HUNTSMAN

Enriching lives through innovation

Advanced Materials

Protection, safety and sustainability

Selector guide for electronics

Rely on us with confidence

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

Araldite®
Arathane®
Aratherm®

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

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 16494 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

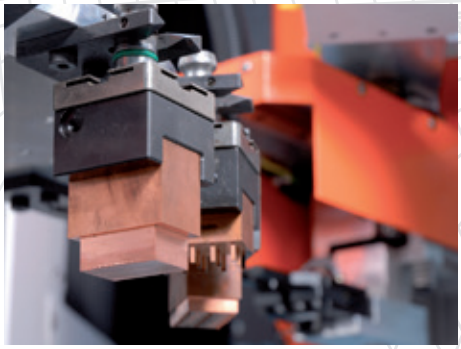
> Ambient and hot curing systems
> Long pot life, latency
> Excellent cross linking
> Excellent impregnation
> High voltage behavior on impregnated parts
> High Tg
> Thermal endurance, high temperature applications
> Long-term reliability

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

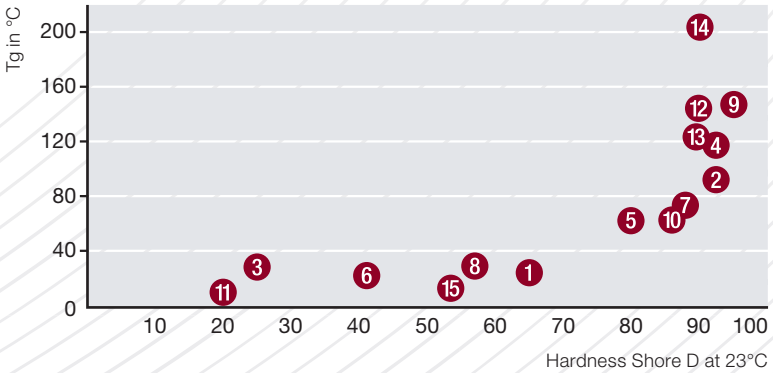
The selection of the appropriate encapsulants and the resulting choice of chemistries are dependent on the various requirements of the final application. Huntsman offers ranges of epoxy and polyurethane encapsulant chemistries that provide customers with the best solution possible for their specific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

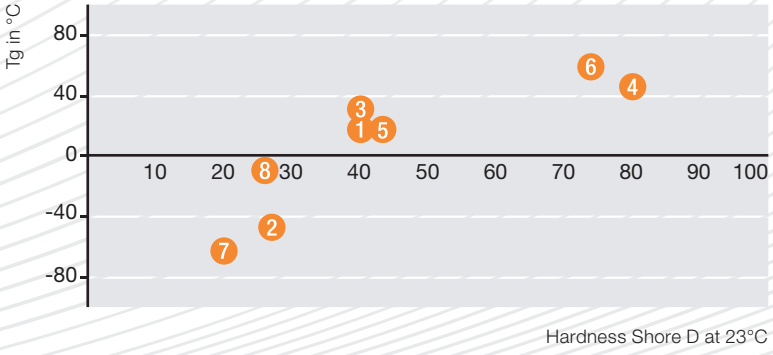
Epoxy resins are proven for long-term thermal endurance, especially for applications at higher temperatures. Polyurethane systems are also available, offering thermal endurance profiles above 100°C and flexibility at low temperatures.

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.

Epoxy encapsulants



Polyurethane encapsulants



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

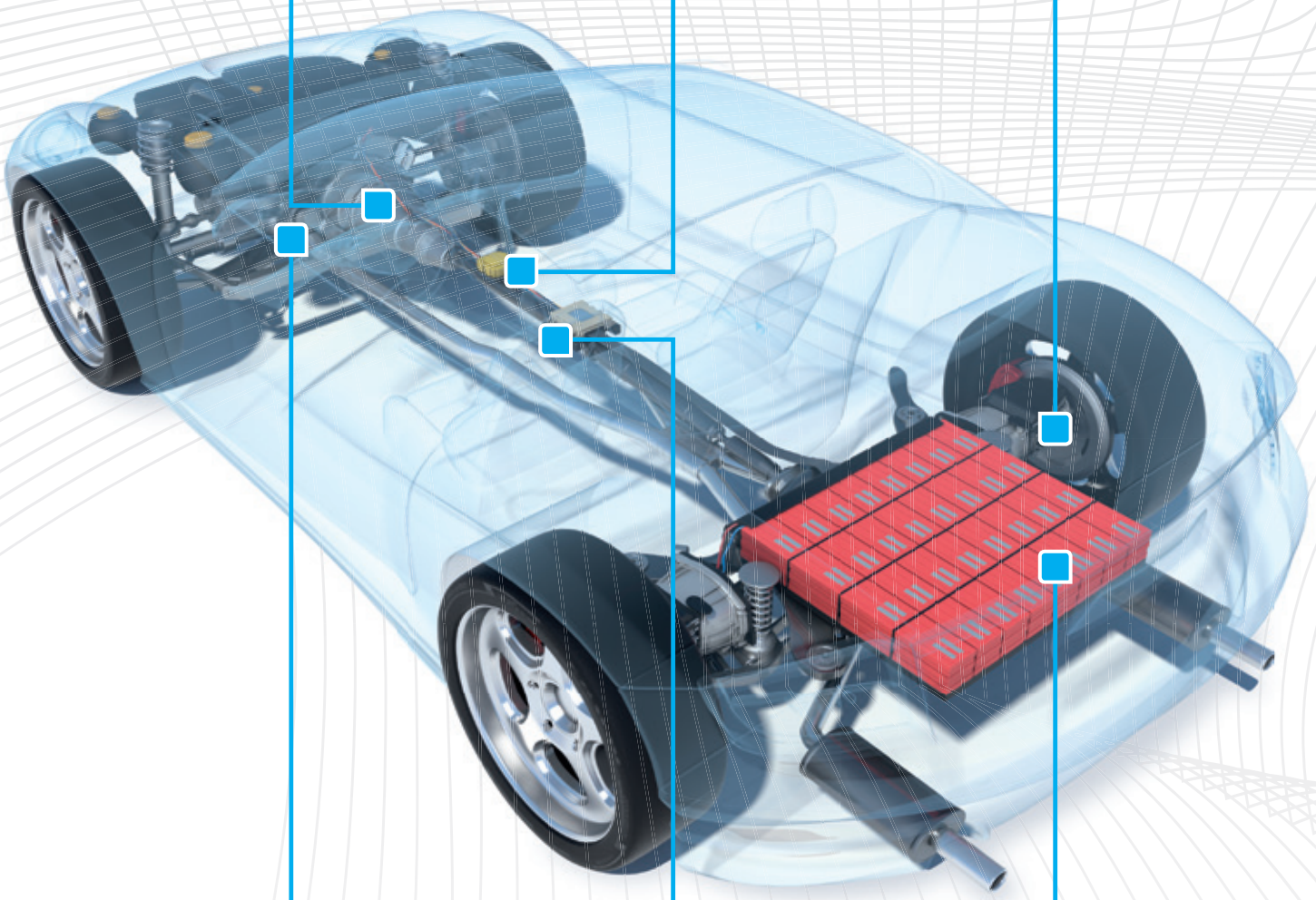
Your needs
> High voltage resistance
> Excellent chemical resistance
> Long-lasting and reliable sealing
> Lightweight end-product
> Low cost alternatives

Our solutions
Araldite® potting and housing sealing systems

1 Wire harness / connectors

2 Inverters and converters

3 Motors



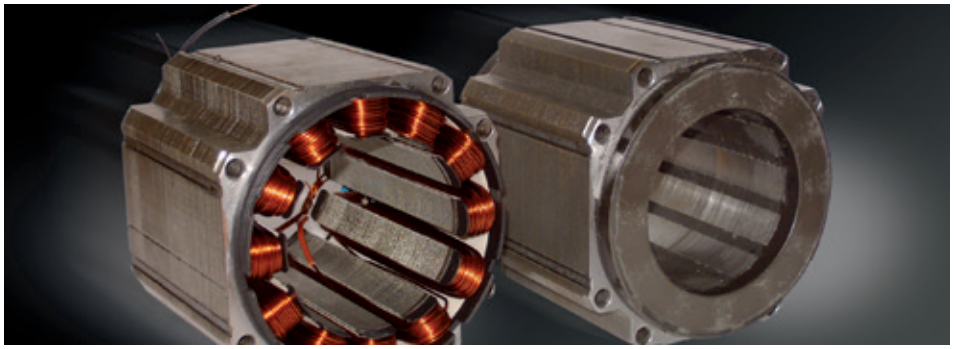
4 Sensors and switches

5 Electronic control units

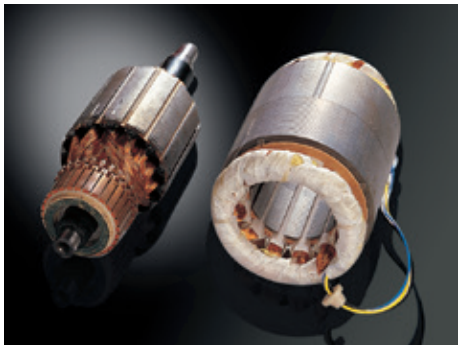
6 Batteries

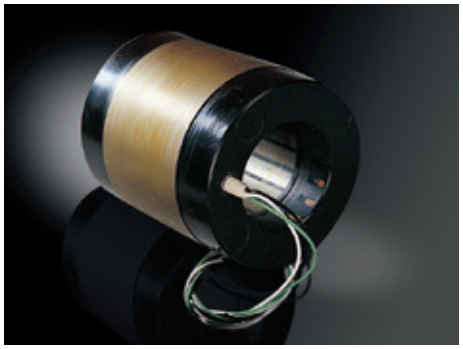
Our solutions for encapsulation

Electric motors



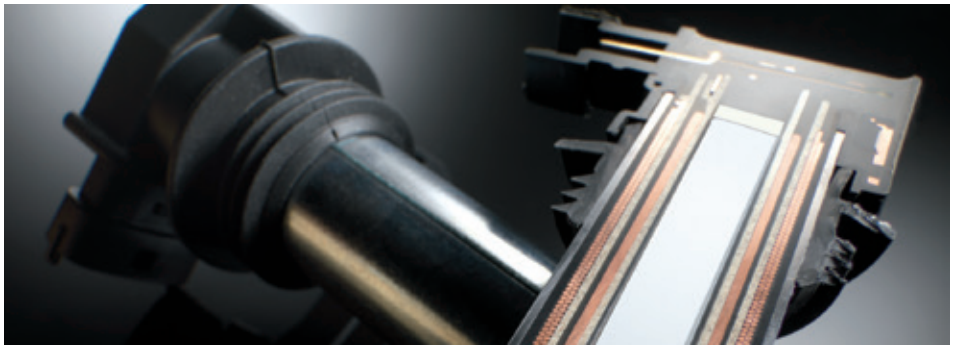
Product designation	Applications			Process			Mix ratio	Impregnation capability	Curing conditions	Glass transition temperature (Tg)	Coefficient of thermal expansion (CTE)	Thermal class
	Power tools	Automotive	Pumps	Vacuum casting	Casting / Potting	Trickle impregnation or VPI						
Conditions										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	-

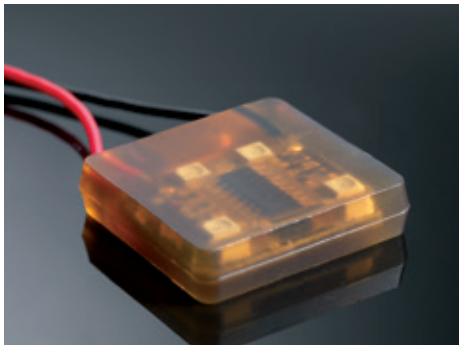
nc : not colored

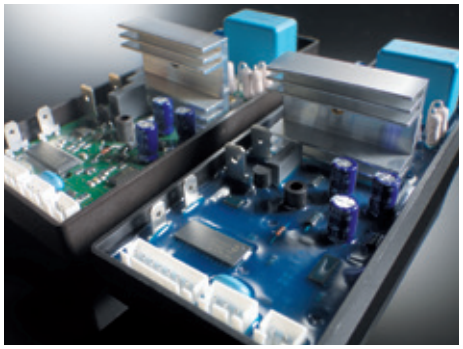
	Flammability	Benefits
	Class	
	UL 94, HB	Mineral filled resin with very good impregnation capability.
	UL 94, HB	Optimally filled toughened casting resin system with good impregnation capability for processing at high temperature.
	UL 94, HB	Mineral filled resin with very high performance.
	UL 94, HB	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 NEW	●				●	●	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 (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 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-O (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)

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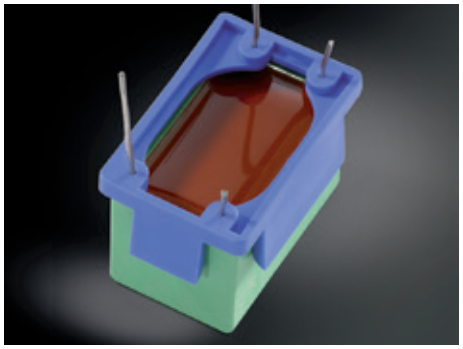


	Dielectric strength	Dielectric dissipation factor (tan δ)	Relative permittivity (ε_r)	Benefits
	2mm plate	23°C	50 Hz	
	IEC 60243-1	IEC 60250	IEC 60250	
	kV/mm	%	23°C	
	14	0.5	3.7	Optimally filled EP system with good impregnating capability. Low CTE.
	25	1.5	4.0	Flexible, multipurpose EP impregnation 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	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.
Araldite® DW 0133 Red	
Araldite® DW 0136 Brown	
Araldite® DW 0137-1 Black	
Araldite® DW 0138 Grey	
Araldite® DW 0139 Red	

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 NEW	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

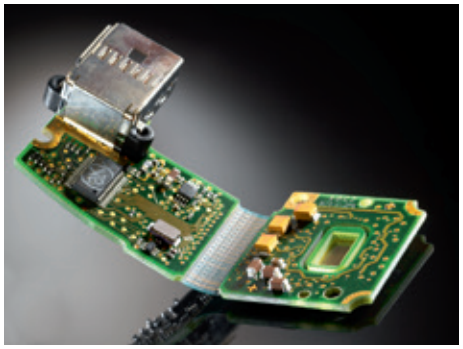
Product designation	Benefits
Ara® Ecocleaner	Suitable alternative to solvents such as acetone, methylene chloride or NMP. High Flash Point. Readily biodegradable. No hazard label. Recycling by filtering. Flash point 103°C. Vapour pressure (20°C) of 25 Pa.

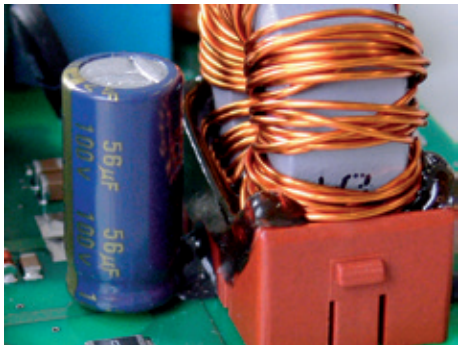
Our solutions for bonding electronic components

Adhesives and sealants

Product designation	Color	Mix ratio	Mix viscosity	Pot life	Cure time to LSS = 1 N/mm²	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/mm²	N/mm²	%	
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 I * with 6% hardener powder added to B - component





Application technologies

Process 1-4 = Encapsulation I Process 5-6 = Impregnation I 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 continous 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 continous process** **Excellent bonding and mechanical fixation** **Good heat dissipation**	Solvent-free resins Thermal class High tracking resistance and dielectric strength High mechanical strength High humidty 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 partical 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


2


3

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

4

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

Huntsman Advanced Materials

Our Advanced Materials division is a leading global chemical solutions provider with a long heritage of pioneering technologically advanced epoxy, acrylic, phenolic and polyurethane-based polymer products.

Our capabilities in high-performance adhesives and composites, delivered by more than 1 600 associates, serve over 2 000 global customers with innovative, tailor-made solutions and more than 1 500 products which address global engineering challenges.

We operate synthesis, formulating and production facilities around the world

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