

Advanced Materials

Araldite[®] CW 5625 Epoxy Resin Aradur[®] HW 5625-1 Epoxy Resin

Pre-Filled Cycloaliphatic Epoxy Resin System:

Hydrophobicity - Transfer & Recovery
Excellent Arc Track and UV Resistance

General

Araldite[®] CW 5625 epoxy resin with Aradur[®] HW 5625-1 epoxy resin is a pre-filled, cycloaliphatic, hot-curing, two component epoxy casting resin system recommended for medium voltage electrical applications in outdoor environments and in high humidity environments. It exhibits hydrophobic properties including hydrophobicity transfer and recovery as well as excellent arc tracking resistance and erosion resistance to UV radiation, excellent mechanical and dielectric properties, and good thermal shock resistance.

Applications

- Outdoor electrical insulating components
- Bushings, sensors
- Instrument transformers
- Line post and pin insulators in the medium voltage range.
- All components for humid indoor medium and high voltage environments
- Excellent indoor and outdoor switchgear components

Features

- Hydrophobicity transfer and recovery
- High mechanical properties
- Excellent dielectric properties
- Very good thermal shock resistance
- High resistance to erosion under UV-radiation
- High tracking and arc resistance
- Extended life-time of insulation
- Silanized fillers ensures stable dielectric properties in outdoor humid conditions

Typical Properties***Araldite® CW 5625 epoxy resin**

Appearance	Grey Viscous Liquid
Specific Gravity	1.71 – 1.77
Viscosity @ 40°C, cPs	20,000 – 35,000

Aradur® HW 5625-1 epoxy resin

Appearance	Grey Brown Viscous Liquid
Specific Gravity	1.85 – 1.90
Viscosity @ 40°C, cPs	15,000 – 30,000

* Typical properties are based on Huntsman's test methods. Copies are available upon request.

Packaging & Storage**Araldite® CW 5625 epoxy resin**

Store at 70-90°F in a dry and well-sealed condition, if possible, in original containers. If only part of container is used, re-close to prevent contamination.

Aradur® HW 5625-1 epoxy resin

Store at 70-90°F in a dry well-sealed condition, if possible in original containers. This product is moisture sensitive and packaged under a blanket of dry nitrogen. Maintain factory seal. If only part of container is used, blanket with dry nitrogen and tightly re-seal.

Provided these materials are stored under the recommended storage conditions in their original containers, they will remain in usable condition for 1 year from date of manufacture.

Mix ratios

	Parts by weight
Araldite® CW 5625 epoxy resin	100
Aradur® HW 5625-1 epoxy resin	100

Processing and Cure

The two components should be mixed in the desired quantity under vacuum and at slight elevated temperature (up to 60°C). For mixing of medium- to high-viscous casting resin systems and for mixing at lower temperatures, we recommend special thin film de-gassing mixers that may produce additional self-heating of 10°C -15 °C as a result of friction. Depending on the quantity, mixer device, mixing temperature and application, the mixing time is, under a vacuum of 1 to 8 mbar, 0.25 to 1 h.

The premixed components are packaged according to their mixing ratio. To minimize any filler sedimentation, it's recommendable to empty the container completely. Before partial use, the contents must be carefully homogenized at elevated temperature. We recommend also the same preheating temperature to prevent air entrapment.

In automatic feeding and mixing installations, both components are de-gassed and homogenized under a vacuum of about 2 - 5 mbar in separate holding tanks. From time to time the prefilled products are agitated to avoid any sedimentation and irregular metering. After dosing and mixing with a static mixer, the system is fed directly to the vacuum casting chamber or, in case of the automatic pressure gelation process, directly to the hot casting mold. Several individual casting stations can be fed via separate feeding tubes.

The effective pot-life of the mixed system is about 1 to 2 days at temperatures below 25°C. Conventional batch mixers should be cleaned once a week or at the end of work. For longer interruptions of work, the pipes of the mixing and metering installations must be cooled and cleaned with the resin component to prevent sedimentation and/or undesired viscosity increase. Interruptions over a weekend without cleaning are possible if the pipes are cooled at temperatures below 18°C. For information regarding viscosity increase and gel time at various temperatures, refer to Figures 1 and 2.

Mold temperature

APG process	130 – 160°C
Conventional vacuum casting	80 – 100°C

Demolding times (depending on mould temperature and casting volume)

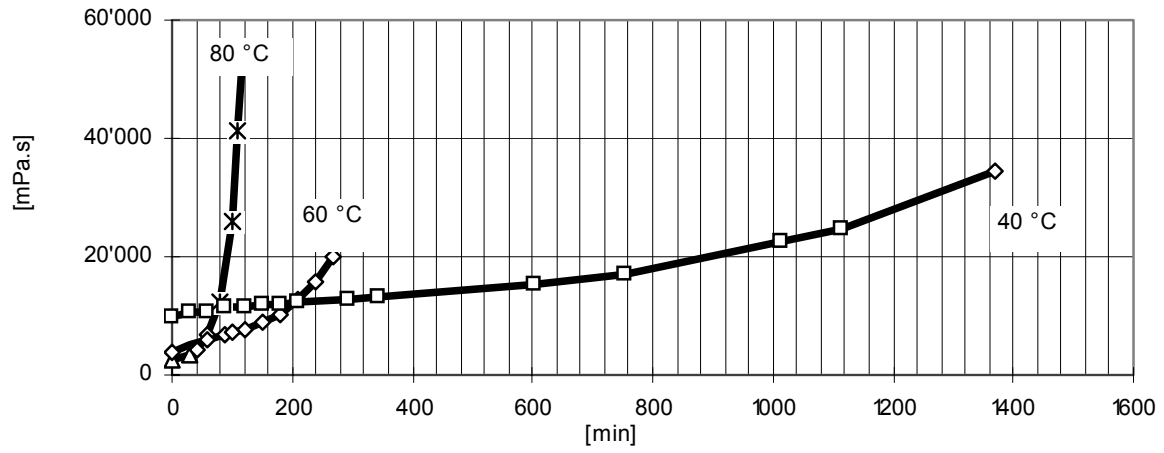
APG process	10 – 40 min
Conventional vacuum casting	2 – 8 h

Cure conditions (minimal postcure)

APG process	2 h @ 150°C (or) 4 h @ 140°C
Conventional vacuum casting	4 h @ 80°C and 4 h @ 140°C

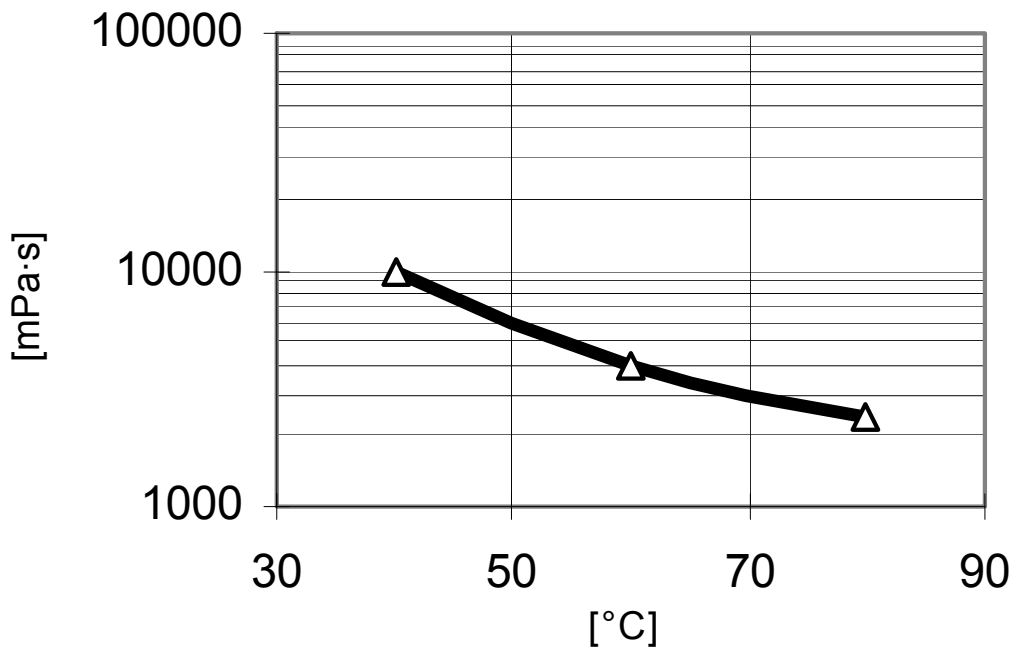
To determine whether cross-linking has been carried to completion and the final properties are optimal, it is necessary to carry out relevant measurements on the actual object or to measure the glass transition temperature. Different gel and post-curing cycles in the manufacturing process could influence the cross-linking and the glass transition temperature respectively.

Figure 1



Viscosity increase at 40°, 60°C and 80°C (measurements with Rheomat 115 A, ; MS DIN 125, Shear rate $D = 6.65 \text{ s}^{-1}$)

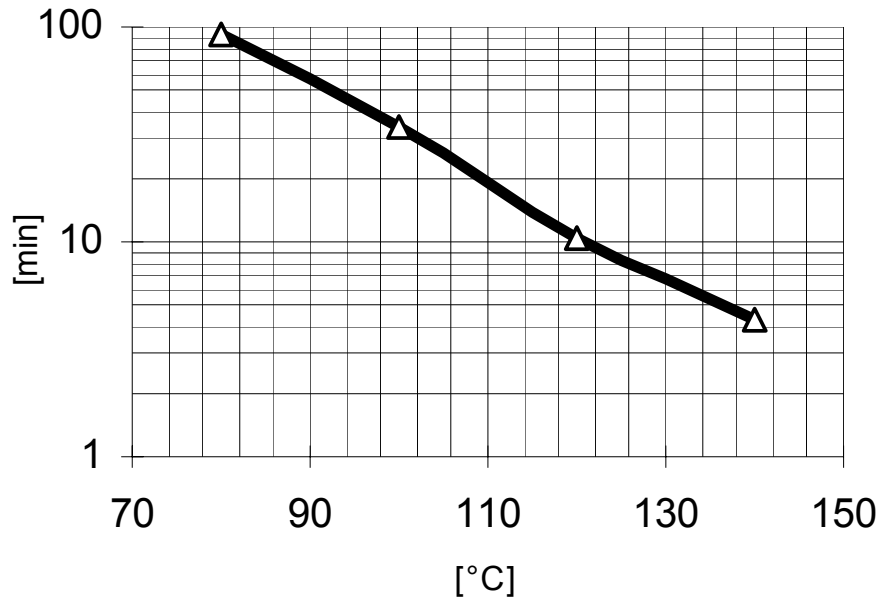
Figure 2



Initial Viscosity vs. Temperature

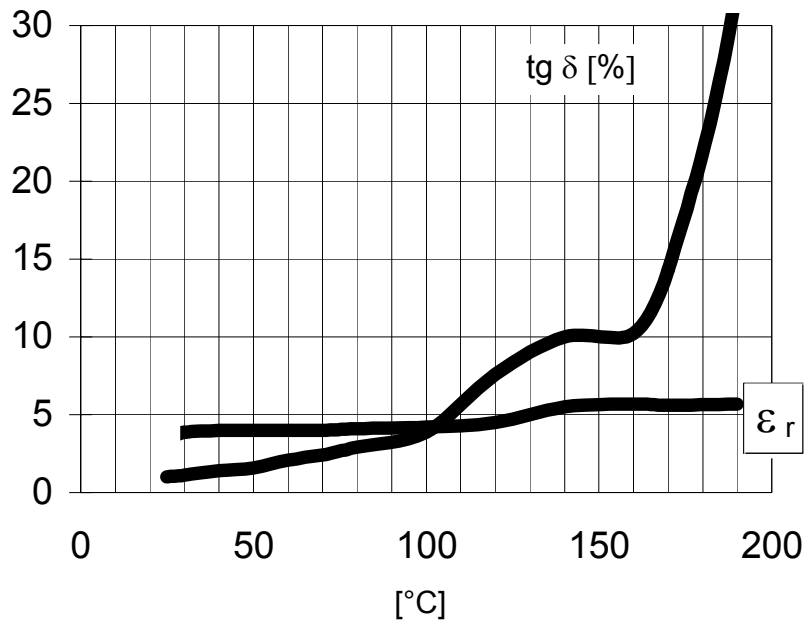
(measurements with Rheomat 115 A, MS DIN 125, Shear rate $D = 6.65 \text{ s}^{-1}$)

Figure 3



Gel Time vs. Temperature
(measurements with Gelnorm Instrument / DIN 16945)

Figure 4



Loss factor (tan δ) and dielectric constant (ε_r) as a function of temperature
(measurement frequency: 50 Hz / IEC 60250)

**Physical Properties
(typical values)**Determined on standard specimen at 23°C
Cured for 6h at 80°C + 10h at 140°C

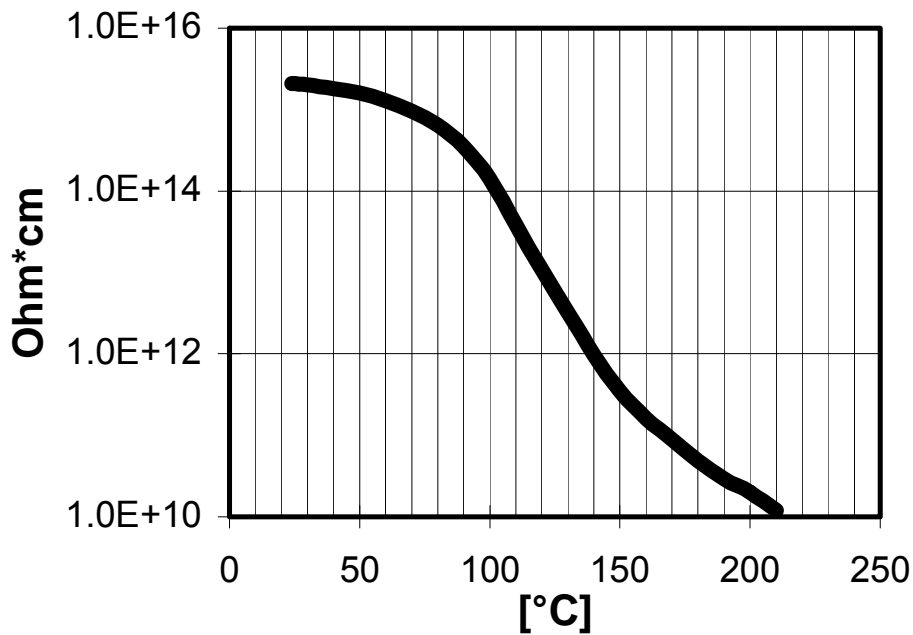
Tensile strength	ISO 527	MPa	65 - 90
Elongation at break	ISO 527	%	0.80 - 1.20
E modulus from tensile test	ISO 527	MPa	10600 - 11000
Flexural strength	ISO 178	MPa	125 - 145
Surface strain	ISO 178	%	1.30 - 1.60
E modulus from flexural test	ISO 178	MPa	11000 - 11500
Double Torsion Test	CG 216		
Critical stress intensity factor (K_{IC})		MPa·m ^{1/2}	2.30 - 2.50
Specific energy at break (G_{IC})		J/m ²	460 - 500
Glass transition temperature (DSC)	IEC 61006	°C	100 - 115
Coefficient of linear thermal expansion	ISO 11359-2		
Mean value for temp. range: 20 - 80°C	K ⁻¹		34 - 37.10 ⁻⁶
Thermal conductivity similar to	ISO 8894	W/m.K	0.90 - 1.00
Water absorption (specimen: 50x50x4 mm)	ISO 62		
10 days at 23°C		% by wt.	0.10 - 0.15
60 min. at 100°C		% by wt.	0.07 - 0.12
Decomposition temperature (heating rate: 10 K/min.)			
	DTA	°C	350
Density	ISO1183	g/cm ³	1.83 - 1.92

**Electrical Properties
(typical values)**

Determined on standard specimen at 23°C
Cured for: 6h at 80°C + 10h at 140°C

Breakdown strength	IEC 60243-1	kV/mm	21 - 26
HV diffusion breakdown strength Temp. of specimen after test	DIN 57 441	Class °C	HD - Class 2 < 24
HV arc resistance	IEC 61621	s	183 - 186
Tracking resistance with test solution A with test solution B	IEC 60112	CTI	> 600 0.0 > 600 M 0.1
HV tracking resistance	IEC 60587	class	1B3.5
Electrolytic corrosion	IEC 60426	grade	A-1

Figure 5



Volume resistivity (ρ) as a function of temperature
(measurement voltage: 1000 V / IEC 60093)

Handling/Safety Precautions

To protect against any potential health risks presented by our products, the use of proper personal protective equipment (PPE) is recommended. Eye and skin protection is normally advised. Respiratory protection may be needed if mechanical ventilation is not available or is insufficient to remove vapors. For detailed PPE recommendations and exposure control options consult the product MSDS or a Huntsman EHS representative.

Araldite® CW 5625

Warning! Causes skin and eye irritation. May cause allergic skin reaction. Avoid contact with eyes, skin, and clothing. Avoid prolonged or repeated contact with skin. Do not breathe dust. Wash thoroughly after handling. Notice! Contains crystalline silica. Breathing dust may cause cancer and delayed lung injury.

Aradur® HW 5625-1

Warning! Causes eye, skin, and respiratory irritation. May cause allergic skin and respiratory reactions. Avoid contact with eyes, skin, and clothing. Avoid breathing vapor or mist. Avoid prolonged or repeated contact with skin. Keep container closed. Use with adequate ventilation. Wash thoroughly after handling. Notice! Contains crystalline silica. Breathing dust may cause cancer and delayed lung injury.

First Aid

In case of contact:

Eyes: Flush eyes with plenty of water for 15 minutes and get prompt medical attention.

Skin: Wash skin thoroughly with mild soap and water; remove contaminated clothing before reuse. Discard contaminated shoes and other articles made of leather.

Inhalation: Remove person to fresh air.

Ingestion: **Do not** induce vomiting. Dilute with plenty of water and contact physician immediately. Never give anything by mouth to an unconscious person.

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