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, Huntsman Advanced Materials has been developing innovative solutions that are used during virtually every stage in the production of electronic devices. Our know-how and expertise allow us to answer the most stringent requirements for electronics applications:

> High thermal resistance and thermal conductivity
> Flame-retardancy (UL94 V0/HB listing, EN 45545-2 qualification)
> 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 our in-house 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 IATF 16949 certified plants in Europe, China and the US and our local technical support teams ensure the highest proximity to 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

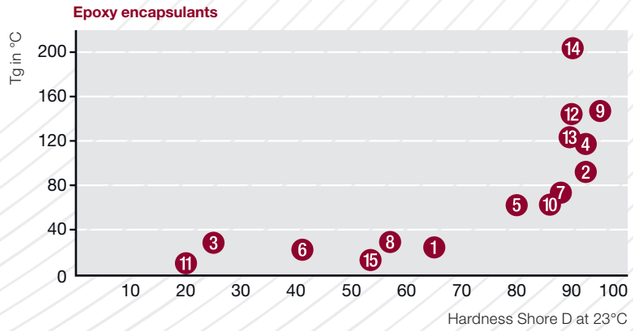
Epoxy and polyurethane encapsulants

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.

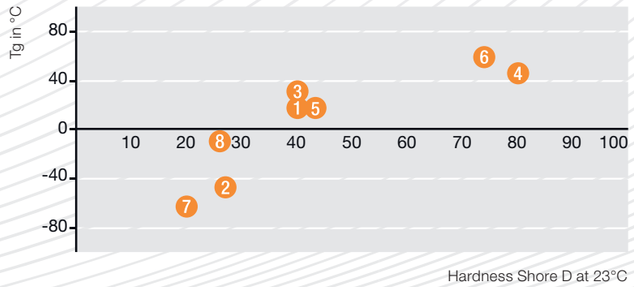
Epoxy resins are proven for long-term thermal endurance, especially for applications at higher temperatures. Polyurethane systems are also available, offering thermal endurance profiles above 100°C and flexibility at low temperatures.

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® CW 5725-6 / Aradur® HY 5726-2
14 Araldite® CW 5742 / Aradur® HY5726

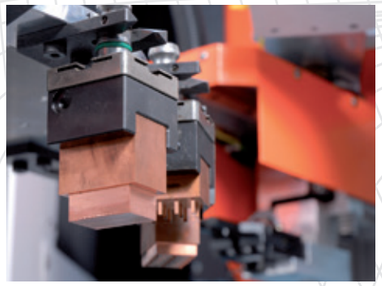


Typical Arathane® systems

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

Our markets


Land transportation


Industrial equipment


Aerospace and defense


Consumer electronics

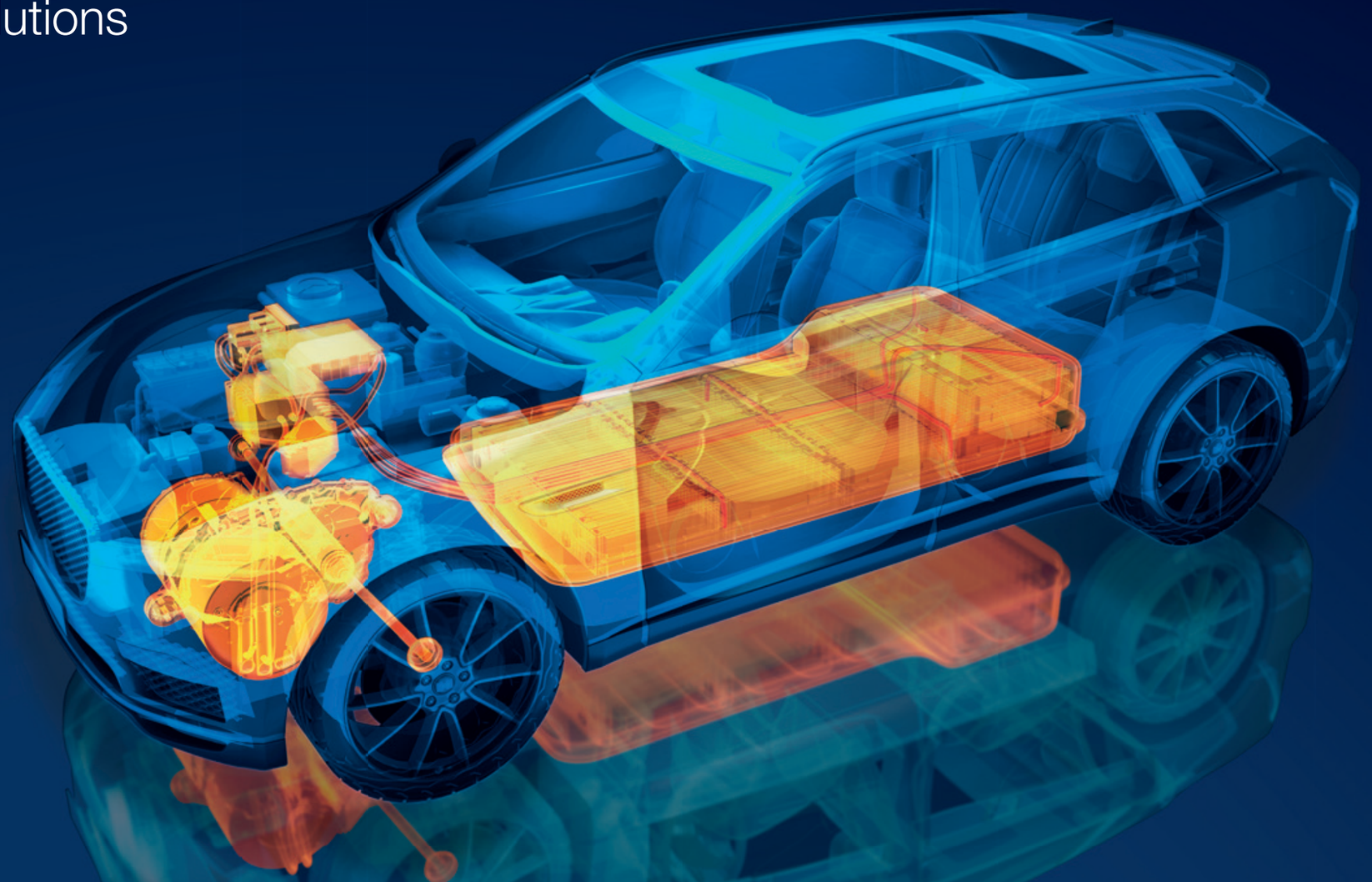

Renewable energies


Medical

Reliable and comprehensive solutions for e-mobility

Huntsman Advanced Materials is a leading global chemical solutions provider with a long heritage of pioneering technologically advanced epoxy, acrylic and polyurethane-based polymer products in the automotive and electronics industries.

With more than 60 years' experience, we have extensive know-how in developing and providing our customers with a wide range of reliable thermal management solutions that answer the most stringent requirements for electronics applications in the electrified powertrain.



Wire harness / connectors

Your needs
> Excellent chemical resistance
> Excellent dielectric properties
> Long-lasting sealing
> Cost efficiency

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

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

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 up to 3 W/mK
Araldite® adhesives for magnet bonding with fast fixture time and high shear strength

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

Electronic control units

Your needs
> Electrical insulation
> Chemical resistance
> Reliability
> Low exotherm
> Low production costs

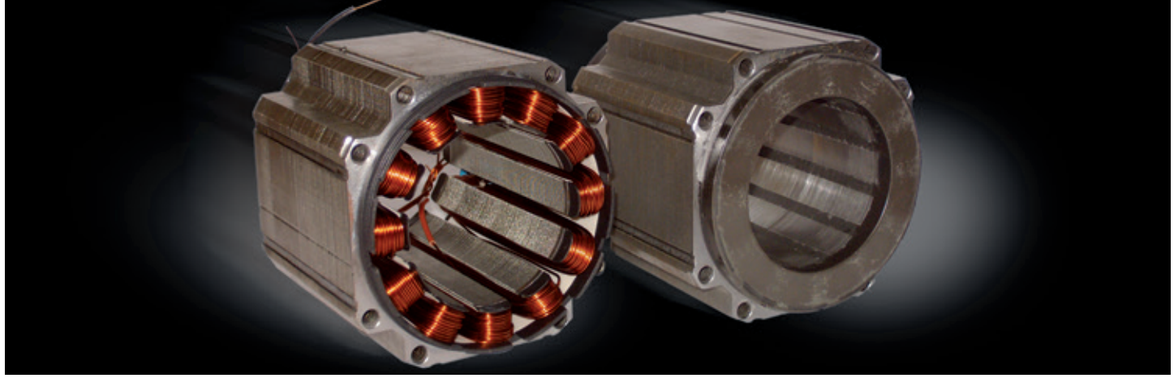
Our solutions
UL 94 registered Araldite® and Arathane® potting and casting resin systems with cold curing and good flexibility
Euremelt® hotmelt adhesives

Batteries

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

Our solutions
Araldite® potting and housing sealing systems

Find out more at **www.huntsman-transportation.com**




Our solutions for encapsulation and impregnation

Electric motors

Product designation	Applications			Process			Mix ratio	Impregnation capability	Curing conditions	Glass transition temperature (Tg)	Coefficient of thermal expansion (CTE)	Thermal class		Thermal conductivity	Flammability	Benefits
	Stator end-turn	Full stator	Rotor	Vacuum casting	Casting / Potting	Trickle impregnation or VPI										
Conditions										DSC	Below Tg / Above Tg	20 000 h		25°C		
Norm										ISO 11357-2		IEC 60085		ISO 8894-1		
Unit							pbw		hot / cold	°C	10^{-6} K^{-1}			W/(m·K)	Class	
Araldite® CW 2731	•				•		-	o	hot	165	24 / 48	H		3.00	UL 94, V-0 (12 mm)	Very high thermal conductivity and endurance. Excellent resistance to atmospheric and chemical degradation. Monocomponent - Storage stable at room temperature.
Araldite® CW 30334 / Aradur® HW 30335 NEW		•	•	•	•		100:75	++	hot	100	25	H		1.20	-	Well balanced properties: good heat conductivity, very good crack resistance, media and thermal resistance. Excellent flow properties allow for fast filling times and good impregnation.
Araldite® CW 30407 / Aradur® HW 30408 NEW		•	•	•	•		100:67	++	hot	75	20	H		1.10	-	Excellent crack resistance (K_{1C} 4.0). Fastest processing / curing.
Araldite® CW 30325 / Aradur® HW 30328 NEW		•	•	•	•		100:265	++	hot	-20	100	-		1.10	-	Good gap filling capability and improved heat-conductivity. Highly flexible material with reinforcing fillers for superior crack and thermoshock resistance.
Araldite® CW 1312 / Aradur® HY 1300		•	•	•	•		100:9	++	cold	30	103	B		1.10	UL 94, V-0 (3,2 mm)	Resilient casting system exhibiting good resistance to thermal ageing and good thermal shock resistance.
Araldite® CW 1302 / Aradur® HY 1300		•	•	•	•		100:11	+	cold	75	42 / 105	H		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.
Araldite® CW 30386 / Aradur® HW 30387 NEW			•		•		100:130	o	hot	195	18	H		0.70	-	High Tg and lowest thermal expansion within the complete operation range. Very high thermal and chemical endurance (Class H). Fast curing.
Araldite® CW 30326 / Aradur® HW 30327 NEW		•	•	•	•		100:100	+	hot	115	28	H		0.70	UL 94, V-1 (12 mm), HB (4 mm), NF 16-101/102, I3F0/2	Good gap filling capability and heat conductivity. Toughened resin with reinforcing fillers for superior crack and thermoshock resistance. Very high thermal and chemical endurance (Class H).
Araldite® CW 5742 / Aradur® HY 5726		•	•	•			100:33	+++	hot	210	38	N		0.70	UL 94, HB	Superior flow and gap filling capabilities enabling fast processing times. High Tg enabling low thermal expansion within the complete operation range. Very high thermal and chemical endurance (Class N).
Araldite® CW 30039 NEW			•		•		-	+	hot	184	20	H		0.70	-	Minimum thermal expansion of 17·10^{-6} 1/K up to 184°C. Monocomponent with strong viscosity drop above 60°C for fast processing. Toughened resin with reinforcing fillers for superior crack and thermoshock resistance.
Arathane® CW 5660 / Arathane® HY 5610		•		•			100:13	++	cold	-16	44 / 133	F		0.70	UL 94, V-0 (6 mm)	Flexible system even at low temperatures. Class F PU system. Flame retardant.
Araldite® CW 1446 BDF / Aradur® HY 2919		•		•	•		100:24	++	hot	95	48 / 134	H		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.
Araldite® XB 2252 / Aradur® XB 2253		•	•	•	•		100:13	++	cold	68	60 / 100	H		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.
Arathane® CW 5631 / Arathane® HY 5610		•		•			100:25	++	cold	47	70 / 135	F		0.60	UL 94, V-0 (6 mm)	Excellent flow properties. Non abrasive casting system.
Araldite® CY 38340 / Aradur® 38341						•	100:26	+++	hot	145	-	F		0.20	-	Bicomponent system for trickle impregnation. 0.15 – 0.25 %wt. water absorption (30min/100°C). Total cure time 30min 150°C.
Araldite® 38400						•	-	+++	hot	120	70 / 130	H		0.20	-	Monocomponent impregnation system. Class H (IEC 60085, UL 1446). Long shelf life and bath stability.
Araldite® 38410 / Aradur® HY 38411						•		+++	hot	140	-	H		0.20	-	Bicomponent impregnation system. Long bath stability for 1k premix and fast curing. Class H (IEC 60085, UL 1446).

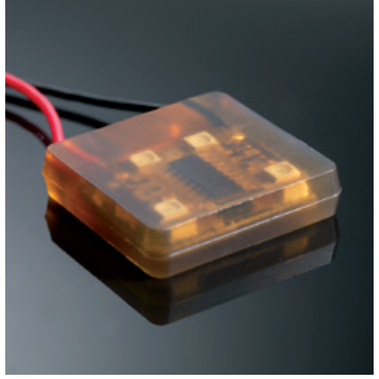
Our solutions for encapsulation

Ignition coils

Product designation	Applications			Process		Mix ratio	Color	Curing conditions	Glass transition temperature (Tg)	Thermal class	Hardness	Coefficient of thermal expansion (CTE)		Flammability	Benefits
	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}		Class	
Araldite® CW 5742 / Aradur® HY 5726	•		•	•		100:33	black	hot	210	N	D90	38		UL 94, HB	Mineral filled resin with highest thermal and dimensional stability.
Araldite® CW 5725-6 / Aradur® HY 5726-2 NEW	•		•	•		100:28	black	hot	133	H	D90	31		UL 94, HB	Mineral filled resin with excellent impregnation capability.
Araldite® CW 5725-3 / Aradur® HY 5726	•		•	•		100:28	black	hot	144	H	D90	35		UL 94, HB	Mineral filled resin with very good impregnation capability.
Araldite® XB 5721 / Aradur® XB 5723	•			•		100:30	black	hot	70	H	D88	39		UL 94, HB	System with very good impregnation capability. Excellent thermal shock resistance.
Araldite® XB 2252 / Aradur® XB 2253		•		•		100:13	black	cold	65	F	D86	60		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.
Araldite® DBF / Aradur® HY 956 EN		•			•	100:20	nc	cold	60	-	D80	-			Unfilled resin system with good chemical and heat resistance.
Araldite® CW 2243-2L / Aradur® HY 842		•			•	100:20	blue	cold	22	B	D70	86		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.
Arathane® CW 5620 / Arathane® HY 5610		•			•	100:22	black, blue	cold	20	B	D40	55		UL 94, V-0 (6 mm)	Halogen free multipurpose PU system for pressure sensitive devices. Railway qualification: EN 45545-2 R24 HL1.
Araldite® DBF / Aradur® HY 842		•			•	100:40	nc	cold	-	-	D64	-			Unfilled resin system with high flexibility. Good chemical and heat resistance.

nc : not colored

PU = polyurethane

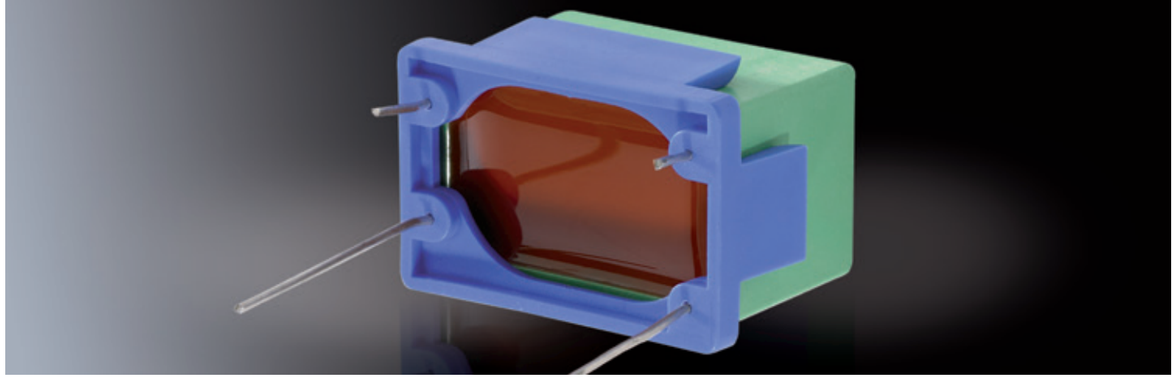


Our solutions for encapsulation

Assemblies

Product designation	Applications				Process		Mix ratio	Curing conditions	Glass transition temperature (Tg)	Thermal class	Hardness		Flammability	Benefits
	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		Class	
Araldite® XW 1155-1 / Aradur® HY 1473			●			●	100:18	cold	58	B	n.a.		UL 94 HBF (6 mm)	Filled expandable EP casting system. Good thermal shock resistance. Excellent electrical properties.
Araldite® DBF / Aradur® HY 2966		●			●	●	100:25	cold	54	E	D80			Low viscosity. Unfilled EP resin. Good heat resistance. Good resistance to atmospheric and chemical degradation.
Araldite® CW 5730N / Aradur® HY 5731	●	●			●	●	100:28	hot	30	F	D70		UL 94 V-0 (6 mm)	Flexible impregnation EP system.
Arathane® CW 5620 / Arathane® HY 5610	●	●		●	●	●	100:22	cold	20	B	D40 / A85		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.
Araldite® CW 2243-2L / Aradur® HY 1872		●			●	●	100:22	cold	8	E	D20 / A70			Very flexible EP system with good thermal ageing stability. Long pot life.
Arathane® CW 5660 / Arathane® HY 5610 NEW	●				●	●	100:15	cold	-16	F	D29 / A85		UL V-0 (6 mm)	Low viscosity and high thermal conductivity. Good flowability. For encapsulation of electric inverters, electrical application, power or instruments transformers, capacitors, relays and sensors.
Euremelt® 3413		●		●		●	-	n.a.	-35	F	D28 / A86		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).
Arathane® XW 949-1 / Arathane® HY 5610		●			●	●	100:50	cold	-62	B	D20 / A70			Unfilled PU system. Low modulus. Excellent dielectric properties. Good thermal shock resistance.

EP = epoxy PU = polyurethane



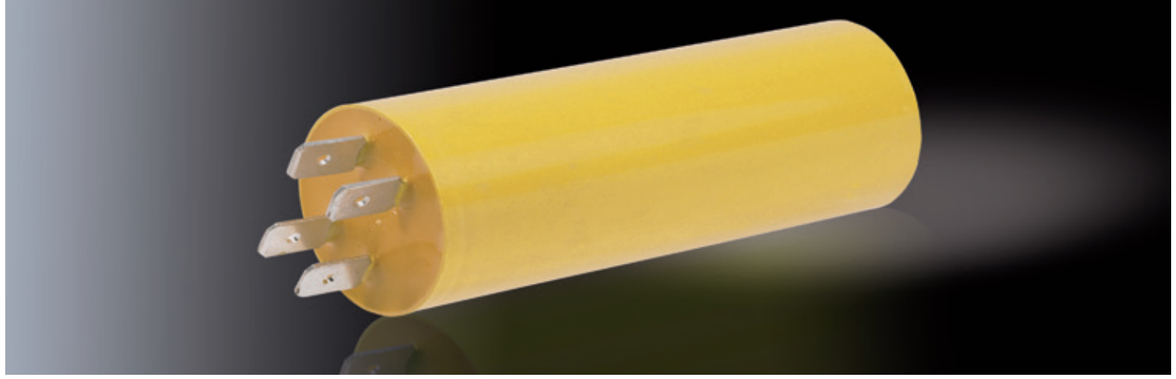
Our solutions for encapsulation

Components

Product designation	Applications				Process		Mix ratio	Curing conditions	Glass transition temperature (Tg)	Thermal class	Hardness	Flammability		Dielectric strength	Dielectric dissipation factor (tan δ)	Relative permittivity (ε_r)	Benefits
	Inductive components / Transformers	Filters	Capacitors / Resistors	Power semi-conductors	Vacuum casting	Casting / Potting											
Conditions									DSC		23°C			2mm plate	23°C	50 Hz	
Norm									ISO 11357-2	IEC 60085	DIN 53505			IEC 60243-1	IEC 60250	IEC 60250	
Unit							pbw	hot / cold	°C		Shore D / Shore A	Class		kV/mm	%	23°C	
Araldite® CW 1195-1 / Aradur® HW 1196				●	●	●	100:100	hot	146	H	D95	UL 94 V-0 (6 mm)		14	0.5	3.7	Optimally filled EP system with good impregnating capability. Low CTE.
Araldite® CW 1446 BDF / Aradur® HY 2919	●				●	●	100:24	hot	95	H	D92	UL 94 V-0 (6 mm)		25	1.5	4.0	Flexible, multipurpose EP impregnation system. Excellent impregnation. Thermal Index (TI) of 204°C.
Araldite® CW 1302 / Aradur® HY 1300	●				●	●	100:11	cold	75	H	D88	UL 94 V-0 (3 mm) NF 16-101/102, I2F1/4		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.
Araldite® XB 2252 / Aradur® XB 2253	●		●		●	●	100:13	cold	65	H	D86	UL 94 V-0 (6 mm)		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.
Arathane® VB U 6920 / Arathane® HY 5611-1			●		●	●	100:25	cold	60	F	D74 / A88	UL 94 V-0 (6 mm)		18	1.5	4.5	Hard PU system. Designed for capacitors.
Araldite® DBF / Aradur® HY 2966	●		●		●	●	100:25	cold	54	E	D80			24	0.7	3.9	Low viscosity unfilled EP resin. Good heat resistance. Good resistance to atmospheric and chemical degradation.
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		28	3.4	4.6	Good dielectric properties. Excellent thermal shock resistance. High thermal conductivity. Railway qualification: EN 45545-2 R23 HL1 / R24 HL2.
Arathane® CW 5631 / Arathane® HY 5610	●	●	●		●		100:25	cold	47	F	D80	UL 94 V-0 (6 mm), NF 16-101/102, I3F1/2		29	3.0	4.5	Hard, multipurpose PU system. Good thermal shock resistance. Thermal Index (TI) of 159°C.
Araldite® CW 2243-2L / Aradur® HY 2966	●				●	●	100:11	cold	37	B	D70	UL 94 V-0 (6 mm)		15	5.0	5.3	Low viscosity. Multipurpose EP system. Good thermal shock resistance.

Continued on page 16

EP = epoxy PU = polyurethane

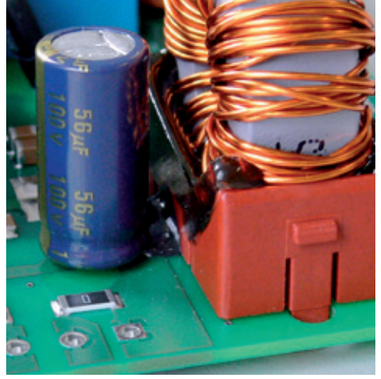


Our solutions for encapsulation

Components

Product designation	Applications				Process		Mix ratio	Curing conditions	Glass transition temperature (Tg)	Thermal class	Hardness	Flammability		Dielectric strength	Dielectric dissipation factor (tan δ)	Relative permittivity (εr)	Benefits
	Inductive components / Transformers	Filters	Capacitors / Resistors	Power semi-conductors	Vacuum casting	Casting / Potting											
Conditions									DSC		23°C			2mm plate	23°C	50 Hz	
Norm									ISO 11357-2	IEC 60085	DIN 53505			IEC 60243-1	IEC 60250	IEC 60250	
Unit							pbw	hot / cold	°C		Shore D / Shore A	Class		kV/mm	%	23°C	
Araldite CW 1116-1 / Aradur XW 1257-1	●				●	●	100:100	hot	32	F	D55	UL 94 V-0 (6mm)		28	4.8	5.0	Excellent winding impregnation. Good thermal shock resistance. Suitable for pressure sensitive devices.
Araldite® CW 5730N / Aradur® HY 5731	●				●	●	100:28	hot	30	F	D70	UL 94 V-0 (6 mm)		28	3.4	4.7	Flexible impregnation EP system.
Araldite® CW 1312 / Aradur® HY 1300	●				●	●	100:9	cold	30	B	D57	UL 94 V-0 (3,6 mm)		15	30.0	9	Resilient EP casting exhibiting good resistance to heat ageing. High thermal conductivity. Good thermal shock resistance.
Araldite® CY 221 / Aradur® HY 2966	●		●		●	●	100:25	cold	29	E	D25			36	7.6	5.4	Multipurpose unfilled EP system with good heat resistance. Good resistance to atmospheric and chemical degradation. Higher filler addition possibility.
Arathane® XB 5633 / Arathane® HY 5610	●	●			●	●	100:20	cold	25	B	D40 / A89	UL 94 V-0 (6 mm)		20	12.5	7.2	Flexible. Multipurpose PU system, good thermal endurance, good thermal shock resistance. Thermal Index (TI) of 155°C.
Araldite® CW 2243-2L / Aradur® HY 842	●				●	●	100:20	cold	22	B	D41	UL 94 V-0 (6mm)		23	14.0	7.0	Flexible EP system. Good thermal shock resistance. Low viscosity. Railway qualification: EN 45545-2 R23 HL1 / R24 HL2.
Arathane® CW 5620 / Arathane® HY 5610	●	●			●	●	100:22	cold	20	B	D40 / A85	UL 94 V-0 (6 mm)		25	11.0	6.0	Flexible multipurpose PU system. Excellent flow properties. Meets typical automotive requirements. Thermal Index (TI) of 152°C.
Arathane® VB U 6942 / Arathane® VB U 001/B	●				●	●	100:16	cold	20	E	D40 / A87	UL 94V-0 (6,4 mm)		22	13.0	5.5	Flexible, multipurpose PU system. Good thermal shock resistance.
Araldite® CW 2243-2L / Aradur® HY 1872	●				●	●	100:22	cold	8	E	D20 / A70			22	14.2	7.7	Very flexible EP system with good thermal ageing stability. Long pot life.
Arathane® CW 5650 / Arathane® HY 5610	●	●			●	●	100:11	cold	-40	E	D27 / A83	UL 94 V-0 (6 mm)		27	11.0	8	Very flexible PU system. Excellent flow properties. Low temperature flexibility.

EP = epoxy PU = polyurethane



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	brown	100:100*	4 000	1 - 2	5	24	500	20	No-mix methacrylate adhesive system with very fast cure after joining. Widely used for magnet / ferrite bonding.
Araldite® 2028-1	transparent	100:100	-	6 - 8	30	15	15	60	Fast curing. Self-levelling. UV-stable. Flexible.
Araldite® 2052-1	red	100:12	thixotropic	15	20	24	1 700	10	Very high temperature and chemical resistance even when cured at RT. Tolerant to «less than ideal» pretreatment. Excellent adhesion on metals. Fast curing.
Araldite® 2014-2	dark grey	100:50	thixotropic	110	300	17	3 000	1	High temperature and chemical resistance. Low shrinkage. Excellent adhesion on metals and composites.
Araldite® 2033	black	100:88	thixotropic	120 - 140	240	16	2 500	1	Self extinguishing. Gap filling. Medium open time. High strength. Flammability class: UL 94 V-0 (4,5 mm), EN 45545-2 HL3.
Araldite® AW 4510 / Hardener HW 4511-1	dark grey	100:50	thixotropic	80 - 90	15 at 60°C	22	4 500	1.2	Non flowing paste. Temperature resistant up to 180°C. Excellent resistance to most common chemicals.
Araldite® AW 4804 / Hardener HW 4804	grey	100:15	17 000	240	120 at 120°C	21	6 200	1.4	Self levelling. Excellent heat resistance up to 210°C. Long pot life.
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® AV 4600	red	n.a. (1 K)	thixotropic	n.a.	40 at 160°C	44	4 000	5	Heat resistant up to 160°C. Excellent lap shear strength and very good peel strength. Non flowing during cure.
Araldite® 2050	pale yellow	100:100	thixotropic	1 - 2	9	30	1 700	10	Ultra-fast curing at room temperature. Suitable for service temperatures up to 120°C. Excellent ageing and weathering properties.

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

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	

Flexibilizers

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	
Flexibilizer DY 040	clear liquid	< 50	4.0 - 7.0	60 - 90	Addition up to 20% possible.
Flexibilizer DY 042	clear liquid	< 30	5.0 - 7.0	45 - 65	Low viscosity, provides superior toughening properties while manufacturing same Tg. Solvent free polyglycol.
Flexibilizer DY 045	colorless liquid	< 15	5.0 - 7.0	80 - 105	Addition up to 20% possible.

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.

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.

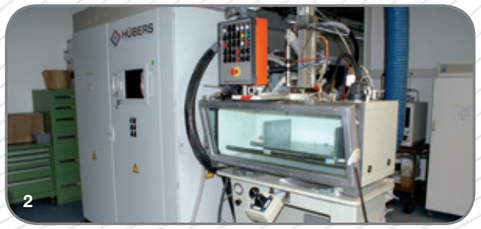
Application engineering

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



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3

1. X-ray thomography
2. Automatic vacuum encapsulating equipment
3. 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 understanding

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

HUNTSMAN

Enriching lives through innovation

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