

INSULATION EXCELLENCE FOR THE GLOBAL POWER INDUSTRY

Electrical engineering
selector guide

A comprehensive range of trusted insulating thermoset solutions that deliver electrical resistance and thermal conductivity, with outstanding mechanical and dielectric properties.



TRUSTED PERFORMANCE FOR OVER 70 YEARS

At Huntsman Advanced Materials, we make things possible. For over 70 years, we've supported businesses like yours across the global power industry with class-leading technologies and solutions, including insulating thermoset materials for insulators and bushings, generators, switchgears, distribution and instrument transformers, and motors for utility and industrial applications.

EXCELLENCE AS STANDARD

We consistently strive to exceed your expectations by supplying high quality products and value-added technology you can depend on. Each product in our extensive portfolio delivers class-leading performance that meets all your requirements for electrical insulation in indoor and outdoor environments, as well as for extended service life.

We've been awarded ISO 9001 and ISO/TS 16949 certifications for quality management and all our products are tested in our in-house laboratories to ensure they deliver specific properties, such as thermal shock, thermal ageing, UV and weathering resistance.

Furthermore, our own ISO/IEC 17025:2017-accredited laboratory accelerates the approval process to minimize

time-to-market, and our IATF 16949-certified plants in Europe, China, and the US, coupled with our global technical support network, ensure the proximity, availability, and service you need.

REACHING FOR A BETTER FUTURE

We take our responsibilities seriously, which is why we focus on developing products and solutions that enable you, and us, to operate as sustainably as possible. Compliance and a commitment to product safety are central to our business and deeply embedded in our Environmental, Health & Safety (EHS) program.

Our epoxy- and polyurethane-based systems provide an environmentally safer alternative. We are also firmly committed to REACH, with an in-house group of experts who make sure our obligations and standards are consistently met – and so you maintain your competitive advantage.

- **High temperature resistance and thermal conductivity**
- **Excellent mechanical and dielectric properties**
- **Variable hardness and high dimensional stability**
- **Good chemical resistance and low water uptake**

The original brands serving
worldwide electrical engineering
for more than half a century.

Araldite® Arathane®



THE RIGHT SOLUTION WHATEVER YOUR BUSINESS

Our experts are ready to guide you through our comprehensive product portfolio, so you can be sure that you have the most effective and efficient system for your needs. No matter where you sit in the power engineering value chain, whether generation, transmission, distribution, or consumption, we have the right insulation solution for your business and process.

We can also support you with a comprehensive technical data package, which includes mechanical properties, water absorption,

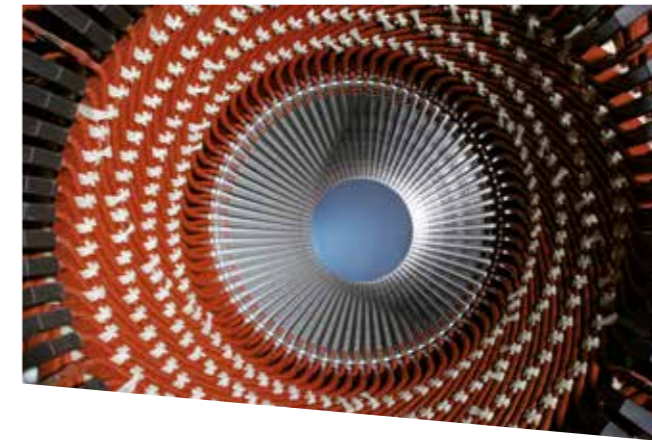
and short term and long term electrical insulation properties, and thermal conductivity. Many of our products are designed to be compatible with insulation media such as air, mineral oil, SF6, mixtures of insulating gases (e.g., SF6 and nitrogen) or vacuum conditions. In addition, many of our products are also suitable for demanding applications, for example in high-temperature or sub-zero environments.

Reliable and comprehensive solutions for electrical engineering

(Ultra) High voltage (UHV)		Medium voltage (MV)		Low voltage (LV)	
Generation		Transmission		Distribution/consumption	
Generators and motors	GIS Switchgear and bushings	Switchgears and transformers	Cast resin transformers (DDT)	Epoxy insulators	

GENERATORS AND MOTORS

ARALDITE® epoxy resin and ARADUR® epoxy curing agent casting and impregnation systems can be used in all insulation components for motors and generators thanks to their high mechanical strength, strong adhesion to various metals and substrates, and their excellent dielectric properties. The low resin viscosity ensures homogenous impregnation.



There is a growing trend for increased power output, higher integration density, and smaller generators and motors that require thermal management. Our heat-conductive products are the ideal solution to dissipate heat and have very high temperature resistance to withstand extreme thermal cycling.

APPLICATIONS

- Large drives and motors
- Large rotating machines

KEY BENEFITS:

- High mechanical strength
- Strong adhesion to various metals and substrates
- Excellent dielectric properties
- Outstanding reliability and life expectancy

IMPREGNATION SYSTEMS

Product designation	Mix ratio	Tg	Viscosity	Thermal class	Manufacturing process	Main features
Conditions			25°C			
Norm						
Unit	pbw	°C	mPa.s			
ARALDITE® MY 790-1 / ARADUR® HY 1102	100 : 100	143	400	H	Vacuum pressure impregnation	Standard system, thermal class H, high Tg. Excellent bath stability, low tan delta at high temperature.
ARALDITE® MY 790-1 / ARADUR® HY 30428	100 : 100	137	260	H	Vacuum pressure impregnation	New, SVHC-candidate free system, thermal class H, high Tg. Good bath stability, low tan delta at high temperature.
ARALDITE® CY 192-1 / ARADUR® HY 918-1	100 : 100	92	200	F	Vacuum pressure impregnation	Outstanding arc and tracking resistance, high flexibility and crack resistance.
Resin XD 4410	1-component	125	1 500	F	Vacuum pressure impregnation	1-component, excellent dielectric properties. Anhydride-free.

INSULATORS AND BUSHINGS



The main requirement for insulators is to obtain high cantilever strength whereas bushings provide void-free castings, low partial-discharge levels for castings and gas tight castings when in use with SF6 gas.

For outdoor applications, excellent weather resistance is a priority. ARALDITE® cycloaliphatic outdoor systems are

backed by 40 years of service expertise. ARALDITE® HCEP epoxy resin systems reduce current leakage and therefore further improve insulator reliability and service life.

APPLICATIONS

- Indoor systems for medium voltage
- Outdoor systems for medium voltage

MONOLITHIC INSULATORS AND BUSHINGS - CASTING SYSTEMS

Product designation	Mix ratio	Tg	K _{1c}	Manufacturing process	Main features
Conditions					
Norm					
Unit	pbw	°C	MPa.√m		

INDOOR APPLICATIONS

ARALDITE® CY 228-1 / ARADUR® HY 918-1 / Accelerator DY 062 or DY 067 / Filler Silica	100 : 85 : 0.8 : 345	110	2.1	Automatic pressure gelation, vacuum casting	High mechanical and electrical properties, good thermal shock resistance, high filler content possible.
ARALDITE® CW 229-3 / ARADUR® HW 229-1	100 : 100	115	2.9	Automatic pressure gelation, vacuum casting	Wollastonite pre-filled system, low thermal expansion coefficient, high crack resistance, moderate reactivity, UL 746 B recognition for 200°C service temperature.
Resin XB 5915 / Hardener XB 5916	70 : 100	140	2.7	Automatic pressure gelation, vacuum casting	Toughened, high Tg, wollastonite pre-filled, suitable for medium voltage and high voltage, high crack resistance.

OUTDOOR APPLICATIONS

ARALDITE® CEP standard systems					
ARALDITE® CY 184 / ARADUR® HY 1235 / Accelerator DY 062 or DY 067 / Filler Silica-EST	100 : 90 : 0.6 : 370	110	2.5	Automatic pressure gelation, vacuum casting	Long experience, liquid hardener, also used in severe indoor conditions (pollution humidity), EDF approved (HN-26-E-20).
ARALDITE® CY 184 / ARADUR® HY 1238 / Accelerator DY 062 or DY 067 / Filler Silica-EST	100 : 92 : 0.5 : 375	107	3	Automatic pressure gelation, vacuum casting	SVHC-candidate free, liquid hardener, also used in severe indoor conditions (pollution humidity). Proven for outdoor applications, based on long experienced CY 184 system.
Resin XB 5918-3 / Hardener XB 5919-3	100 : 100	110	2.6	Automatic pressure gelation, vacuum casting	Core shell toughened outdoor system, pre-filled, high crack resistance.
ARALDITE® HCEP systems with hydrophobic properties					
ARALDITE® CY 5622 / ARADUR® HY 1235 / Accelerator DY 062 or DY 067 / Filler Silica-EST	100 : 82 : 0.45 : 355	110	2.5	Automatic pressure gelation, vacuum casting	Hydrophobic cycloaliphatic system with liquid hardener, excellent thermal cycle resistance, hydrophobicity transfer and recovery, extended insulator lifetime, utility approvals. Approved according to EN 45545-2 for railway applications: best class R23 / HL 3 suited for tunnels.
ARALDITE® CY 5622 / ARADUR® HY 1238 / Accelerator DY 062 or DY 067 / Filler Silica-EST	100 : 84 : 0.46 : 345	105	2.95	Automatic pressure gelation, vacuum casting	Hydrophobic cycloaliphatic system with liquid, SVHC-candidate free hardener, excellent thermal cycle resistance, hydrophobicity transfer and recovery, extended insulator lifetime, utility approvals.
Resin XB 5957 / Hardener XB 5958	100 : 100	110	2.5	Automatic pressure gelation, vacuum casting	Hydrophobic pre-filled cycloaliphatic system, improved crack resistance, hydrophobicity transfer and recovery, extended insulator lifetime.

Electro composites are semi-finished products for pressboards, flexible and rigid sheets, pre-pregs, rods, tubes, and tapes. They are manufactured with matrix resins reinforced by fibers, filaments, and fabrics.

ARALDITE® epoxy resin matrix systems provide low viscosity to ensure good impregnation combined with excellent mechanical and electrical insulation properties covering a broad Tg range. The systems can be processed by pultrusion, filament winding, and vacuum impregnation.

Our impregnation systems are complemented by a casting system for composite insulator housings, providing a package with the matrix system for the rods.

APPLICATIONS

- Impregnation systems for HV bushings, composite insulator rods and tubes
- Casting system for composite insulators

KEY BENEFITS:

- High mechanical strength
- Strong adhesion to various metals and substrates
- Excellent dielectric properties
- Outstanding reliability and life expectancy

COMPOSITE INSULATORS AND BUSHINGS - IMPREGNATION SYSTEM

Product designation	Mix ratio	Tg	Viscosity	Flexural strength	Manufacturing process	Main features
Conditions			25°C			
Norm						
Unit	pbw	°C	mPa.s	MPa		

FOR RODS AND TUBES

ARALDITE® MY 740 / ARADUR® HY 1102 / Accelerator DY 062 or DY 067	100 : 90 : 0.2	140	1 000	115	Pultrusion, filament winding, vacuum impregnation	Standard system with variable accelerator amount.
ARALDITE® MY 740 / ARADUR® HY 906 / Accelerator DY 070	100 : 95 : 1.2	170	1 500	145	Pultrusion, filament winding	High Tg system with good mechanical properties.
ARALDITE® MY 740 / ARADUR® HY 918-1 / Accelerator DY 062	100 : 85 : 1.3	120	700	160	Pultrusion, filament winding	Standard system with high mechanical performance.
ARALDITE® CY 179 / ARADUR® HT 907 / Accelerator DY 072	100 : 105 : 8.5	155	280	100	Filament winding	Low viscosity standard system for high Tg. Moderate reactivity. System also available with liquid hardener.

FOR RESIN IMPREGNATED PAPER BUSHINGS

ARALDITE® MY 790-1 / ARADUR® HY 1102 / Accelerator DY 9577 / Accelerator DY 073-1	100 : 90 : 0.16 : 0.04	143	400	135	Vacuum impregnation	Thermal class H, high Tg. Ultra high voltage bushings.
ARALDITE® MY 740 / ARADUR® HY 1102 / Accelerator DY 062 or DY 067	100 : 90 : 0.2	140	1 000	115	Vacuum impregnation	Standard system with variable accelerator amount.
ARALDITE® CY 30269 / ARADUR® HY 30270	100 : 90	125 - 135	550	155	Vacuum impregnation	SVHC free, 2-component system with improved toughness and low loss factors.

GAP FILLING DIELECTRIC - PU FOAM

ARATHANE® CY 11035-1 / ARADUR® HY 11036	100 : 25	-65	2 400	Elongation: 200%	Gas infusion mixing and dosing	Permanent elastic foam, low dielectrics over wide temperature range, easy gap filling. Substitutes SF6 or other gases as moisture barrier for hollow core applications.
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SWITCHGEARS

For medium voltage switchgear casting systems, ARALDITE® epoxy systems offer high glass transition temperatures ($T_g > 105^\circ\text{C}$) with excellent cracking resistance and mechanical properties, and low shrinkage and rapid curing properties for APG casting processes. For the application of high voltage GIS components, they have higher glass temperature ($T_g = 105^\circ\text{C} \sim 140^\circ\text{C}$) and excellent resistance to cracking and mechanical creep.



ARALDITE® cycloaliphatic outdoor systems have been trusted by businesses worldwide for over 40 years for excellent weather resistance. ARALDITE® hydrophobic cycloaliphatic epoxy (HCEP) systems reduce current leakage, further improving insulator reliability and extending product lifetimes.

KEY BENEFITS:

- **Medium to high glass transition temperature**
- **T_g adjusted to service temperature**
- **High resistance to mechanical creeping**
- **Excellent weathering resistance**
- **HCEP systems reduce current leakage**

INDOOR SYSTEMS

Product designation	Mix ratio	T _g	K _{1c}	Manufacturing process	Main features
Conditions					
Norm					
Unit	pbw	°C	MPa·√m		

FOR MEDIUM VOLTAGE

ARALDITE® CW 229-3 / ARADUR® HW 229-1	100 : 100	115	2.9	Automatic pressure gelation, vacuum casting	Wollastonite prefilled system, low thermal expansion coefficient, high crack resistance, moderate reactivity, best suited for vacuum casting, UL 746 B recognition for 200°C service temperature.
ARALDITE® CY 228-1 / ARADUR® HY 918-1 / Accelerator DY 062 or DY 067 / Filler Silica	100 : 85 : 0.8 : 345	110	2.1	Automatic pressure gelation, vacuum casting	High mechanical and electrical properties, good thermal shock resistance, high filler content possible.
ARALDITE® CY 225 / ARADUR® HY 925 / Filler Silica	100 : 80 : 280	115	1.9	Automatic pressure gelation, vacuum casting	High mechanical and electrical properties, good thermal shock resistance.
ARALDITE® CY 5997 / ARADUR® HY 5998-1 / Accelerator DY 062 or DY 067 / Filler Silica	100 : 3 : 0.75 : 340	115	2.4	Automatic pressure gelation	Pre-accelerated hardener, high mechanical and electrical properties, good thermal shock resistance, high filler content possible.

FOR HIGH VOLTAGE

ARALDITE® CY 5995 / ARADUR® HY 5996-1 / Filler Silica	100 : 82 : 274	140	2	Automatic pressure gelation, vacuum casting	Toughened system for GIS HV with high glass transition temperature and good mechanical end-properties.
ARALDITE® CY 5995 / ARADUR® HY 925 / Filler Al 2O3	100 : 87 : 400	120	2.3	Automatic pressure gelation, vacuum casting	Toughened system for high voltage GIS.
Solid resin ARALDITE® B 41 / ARADUR® HT 903 / Filler Silica or Al 2O3	100 : (30-40) : (200-315)	115	2.4	Vacuum casting	High mechanical and electrical properties, good thermal shock resistance, big volume casting possible, high process temperatures needed.

OUTDOOR SYSTEMS

Product designation	Mix ratio	T _g	K _{1c}	Manufacturing process	Manufacturing process
Conditions					
Norm					
Unit	pbw	°C	MPa·√m		

FOR MEDIUM VOLTAGE

ARALDITE® CEP standard systems					
ARALDITE® CY 184 / ARADUR® HY 1235 / Accelerator DY 062 or DY 067 / Filler Silica-EST	100 : 90 : 0.6 : 370	110	2.5	Automatic pressure gelation, vacuum casting	Long experience, liquid hardener, also used in severe indoor conditions (pollution, humidity), EDF approved (HN-26-E-20).
ARALDITE® CY 184 / ARADUR® HY 1238 / Accelerator DY 062 or DY 067 / Filler Silica-EST	100 : 92 : 0.5 : 375	107	3	Automatic pressure gelation, vacuum casting	SVHC-candidate free, liquid hardener, also used in severe indoor conditions (pollution, humidity). Proven for outdoor applications, based on long experienced CY 184 system.
Resin XB 5918-3 / Hardener XB 5919-3	100 : 100	110	2.6	Automatic pressure gelation, vacuum casting	Core shell toughened outdoor system, prefilled, high crack resistance.
ARALDITE® HCEP systems with hydrophobic properties					
ARALDITE® CY 5622 / ARADUR® HY 1235 / Accelerator DY 062 or DY 067 / Filler Silica-EST	100 : 82 : 0.45 : 355	110	2.5	Automatic pressure gelation, vacuum casting	Hydrophobic cycloaliphatic system with liquid hardener, excellent thermal cycle resistance, hydrophobicity transfer and recovery, extended insulator lifetime, utility approvals. Approved according to EN 45545-2 for railway applications: best class R23 / HL 3 suited for tunnels.
ARALDITE® CY 5622 / ARADUR® HY 1238 / Accelerator DY 062 or DY 067 / Filler Silica-EST	100 : 84 : 0.46 : 347	105	2.95	Automatic pressure gelation, vacuum casting	Hydrophobic cycloaliphatic system with liquid, SVHC-candidate free hardener, excellent thermal cycle resistance, hydrophobicity transfer and recovery, extended insulator lifetime, utility approvals.
Resin XB 5957 / Hardener XB 5958	100 : 100	110	2.5	Automatic pressure gelation, vacuum casting	Hydrophobic pre-filled cycloaliphatic system, improved crack resistance, hydrophobicity transfer and recovery, extended insulator lifetime.

INSTRUMENT TRANSFORMERS

ARALDITE® epoxy systems provide high crack resistance, low viscosity, high filler ratio, reliable process operability, and excellent cured properties for indoor transformer applications.

ARALDITE® cycloaliphatic outdoor systems have been trusted for over 40 years to deliver outstanding performance and weather resistance, and ARALDITE® hydrophobic cycloaliphatic epoxy (HCEP) systems are proven to improve transformer reliability and service life.

KEY BENEFITS:

- **Optimum glass transition temperature**
- **Excellent weathering resistance**
- **Outstanding hydrophobic properties**
- **HCEP systems reduce current leakage**

Product designation	Mix ratio	Tg	K _{1c}	Manufacturing process	Main features
Conditions					
Norm					
Unit	pbw	°C	MPa.√m		

INDOOR APPLICATIONS

ARALDITE® CW 229-3 / ARADUR® HW 229-1	100 : 100	115	2.9	Automatic pressure gelation, vacuum casting	Wollastonite pre-filled system, low thermal expansion coefficient, high crack resistance, moderate reactivity, best suited for vacuum casting, UL 746 B recognition for 200°C service temperature.
ARALDITE® CY 228-1 / ARADUR® HY 918-1 / Flexibilizer DY 045 / Accelerator DY 062 or DY 067 / Filler Silica	100 : 85 : 20 : 0.8 : 385	70	2.7	Automatic pressure gelation, vacuum casting	Standard, low viscosity, high filler load. DY 042 available as flexibilizer with improved toughness.
ARALDITE® CY 30318 / ARADUR® HY 30319 / DY 062 / Filler Silica	100 : 75 : 0.35 : 370	80	3.0	Automatic pressure gelation, vacuum casting	Very low viscous, highly filled casting resin with very good crack resistance. Hardener pre-accelerated, can be used as a 2 component system.
ARALDITE® CY 5995 / ARADUR® HY 227 / Filler Silica	100 : 100 : 300	60	3.5	Vacuum casting	Highest toughness and crack resistance.

OUTDOOR APPLICATIONS

ARALDITE® CEP standard systems					
ARALDITE® CY 184 / ARADUR® HY 1235 / Accelerator DY 062 or DY 067 / Filler Silica-EST	100 : 90 : 0.6 : 370	110	2.5	Automatic pressure gelation, vacuum casting	Long experience, liquid hardener, also used in severe indoor conditions (pollution humidity), EDF approved (HN-26-E-20).
ARALDITE® CY 184 / ARADUR® HY 1238 / Accelerator DY 062 or DY 067 / Filler Silica-EST	100 : 92 : 0.5 : 375	107	3	Automatic pressure gelation, vacuum casting	SVHC-candidate free, liquid hardener, also used in severe indoor conditions (pollution humidity). Proven for outdoor applications, based on long experienced CY 184 system.
Resin XB 5918-3 / Hardener XB 5919-3	100 : 100	110	2.6	Automatic pressure gelation, vacuum casting	Core shell toughened outdoor system, pre-filled, high crack resistance.
ARALDITE® HCEP systems with hydrophobic properties					
ARALDITE® CY 5622 / ARADUR® HY 1235 / Accelerator DY 062 or DY 067 / Filler Silica-EST	100 : 82 : 0.45 : 355	110	2.5	Automatic pressure gelation, vacuum casting	Hydrophobic cycloaliphatic system with liquid hardener, excellent thermal cycle resistance, hydrophobicity transfer and recovery, extended insulator lifetime, utility approvals. Approved according to EN 45545-2 for railway applications: best class R23 / HL 3 suited for tunnels.
ARALDITE® CY 5622 / ARADUR® HY 1238 / Accelerator DY 062 or DY 067 / Filler Silica-EST	100 : 84 : 0.46 : 347	105	2.95	Automatic pressure gelation, vacuum casting	Hydrophobic cycloaliphatic system with liquid, SVHC-candidate free hardener, excellent thermal cycle resistance, hydrophobicity transfer and recovery, extended insulator lifetime, utility approvals.
Resin XB 5957 / Hardener XB 5958	100 : 100	110	2.5	Automatic pressure gelation, vacuum casting	Hydrophobic pre-filled cycloaliphatic system, improved crack resistance, hydrophobicity transfer and recovery, extended insulator lifetime.

DRY-TYPE DISTRIBUTION TRANSFORMERS

ARALDITE® epoxy systems are trusted worldwide to meet even the most demanding requirements for dry-type distribution transformers, providing the high electrical insulation, crack resistance, slow curing process to avoid internal stress, and high heat resistance ratings you need.

KEY BENEFITS:

- **High crack resistance**
- **Excellent insulation properties**
- **No internal stresses during curing**
- **High thermal class**



Product designation	Mix ratio	Tg	K _{1c}	Thermal class	Manufacturing process	Main features
Conditions						
Norm						
Unit	pbw	°C	MPa.√m			

ARALDITE® CW 229-3 / ARADUR® HW 229-1	100 : 100	115	2.9	H	Vacuum casting	Wollastonite pre-filled system, low thermal expansion coefficient, high crack resistance, moderate reactivity, UL 746 B recognition for 200°C service temperature.
ARALDITE® CY 5948 BROWN / ARADUR® HY 925-1 WMO / Filler Silica	100 : 80 : 350	85	3.0	200	Vacuum casting	RAL 8016 color with good hiding power. UL 746 B recognition for 200°C service temperature. Additional hardener HY 925 available for different reactivity.
ARALDITE® CY 5948 / ARADUR® HY 926 / Filler Silica	100 : 80 : 350	85	2.8	200	Vacuum casting, vacuum impregnation	UL 746 B recognition for 200°C service temperature. Also used without filler for GFRP structures.
ARALDITE® CY 225 / ARADUR® HY 227 / Filler Silica	100 : 100 : 300	65	3.0	F	Vacuum casting	Standard system with long experience, low Tg, very high crack resistance.
ARALDITE® CY 5538 / ARADUR® HY 5571-2 / Filler Al(OH) ₃ / Filler Silica	100 : 100 : 310 : 80	55	2.1	F	Vacuum casting	Suitable for flame retardant cast resin transformers fulfilling IEC 60076-11 F1 E2 C2, low viscosity, low Tg, high filler load.
Resin XB 5942 / Hardener XB 5943	100 : 100	55	2.4	F	Vacuum casting	Pre-filled, low viscosity, low Tg system to meet IEC 60076-11 requirements F1 E2 C2.
ARALDITE® CY 30200 / ARADUR® HY 30201	100 : 80	113	0.73	F	Filament winding	Flame retardant, brown impregnation system. Low viscosity, fast cure.

ADHESIVES

Our adhesives have been proven for decades to deliver the performance and reliability needed by businesses like yours across the power engineering industry, worldwide. With excellent thermal insulation properties, bonding strength, and weathering resistance, they are the perfect choice for all your indoor or outdoor applications.

Product designation	Chemistry	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		Aluminium	23°C	23°C	
Norm										
Unit			pbw	Pa.s	min		N/mm ²	N/mm ²	%	
ARALDITE® CY 8767 / ARADUR® HY 8767-1	Epoxy	black	100 : 25	1	> 100	1 h at 65°C	-	3 600	2.7	Potting system for use in sealed acid and storage batteries. Low-cost alternative for terminal lead potting and housing sealing.
ARALDITE® AV 4415 / Hardener HV 4416-1	Epoxy	dark grey	100 : 50	thixotropic	90	15 min at 60°C	22	4 500	1	High performances on composites, bonds a wide range of substrates. Temperature resistance up to 180°C. Excellent resistance to most common chemicals. Non flowing paste for ease of application. Available in cartridges.
ARALDITE® AV 138M-1 / Hardener HV 998-1	Epoxy	grey	100 : 40	thixotropic	30	20 min at 60°C	15	4 200	1	Good temperature and chemical resistance even with a cure at room temperature.
ARALDITE® 2014-2	Epoxy	grey paste	100 : 50	thixotropic	110	5 h at 23°C	17	3 000	1	Multi purpose adhesive with a high temperature and chemical resistance even with a cure at room temperature. Available in cartridges.
ARALDITE® AV 4738 / Hardener HV 4739	Epoxy	grey paste	100 : 26	thixotropic	45	3 h at 23°C	16	3 000	1.5	Temperature resistance up to 150 °C, excellent resistance to most chemicals. For metals and reinforced composites.
ARALDITE® 2011 (ARALDITE® AW 106 / ARADUR® HV 953 U)	Epoxy	pale yellow	100 : 80	40	100	7 h at 23°C	26	1 900	9	Multi purpose, long pot life, self-levelling adhesive with a good resistance to dynamic loading. Very good adhesive for repair applications.
ARALDITE® 2019 (ARALDITE® AW 4859 / Hardener HW 4859)	Epoxy	black	100 : 43	thixotropic	100	20 min at 60°C	33	1 500	5	High strength and toughness, good temperature resistance. Available in cartridges.
ARALDITE® AW 4510 / Hardener HW 4511-1	Epoxy	dark grey	100 : 50	thixotropic	85	15 min at 60°C	22			Temperature resistance up to 180 °C, excellent resistance to most chemicals. Bonds a wide range of substrates.
ARALDITE® 2051	Acrylic	pale yellow	100 : 100	non-sagging	5	15 min at 23°C	22	1700	10	Toughened methacrylate adhesive with fast cure from 0°C to 40°C and service temperature up to 120°C. Minimum surface pre-treatment needed.
ARALDITE® 2053-05 & ARALDITE® 2053-15	Acrylic	dark grey	100 : 13	non-sagging	5 with -05 15 with -15	20 min at 23°C with -05 40 min at 23°C with -15	17	1000	50	Toughened methacrylate adhesive with very high elongation and service temperature up to 100°C. Minimum surface pre-treatment needed.

Product designation	Dielectric strength	Volume resistivity	Dielectric constant / Loss tangent	Loss tangent
Conditions	RT	RT	50Hz, RT	RT
Norm	IEC 60243-1	IEC 60093	IEC 60250	IEC 60250
Unit	kV/mm	Ohm	%	%
ARALDITE® 2014-2	25	2.7	4.0	1.3
ARALDITE® 2011 (ARALDITE® AW 106 / ARADUR® HV 953 U)	26	7.1	3.4	1.7
ARALDITE® AV 4738 / Hardener HV 4739	no data	3.2	4.4	1.4

ANCILLARIES

In addition to a comprehensive portfolio of formulated impregnation and casting systems, Huntsman also offers a broad range of ancillary products to meet the needs of our formulating customers.



COLORING PASTES

Product designation	Benefits
Conditions	
Norm	
Unit	
ARALDITE® DW 0131 / RAL 1013 (white)	Uniform and homogenous coloration. Minor effects on the processing and end properties of a casting resin system. Light and heat resistance. Viscosity at 25°C: 20 - 160 Pas. Pigment particle size below 50 µm.
ARALDITE® DW 0133 / RAL 3000 (red)	
ARALDITE® DW 0136 / RAL 8016 (brown)	
ARALDITE® DW 0137-1 / RAL 8022 (black)	
ARALDITE® DW 0138 / RAL 7035 (grey)	
ARALDITE® DW 0139 / RAL 3000 (red)	
ARALDITE® DW 9134 / RAL 7035 (grey)	

FLEXIBILIZERS

Product designation	Color	pH value	Viscosity	Benefits
Conditions	visual	5% in water; 23°C	dynamic 25°C	
Norm		ISO 787-9	ISO 12058	
Unit			mPa.s	
Flexibilizer DY 040	colorless liq uid	4.0 - 7.0	60 - 90	Standard flexibilizer, low viscosity.
Flexibilizer DY 042	colorless liquid	5.0 - 7.0	45 - 65	Low viscosity. Superior toughening / higher flexibility. Better crack resistance. Less amount required.
Flexibilizer DY 044	colorless liquid	4.0 - 7.0	150 - 200	Preferred for outdoor.
Flexibilizer DY 045	colorless liquid	5.0 - 7.0	80 - 105	Standard flexibilizer.

RELEASE AGENT

Product designation	Benefits
Mold Release QZ 66	Solvent-free mold release agent. Improved working hygiene. Optimum release effects. Enables precise reproduction of surface detail, contours. Allows smooth demolding at mold temperatures up to 250°C. Little amount needed for good release. Fast drying times. Does not corrode ARALDITE® epoxy or metal molds. Multiple demold.
Mold Release QZ 13	Mold release agent. Optimum release effects. Enables precise reproduction of surface detail, contours. Allows smooth demolding at mold temperatures up to 250°C. Little amount needed for good release. Fast drying times. Does not corrode ARALDITE® epoxy or metal molds. Multiple demold.

CLEANING AGENT

Product designation	Benefits
ARA® Ecocleaner	Suitable alternative to solvents such as acetone, methylene chloride or NMP. Non-toxic. No hazard label. Improved working hygiene. Non flammable. High flash point. Readily biodegradable. Recycling by filtering. Flash point 103°C. Vapour pressure (20°C) of 25 Pa.

APPLICATION TECHNOLOGIES

To achieve optimal electrical insulation properties, the major process methods are listed below. Absolute void-free curing can be achieved by applying epoxy under vacuum and fillers are added for most volume applications. Note that required mixing and dosing equipment is widely available on the market.

PROCESS 1-2 = CASTING | PROCESS 3 = IMPREGNATION

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		
<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> Excellent impregnation 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 	<ul style="list-style-type: none"> Insulators Bushings Dry Type Transformers Instrument Transformers
2. AUTOMATED PRESSURE GELATION (APG)		
<ul style="list-style-type: none"> Short cycle times Void free castings Shrinkage compensation Feeding of clamping machines over ring lines with central resin system preparation 	<ul style="list-style-type: none"> Low viscosity for easy processing Sedimentation stability Fast demolding and curing Thermal class High crack resistance Low coefficient of thermal expansion 	<ul style="list-style-type: none"> Insulators Bushings Instrument Transformers Switchgears
3. VACUUM PRESSURE IMPREGNATION (VPI)		
<ul style="list-style-type: none"> Ensuring void-free impregnation Reliable electrical insulation with lowest partial-discharges Excellent bonding and mechanical fixation 	<ul style="list-style-type: none"> Low viscosity Stable viscosity 1- or 2-component systems Thermal class High tracking resistance and dielectric strength Humidity and chemical resistance 	<ul style="list-style-type: none"> Large motors and generators

GLOSSARY OF INDUSTRY TERMINOLOGY



Properties	Definitions	Standards
Density	The mass per unit volume of a substance under specified conditions of pressure and temperature.	ISO 1183
Viscosity	Measure of the resistance to flow of a fluid under shear force.	ISO 2555
Gel Time	Time taken for a thermosetting compound to solidify or to reach the point where it no longer flows.	ISO 9396
Glass Transition	Temperature at which an amorphous substance will transform from a glassy to a rubbery state.	ISO 11357-2
Thermal Conductivity	Heat flow per unit area divided by the temperature gradient [W/mK].	ISO 8894-2
Thermal Class	Thermal Classes: Y = 90°C, A = 105°C, E = 120°C, B = 130°C, F = 155°C, H = 180°C, K = 200°C, M = 220°C.	IEC 60085
Shore Hardness	Resistance against the penetration of a body of specified shape, applied under a specific load.	ISO 868
Tensile Strength	The tensile strength is the maximum stress that a material can withstand while being stretched or pulled before failing or breaking.	ISO 527
Flexural Strength	Characterizes the ability of a material to resist deformation under load.	ISO 178
Elongation at Break	Also known as fracture strain. It is the ratio between changed length and initial length after breakage of the test specimen.	ISO 527
Modulus of Elasticity	Also known as Young's Modulus. It is used to characterize the stiffness of a material by expressing the ratio of the stress applied to a substance to the strain that results in the substance in response to it.	ISO 527
Dielectric Dissipation Factor Tan δ	The dielectric dissipation factor tan δ of a material indicates the electrical losses of the dielectric. It is the tangent of the dielectric loss angle δ. The dielectric loss angle δ of an insulating material is the angle by which the phase difference between applied voltage and resulting current deviates from 90 degrees, when the dielectric of the capacitor consists exclusively of the dielectric material.	IEC 60250
Relative Permittivity	The relative permittivity of an insulating material is the ratio of capacitance of a capacitor, in which the space between and around the electrodes is entirely and exclusively filled with the insulating material in question, to the capacitance of the same configuration of electrodes in vacuum. The permittivity of an insulating material is the product of its relative permittivity, and the electric constant (or permittivity of vacuum).	IEC 60250
Dielectric Strength	The dielectric strength is the quotient of the breakdown voltage and the distance between the conducting parts between which the voltage is applied under prescribed test conditions.	IEC 60243-1 IEC 60455-2 (1998)
Fracture Toughness	The double-torsion test and the bend notch test are controlled crack propagation methods for measuring the energy required to propagate a crack. - K _{IC} , critical stress intensity factor: K _I defines the stress field around the sharp crack; the fracture occurs when K _I reaches the critical value. K _{IC} - G _{IC} , specific energy of fracture: measure of resistance to crack propagation in a material under static load. The higher the values of K _{IC} and G _{IC} , the tougher is the material.	Internal test PM 216-0 double-torsion test (for prefilled material) ISO 13586 bend notch test (for unfilled material)
Comparative Tracking Index CTI	The comparative tracking index is the numerical value of the maximum voltage at which five test specimens withstand the test period for 50 drops without tracking failure and without a persistent flame occurring and including also statements relating to the behavior of the material when tested using 100 drops and the depth of erosion.	IEC 60112

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