-0 (6 mm) | Filled casting system for processing and curing at room temperature. Excellent sedimentation stability and low abrasive fillers. Excellent thermal endurance. Railway qualification: EN 45545-2 R23 HL1 / R24 HL2. |
| 0.60 | UL 94, HB | Optimally filled casting system with good impregnation capability for processing and curing at high temperature. |
| 0.60 | UL 94, V-0 (6 mm) | High thermal endurance. Excellent flow properties. Non abrasive casting system. |
| 0.20 | - | Unfilled system. Produces homogeneous winding impregnation with excellent mechanical and electrical properties. Very good adhesion. High thermal loading capacity. |
| 0.20 | - | Unfilled system. Produces homogeneous winding impregnation with excellent mechanical and electrical properties. Very good adhesion. High thermal loading capacity. |

Ignition coils



| Product designation | Applications | | | Process | | Mix ratio | Color | Curing conditions | Glass transition temperature (Tg) | Thermal class | Hardness | Coefficient of thermal expansion (CTE) |
|---------------------------------------|--------------|------------------|-------------------------|----------------|-------------------|-----------|-------------|-------------------|-----------------------------------|---------------|-----------|--|
| | Car | Oil / Gas burner | Motorbike or motorcycle | Vacuum casting | Casting / Potting | | | | | | | |
| Conditions | | | | | | | | | DSC | | 23°C | |
| Norm | | | | | | | | | ISO 11357-2 | IEC 60085 | DIN 53505 | ISO 11359 |
| Unit | | | | | | pbw | | hot / cold | °C | | Shore D | 10 ⁻⁶ K ⁻¹ |
| Araldite® CW 5725-3 / Aradur® HY 5726 | • | | • | • | | 100:28 | black | hot | 144 | H | D90 | 35 |
| Araldite® CW 5715 / Aradur® HY 5716 | • | | | • | | 100:27 | black | hot | 135 | H | D85 | 28 |
| Araldite® CW 5763 / Aradur® HY 5726 | • | | | • | | 100:26 | black | hot | 126 | H | D90 | 33 |
| Araldite® XGR 247 / Aradur® XGH 248 | • | | | • | | 100:35 | grey | hot | 117 | H | D88 | 42 |
| Araldite® CY 2239 / Aradur® XG 209-1 | | | • | • | • | 100:84 | nc | hot | 77 | - | D80 | 50 |
| Araldite® XB 5721 / Aradur® XB 5723 | • | | | • | | 100:30 | black | hot | 70 | H | D88 | 39 |
| Araldite® CW 2202 / Aradur® HY 2203 | • | | • | • | | 100:30 | grey | hot | 69 | F | D77 | 42 |
| Araldite® XB 2252 / Aradur® XB 2253 | | • | | • | | 100:13 | black | cold | 65 | F | D86 | 60 |
| Araldite® DBF / Aradur® HY 956 EN | | • | | | • | 100:20 | nc | cold | 60 | - | D80 | - |
| Araldite® CW 2243-2L / Aradur® HY 842 | | • | | | • | 100:20 | blue | cold | 37 | B | D70 | 86 |
| Arathane® CW 5620 / Arathane® HY 5610 | | • | | | • | 100:22 | black, blue | cold | 20 | B | D40 | 55 |
| Araldite® DBF / Aradur® HY 842 | | • | | | • | 100:40 | nc | cold | - | - | D64 | - |

nc : not colored



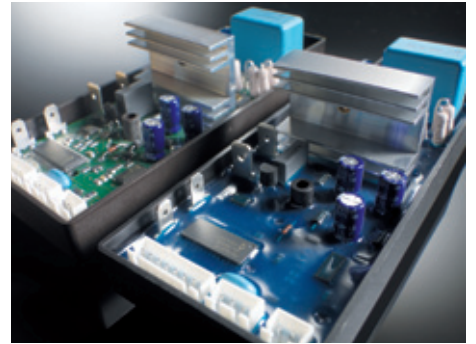
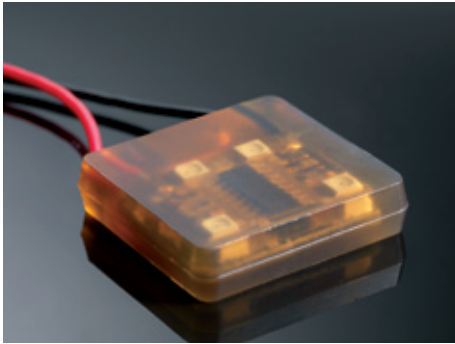
| Flammability | Benefits |
|-------------------|--|
| | |
| | |
| Class | |
| UL 94, HB | Mineral filled resin with very good impregnation capability. |
| UL 94, HB | Optimally filled toughened casting resin system with good impregnation capability for processing at high temperature. |
| UL 94, HB | Mineral filled resin with very high performance. |
| UL 94, HB | Low viscosity, optimally filled casting system for processing and curing at high temperature. |
| | Unfilled resin system with good dielectric and thermal shock resistance. |
| UL 94, HB | System with very good impregnation capability. Excellent thermal shock resistance. |
| UL 94, HB | Mineral filled resin with very good impregnation capability. |
| UL 94, V-0 (6 mm) | Mineral filled casting system with excellent thermal ageing stability and thermal shock resistance. Railway qualification: EN 45545-2 R23 HL1 / R24 HL2. |
| | Unfilled resin system with good chemical and heat resistance. |
| UL 94, V-0 (6 mm) | Mineral filled casting system with good thermal ageing stability and thermal shock resistance. Railway qualification: EN 45545-2 R23 HL1 / R24 HL2. |
| UL 94, V-0 (6 mm) | Halogen free multipurpose PU system for pressure sensitive devices. Railway qualification: EN 45545-2 R24 HL1. |
| | Unfilled resin system with high flexibility. Good chemical and heat resistance. |

PU = polyurethane

Assemblies



| Product designation | Applications | | | | Process | | Mix ratio | Curing conditions | Glass transition temperature (Tg) | Thermal class | Hardness |
|---|------------------------|-------------------|--------------------|---------------------------|----------------|-------------------|-----------|-------------------|-----------------------------------|---------------|-------------------|
| | Inverters / Converters | Modules / Sensors | Proximity switches | Wire harness / Connectors | Vacuum casting | Casting / Potting | | | | | |
| Conditions | | | | | | | | | DSC | | 23°C |
| Norm | | | | | | | | | ISO 11357-2 | IEC 60085 | DIN 53505 |
| Unit | | | | | | | pbw | hot / cold | °C | | Shore D / Shore A |
| Araldite® XW 1155-1 / Aradur® HY 1473 | | | • | | | • | 100:18 | cold | 58 | B | n.a. |
| Araldite® DBF / Aradur® HY 2966 | | • | | | • | • | 100:25 | cold | 54 | E | D80 |
| Araldite® CW 5730N / Aradur® HY 5731 | • | • | | | • | • | 100:28 | hot | 30 | F | D70 |
| Arathane® CW 5620 / Arathane® HY 5610 | • | • | | • | • | • | 100:22 | cold | 20 | B | D40 / A85 |
| Araldite® CW 2243-2L / Aradur® HY 1872 | | • | | | • | • | 100:22 | cold | 8 | E | D20 / A70 |
| Arathane® CW 5660 / Arathane® HY 5610 | • | | | | • | • | 100:15 | cold | -9 | F | D29 / A85 |
| Euremelt® 3413 | | • | | • | | • | - | n.a. | -35 | F | D28 / A86 |
| Arathane® XW 949-1 / Arathane® HY 5610 | | • | | | • | • | 100:50 | cold | -62 | B | D20 / A70 |



| Flammability | Benefits |
|------------------|--|
| | |
| Class | |
| UL 94 HBF (6 mm) | Filled expandable EP casting system. Good thermal shock resistance. Excellent electrical properties. |
| | Low viscosity. Unfilled EP resin. Good heat resistance. Good resistance to atmospheric and chemical degradation. |
| UL 94 V-0 (6 mm) | Flexible impregnation EP system. |
| UL 94 V-0 (6 mm) | Flexible multipurpose PU system. Excellent flow properties. Thermal Index (TI) of 152°C. Railway qualification: EN 45545-2 R24 HL1. |
| | Very flexible EP system with good thermal ageing stability. Long pot life. |
| UL V-0 (6 mm) | Low viscosity and high thermal conductivity. Good flowability. For encapsulation of (solar) electric inverters. |
| UL 94 V-0 (4 mm) | Thermoplastic hotmelt adhesive. Application temperature 180-230°C. Good adhesion to PVC and other plastics. High flexibility and good heat stability under load. Casting of electrical devices by low pressure injection moulding. Suitable for ECUs (Electronic Control Units). |
| | Unfilled PU system. Low modulus. Excellent dielectric properties. Good thermal shock resistance. |

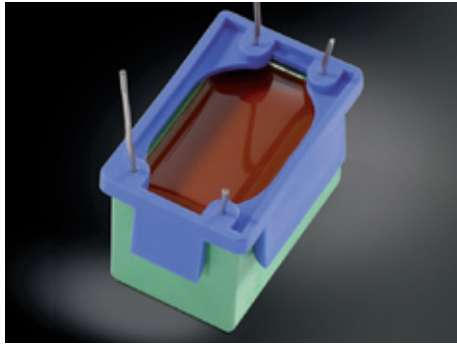
EP = epoxy PU = polyurethane

Components



| Product designation | Applications | | | | Process | | Mix ratio | Curing conditions | Glass transition temperature (T _g) | Thermal class | Hardness | Flammability |
|---|-------------------------------------|---------|------------------------|-----------------------|----------------|-------------------|-----------|-------------------|--|---------------|-------------------|--|
| | Inductive components / Transformers | Filters | Capacitors / Resistors | Power semi-conductors | Vacuum casting | Casting / Potting | | | | | | |
| Conditions | | | | | | | | | DSC | | 23°C | |
| Norm | | | | | | | | | ISO 11357-2 | IEC 60085 | DIN 53505 | |
| Unit | | | | | | | pbw | hot / cold | °C | | Shore D / Shore A | Class |
| Araldite® CW 1195-1 / Aradur® HW 1196 | | | | • | • | • | 100:100 | hot | 146 | H | D95 | UL 94 V-0 (6 mm) |
| Araldite® CW 1446 BDF / Aradur® HY 2919 | • | | | | • | • | 100:24 | hot | 95 | H | D92 | UL 94 V-0 (6 mm) |
| Araldite® CW 1302 / Aradur® HY 1300 | • | | | | • | • | 100:11 | cold | 75 | H | D88 | UL 94 V-0 (3 mm) NF 16-101/102, I2F1/4 |
| Araldite® XB 2252 / Aradur® XB 2253 | • | | • | | • | • | 100:13 | cold | 65 | F | D86 | UL 94 V-0 (6 mm) |
| Arathane® VB U 6920 / Arathane® HY 5611-1 | | | • | | • | • | 100:25 | cold | 60 | F | D74 / A88 | UL 94 V-0 (6 mm) |
| Arathane® VB U 6910 / Arathane® HY 5611-1 | | • | • | | • | • | 100:25 | cold | 55 | F | D82 | UL 94 V-0 (6 mm) |
| Araldite® DBF / Aradur® HY 2966 | • | | • | | • | • | 100:25 | cold | 54 | E | D80 | |
| Araldite® CW 2250-1 / Aradur® HY 2251 | • | • | • | | • | • | 100:13 | cold | 54 | B | D88 | UL 94 V-0 (4 mm), NF 16-101/102, I3F1/2 |
| Arathane® CW 5631 / Arathane® HY 5610 | • | • | • | | • | | 100:25 | cold | 47 | F | D80 | UL 94 V-0 (6 mm), NF 16-101/102, I3F1/2 |
| Araldite® CW 2243-2L / Aradur® HY 2966 | • | | | | • | • | 100:25 | cold | 37 | B | D70 | UL 94 V-0 (6 mm) |

Continued on page 16



| Dielectric strength | Dielectric dissipation factor (tan δ) | Relative permittivity (ϵ_r) | Benefits |
|---------------------|---|--|---|
| 2mm plate | 23°C | 50 Hz | |
| IEC 60243-1 | IEC 60250 | IEC 60250 | |
| kV/mm | % | 23°C | |
| 14 | 0.5 | 3.7 | Optimally filled EP system with good impregnating capability. Low CTE. |
| 25 | 1.5 | 4.0 | Flexible, multipurpose EP impregnation system. Excellent impregnation. Thermal Index (TI) of 204°C. |
| 27 | 5.3 | 4.9 | Optimally filled casting system with good impregnating capability. High thermal conductivity. Low water absorption. Thermal Index (TI) of 181°C. Railway qualification: EN 45545-2 R23 HL2 / R24 HL3. |
| 29 | 4.4 | 4.7 | Multipurpose EP system with high thermal endurance and excellent impregnation capability. Thermal Index (TI) of 180°C. Low viscosity. Excellent flowability at RT. Railway qualification: EN 45545-2 R23 HL1 / R24 HL2. |
| 18 | 1.5 | 4.5 | Hard PU system. Designed for capacitors. |
| 29 | 2.1 | 4.4 | Hard multipurpose PU system. |
| 24 | 0.7 | 3.9 | Low viscosity unfilled EP resin. Good heat resistance. Good resistance to atmospheric and chemical degradation. |
| 28 | 3.4 | 4.6 | Good dielectric properties. Excellent thermal shock resistance. High thermal conductivity. Railway qualification: EN 45545-2 R23 HL1 / R24 HL2. |
| 29 | 3.0 | 4.5 | Hard, multipurpose PU system. Good thermal shock resistance. Thermal Index (TI) of 159°C. |
| 15 | 5.0 | 5.3 | Low viscosity. Multipurpose EP system. Good thermal shock resistance. |

EP = epoxy PU = polyurethane

Components

Continued

| Product designation | Applications | | | | Process | | Mix ratio | Curing conditions | Glass transition temperature (Tg) | Thermal class | Hardness | Flammability |
|--|-------------------------------------|---------|------------------------|-----------------------|----------------|-------------------|-----------|-------------------|-----------------------------------|---------------|-------------------|--------------------|
| | Inductive components / Transformers | Filters | Capacitors / Resistors | Power semi-conductors | Vacuum casting | Casting / Potting | | | | | | |
| Conditions | | | | | | | | | DSC | | 23°C | |
| Norm | | | | | | | | | ISO 11357-2 | IEC 60085 | DIN 53505 | |
| Unit | | | | | | | pbw | hot / cold | °C | | Shore D / Shore A | Class |
| Araldite CW 1116-1 / Aradur XW 1257-1 | • | | | | • | • | 100:100 | hot | 32 | F | D55 | UL 94 V-0 (6mm) |
| Araldite® CW 5730N / Aradur® HY 5731 | • | | | | • | • | 100:28 | hot | 30 | F | D70 | UL 94 V-0 (6 mm) |
| Araldite® CW 1312 / Aradur® HY 1300 | • | | | | • | • | 100:9 | cold | 30 | B | D57 | UL 94 V-0 (3,6 mm) |
| Araldite® CY 221 / Aradur® HY 2966 | • | | • | | • | • | 100:25 | cold | 29 | E | D25 | |
| Arathane® XB 5633 / Arathane® HY 5610 | • | • | | | • | • | 100:20 | cold | 25 | B | D40 / A89 | UL 94 V-0 (6 mm) |
| Araldite® CW 2243-2L / Aradur® HY 842 | • | | | | • | • | 100:20 | cold | 22 | B | D41 | UL 94 V-0 (6mm) |
| Arathane® CW 5620 / Arathane® HY 5610 | • | • | | | • | • | 100:22 | cold | 20 | B | D40 / A85 | UL 94 V-0 (6 mm) |
| Arathane® VB U 6942 / Arathane® VB U 001/B | • | | | | • | • | 100:16 | cold | 20 | E | D40 / A87 | UL 94V-0 (6,4 mm) |
| Araldite® CW 2243-2L / Aradur® HY 1872 | • | | | | • | • | 100:22 | cold | 8 | E | D20 / A70 | |
| Arathane® CW 5650 / Arathane® HY 5610 | • | • | | | • | • | 100:11 | cold | -40 | E | D27 / A83 | UL 94 V-0 (6 mm) |

| Dielectric strength | Dielectric dissipation factor (tan δ) | Relative permittivity (ε _r) | Benefits |
|---------------------|---------------------------------------|---|---|
| 2mm plate | 23°C | 50 Hz | |
| IEC 60243-1 | IEC 60250 | IEC 60250 | |
| kV/mm | % | 23°C | |
| 28 | 4.8 | 5.0 | Excellent winding impregnation. Good thermal shock resistance. Suitable for pressure sensitive devices. |
| 28 | 3.4 | 4.7 | Flexible impregnation EP system. |
| 15 | 30.0 | 9 | Resilient EP casting exhibiting good resistance to heat ageing. High thermal conductivity. Good thermal shock resistance. |
| 36 | 7.6 | 5.4 | Multipurpose unfilled EP system with good heat resistance. Good resistance to atmospheric and chemical degradation. Higher filler addition possibility. |
| 20 | 12.5 | 7.2 | Flexible. Multipurpose PU system, good thermal endurance, good thermal shock resistance. Thermal Index (TI) of 155°C. |
| 23 | 14.0 | 7.0 | Flexible EP system. Good thermal shock resistance. Low viscosity. Railway qualification: EN 45545-2 R23 HL1 / R24 HL2. |
| 25 | 11.0 | 6.0 | Flexible multipurpose PU system. Excellent flow properties. Meets typical automotive requirements. Thermal Index (TI) of 152°C. |
| 22 | 13.0 | 5.5 | Flexible, multipurpose PU system. Good thermal shock resistance. |
| 22 | 14.2 | 7.7 | Very flexible EP system with good thermal ageing stability. Long pot life. |
| 27 | 11.0 | 8 | Very flexible PU system. Excellent flow properties. Low temperature flexibility. |

EP = epoxy PU = polyurethane

Ancillaries

Coloring pastes

| Product designation | Benefits |
|---|--|
| Araldite® DW 0131 White Araldite® DW 0133 Red Araldite® DW 0136 Brown Araldite® DW 0137-1 Black Araldite® DW 0138 Grey Araldite® DW 0139 Red | Uniform and homogenous coloration. Minor effects on the processing and endproperties of a casting resin system. Light and heat resistance. Pigment particle size below 50 µm. |

Fillers

| Product designation | Color | Bulk Density | Benefits |
|---------------------------|--------|--------------|-------------------------------------|
| Unit | | g/cm³ | |
| Filler DT 077-1 | white | 1.0 | Can be used with EP and PU systems. |
| Filler DT 081 | grey | 0.35-0.4 | Can be used with EP and PU systems. |
| Filler DT 082 | white | 1.6 | Can be used with EP and PU systems. |
| Thixotropic Agent DT 5039 | opaque | 0.1-0.15 | Can be used with EP systems. |

Flexibilisers

| Product designation | Color | Color Index | pH value | Viscosity | Benefits |
|---------------------|------------------|----------------------------|-------------------|--------------|--|
| Conditions | visual | APHA | 5% in water; 23°C | dynamic 25°C | in combination with Araldite® epoxy resin systems |
| Norm | | ISO 6271; DIN EN 1557:1997 | ISO 787-9 | ISO 12058 | |
| Unit | | | | mPa·s | |
| Flexibiliser DY 040 | clear liquid | < 50 | 4.0 - 7.0 | 60 - 90 | Addition up to 20% possible. |
| Flexibiliser DY 042 | clear liquid | < 30 | 5.0 - 7.0 | 45 - 65 | Low viscosity, provides superior toughening properties while manufacturing same Tg. Solvent free polyglycol. |
| Flexibiliser DY 044 | clear liquid | < 60 | 4.0 - 7.0 | 150 - 200 | Addition up to 20% possible. |
| Flexibiliser DY 045 | colorless liquid | < 15 | 5.0 - 7.0 | 80 - 105 | Addition up to 20% possible. |

Release agents

| Product designation | Benefits |
|---------------------|--|
| RenLease® QZ 5101 | Film forming Poly-Vinyl-Alcohol (PVA) release agent which also can be used as a sealer for porous surfaces. Produces glossy mouldings. |
| RenLease® QV 5110 | Cloth applied wax based release agent for general applications. Polishable to lustre. |
| RenLease® QZ 5111 | A liquid suspension of waxes in solvent for the release of general and intricate mould surfaces. Polishable to lustre. |

Cleaning agent

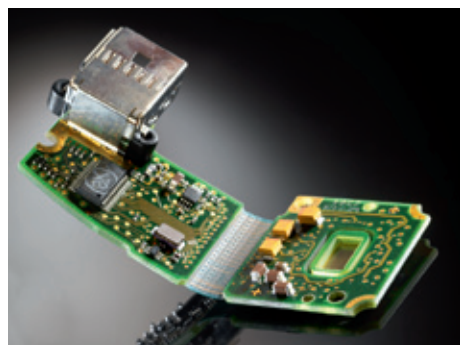
| Product designation | Benefits |
|---------------------|--|
| Ara® Ecocleaner | Suitable alternative to solvents such as acetone, methylene chloride or NMP. High Flash Point. Readily biodegradable. No hazard label. Recycling by filtering. Flash point 103°C. Vapour pressure (20°C) of 25 Pa. |

Our solutions for bonding electronic components

Adhesives and sealants

| Product designation | Color | Mix ratio | Mix viscosity | Pot life | Cure time to LSS = 1 N/mm ² | Lap shear strength | E-modulus | Elongation at break | Benefits |
|--|-----------------|---------------|--------------------------------------|-------------|--|--------------------|-------------------|---------------------|--|
| Conditions | | | RT | 23°C, 100g | 23°C | Aluminium | 23°C | 23°C | |
| Norm | | | | | | | | | |
| Unit | | pbw | mPa·s | min | min | N/mm ² | N/mm ² | % | |
| Araldite® F305 A/B | yellow | 100 : 100* | 3500 | 1-2 | 4 | 25 | 800 | 10 | Very fast curing for high series production. Widely used for magnet / ferrite bonding. |
| Araldite® 2028-1 | transparent | 100 : 100 | - | 6 - 8 | 15 | 15 | 16 | 60 | Fast curing. UV-stable. |
| Araldite® 2052-1 | red | 100 : 12 | thixotropic | 15 | 20 | 24 | 1750 | 7 | Very high temperature and chemical resistance. Tolerant to "less than ideal" pretreatment. Excellent adhesion on metals, many thermoplastics, glass and ceramics. |
| Araldite® 2014-1 | grey | 100 : 50 | thixotropic | 60 | 180 | 19 | 4 000 | 0.7 | High temperature and chemical resistance. Low shrinkage. Excellent adhesion on metals and composites. It has a CTI of 600V which is the maximum rate according to the IEC 60112. |
| Araldite® 2033 | black | 100 : 88 | thixotropic | 120 - 140 | 240 | 16 | 576 | 39 | Self extinguishing. Gap filling. Medium open time. High strength. Flammability class: UL 94 V-0 (4,5 mm), NF 16-101/102 I2F2, PrCEN/TS 45545-2 |
| Resin XD 4447 / Hardener XD 4448 | pale yellow | 100 : 33 | 300 - 600 | 4 - 6 weeks | 24h at 120°C | 18 | - | <1 | Good impregnation properties. Good resistance to temperatures up to 110°C. |
| Araldite® AT1-1 | white-yellowish | - | solid material, softening point 55°C | - | 24h at 120°C | 33 | - | <1 | Long term heat resistance up to 110°C. Good resistance to weathering and chemicals. High resistance to static and dynamic stresses. |
| Araldite® CY 8767 / Aradur® HY 8767-1 | black | 100 : 25 | - | - | 60 at 60°C | - | - | 2.7 | Potting system for use in sealed acid and storage batteries. Low-cost alternative for terminal lead potting and housing sealing. |
| Araldite® F330 with Hardener lacquer | brown | n.a. (no mix) | 20 000 (F330) | n.a. | 20 | 33 | 1 500 | 3 | No-mix methacrylate adhesive system with rapid cure after joining. Very good temperature resistance. Good adhesion on metals and composites. |
| Araldite® 2048 | red | 100 : 10 | thixotropic | 10 | 15 | 24 | 350 | 90 | High elongation at break and lap shear. Optimum pot life / handling time ratio. |

LSS: Lap Shear Strength | * with 6% hardener powder added to B - component



Application technologies

Process 1-4 = Encapsulation | Process 5-6 = Impregnation | Process 7 = Bonding

| Why using this process ? | Which criteria need to be considered for the selection of a resin system ? | What are the typical applications ? |
|---|---|---|
| 1. Vacuum casting | | |
| Ensuring perfect impregnation of high voltage windings Reliable electrical insulation Excellent chemical and mechanical protection Short cycle times Fully automatic continuous production lines Mass production with highest productivity | Excellent impregnation and gap filling capability Low viscosity for easy processing High crack resistance Low coefficient of thermal expansion High thermal durability (thermal class) High dielectric strength High heat conductivity Sedimentation stability Supply in bulk container | Car ignition coils Motor bike ignition coils Transformers Stators / Rotors |
| 2. Atmospheric casting | | |
| Provides electrical insulation, mechanical fixation and protection from chemical and humidity Vibration and noise damping Good heat dissipation Easy processing Simple equipment | Different thermosetting chemistries such as epoxy and polyurethane Low viscosity Fast curing Flammability Thermal class Humidity and chemical resistance | Electrical components such as capacitors, resistors, modules, assemblies, etc. |
| 3. Automated Pressure Gelation (APG) | | |
| Short cycle times Void free castings Shrinkage compensation Feeding of clamping machines over ring lines with central resin system preparation | Low viscosity for easy processing Sedimentation stability Fast demolding and curing Thermal class High crack resistance Low coefficient of thermal expansion High heat conductivity | Insulators Bushings Stators / Rotors Switchgears |
| 4. Low pressure molding | | |
| High processing speed Easy demolding Simple equipment Reliable mechanical fixation and bonding | Thermoplastic hot melt adhesives Application temperature Adhesive strength Low temperature flexibility Heat ageing stability Good humidity and chemical resistance | Connectors Wire harness Grommets Sensors |
| 5. Trickle impregnation | | |
| Ensuring void-free impregnation of windings No loss of impregnating resin Automatic trickle machines for continuous process Excellent bonding and mechanical fixation Good heat dissipation | Solvent-free resins Thermal class High tracking resistance and dielectric strength High mechanical strength High humidity and chemical resistance Humidity | Small motors for hand tools and household appliances |
| 6. Vacuum Pressure Impregnation (VPI) | | |
| Ensuring void-free impregnation Reliable electrical insulation with lowest partial discharges Excellent bonding and mechanical fixation Good heat dissipation | Low viscosity Stable viscosity 1-/2-component systems Thermal class High tracking resistance and dielectric strength Humidity and chemical resistance | Large motors and generators |
| 7. Sealing and gasketing | | |
| Reliable sealing of housings and enclosures Ensuring protection from humidity and chemicals | Defined flow characteristics High adhesive strength Humidity and chemical strength Fast curing | Sensors Electronic control units Valves Modules Hard disk drives |

Testing, supporting and training services

Material testing and characterisation

Mechanical testings

Tensile, compressive, flexural properties, shore hardness, thermal ageing, cycling under humidity, compressive & flexural properties, HDT, UV-ageing under temperature and humidity, Charpy / Izod pendulum impact testing, tensile shear / peeling, ILSS, creep testing.

Electrical testings

Dielectric strength, dissipation factor, permittivity, inductance / capacitance, resistivity, tracking resistance CTI, electrolytic corrosion, moisture insulation resistance, thermal shock storage, thermal ageing, UV & weathering ageing,

Advanced characterisation

X-ray tomography, SEM, LC-MS chromatography, NMR, flammability testing following UL94.

Application engineering

Production of sample parts by potting, vacuum casting, automatic pressure gelation (APG), vacuum pressure impregnation (VPI), trickle impregnation, coating technologies, simulation of casting processes.

Training

We offer a training program aimed at understanding both insulating materials and processing technologies including practical sessions.

Further information on dates & locations available upon request.



1. X-ray tomography
2. Automatic vacuum encapsulating equipment
3. Production site Monthey / Switzerland
4. Training



With innovation

Every day, all over the world, our Technical Competence centers engage in intensive research and development focusing on one goal; to deliver innovative solutions by working hand-in-hand with our business partners. Together through a continual exchange of ideas, supported by an experienced team of sales and technical specialists, we strive to deliver innovative solutions.

We track both new market expectations and changing regulations. Protection of the environment, as well as health and safety are paramount concerns that play an integral part in our development projects.

By providing certified technologies and patented products in combination with high quality and reliability, our chemists and experts bring enhanced value to our customers to ensure their success.

With customer intimacy

We market a unique product portfolio and a broad range of forward-looking solutions for our customers. Customers and partners benefit from an advanced level of service in:

- > Product development and quality control
- > Product trials in-house and with customers
- > Customer seminars and training
- > Trouble-shooting and problem-solving

Partnership with our customers is more than simply «putting them first». It requires long-term commitment to forge close relationships that create synergies of knowledge, security and adaptability to create a successful, shared future.

With care

Sustainability is a fundamental part of our corporate and business strategy. We see a better world in which our innovations help reduce consumption of natural resources and improve the quality of life for people everywhere. We are identifying the long-term trends that affect our markets and looking at how our products and applications can play a part in supporting and providing solutions to the challenges those markets face.





We value
your
challenge

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