

Araldite[®] CW 229

Aradur[®] HW 229-1

UL[®] Recognized Polymeric System at 200°C

General

Araldite CW 229 with Aradur HW 229-1 is a liquid, hot curing two-component epoxy casting systems containing mechanically reinforcing fillers. This system is readily processed into a resilient polymer having excellent mechanical and electrical characteristics. The cured product exhibits exceptional resistance to thermal cycling as well as thermal endurance properties, which qualifies for 200°C service.

This system is recommended for the manufacture of electrically insulating components and for use as electrical insulation for indoor medium and high voltage applications including SF₆ insulated types.

Applications

Components are easily processed liquids
Adequate working life at processing temperatures
Rapid gelation at mold temperatures of 140°C and above
Excellent mechanical and electrical properties
Excellent fracture toughness characteristics
Excellent performance in applications requiring thermal cycling
UL[®] recognized insulation component with Thermal Index of 200°C

Typical Properties*	
Araldite CW 229	
Appearance	Biege Viscous Liquid
Specific Gravity	1.76 - 1.83
Viscosity @ 25°C, cPs	80,000 – 200,000
Flash point, Closed Cup, °C	135
Aradur HW 229-1	
Appearance	Biege Viscous Liquid
Specific Gravity	1.90 - 1.98
Viscosity @ 25°C, cPs	25,000 – 75,000
Flash point, Closed Cup, °C	140
Mixed	
Specific Gravity	1.80 - 1.85
Viscosity, cPs	
@ 25°C	25,000 – 35,000
@ 50°C	2,500 – 3,500
@ 70°C	700 – 1,200

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

Packaging & Storage	
Araldite CW 229:	Contains cure-accelerating additives. It should not be stored for long periods at temperatures in excess of 30°C nor should it be exposed to temperatures in excess of 100°C for more than 2 hours. Incorrect handling will result in an increase in viscosity and reduced cured-state properties.
Aradur HW 229-1:	Contains cure accelerators. Storage at elevated temperatures (>80°C) for long periods (>5 days) will result in an undesirable increase in viscosity and impaired reactivity of the mixed system. This hardener is sensitive to moisture. Partially used containers should be closed immediately after use.
	Under these conditions their shelf lives will be one year from date of shipping. Contact Customer Service for packaging information.

Mix ratios		
	Parts by weight	Parts by volume
Araldite CW 229	100	100
Aradur HW 229-1	100	90
Processing data		
(average values)	Mixed viscosity @ 25°C, cPs	50,000 – 70,000
	Gel time, 10 g sample, min	
	@ 130°C	13 – 15
	@ 150°C	8 – 9
	Recommended cure time, hours	
	@ 80°C	5 +
	@ 140°C	10

Processing and Cure

Araldite CW 229 and Aradur HW 229-1 system is ideally suited to processing by conventional techniques. When casting very large parts with this system, an extended cure cycle is recommended to reduce formulation of high stresses within the cured part. The optimum gelation and cure schedule in this case is dependent on the design of the part. General processing conditions are given below:

Smaller parts:

For relatively thin, low mass castings, a simplified cure schedule would be: within preheated mold at 80°C - 100°C, mix materials at 40°C - 80°C. Fill mold, then gel typically for 4 - 6 hours at 80°C or 2 hours at 100°C. Then post cure either 2 hours at 140°C, or 10 hours at 130°C.

Very large parts:

Within preheated mold and mixed materials at 60°C - 80°C, cure with either a step or ramp cure cycle. For example, ramp cure from initial mold temperature to 140°C in linear ramp over a time of 16 - 24 hours. Then post cure for an additional 4 hours at 140°C. Cool slowly to 100°C or less over a period of several hours prior to de-molding.

This system is ideally suited to processing by the Automatic Pressure Gelation (APG) technique. However, it can be used to produce small sized castings by conventional means as above. In using the APG process, preheat mold to 140°C - 160°C. Fill the mold in 2 - 5 minutes with the mixed material at approximately 60°C. Gel within mold under pressure of 1-3 atm for 7-15 minutes (dependent on part size and mixed material temperature). Then post cure for either 2 hours at 150°C, 6 hours at 140°C, or 10 hours at 130°C.

Processing Guides

When using the Araldite CW 229 / Aradur HW 229-1 system to produce large parts by conventional vacuum casting techniques the resin and hardener components, as well as the prepared mold, are typically preheated separately at 60°C - 80°C. The casting components are mixed thoroughly for approximately 30 minutes under vacuum of 2 - 6 torr, then brought to atmospheric pressure.

An effective method for eliminating air entrapment in the casting is to place the preheated mold in a vacuum chamber at 4 - 8 torr vacuum. The mixed and de-aired casting system is introduced into the mold while it is within the vacuum environment. The filled mold is then placed in an oven for cure and post cure. When using this system by the APG process, the resin and hardener components are typically preheated to 50°C - 60°C. If using continuous metering/mixing/dispensing equipment, the components are typically maintained in a de-aired condition at 50°C - 60°C. The prepared mold is pre-heated on the APG clamping machine to 140°C - 160°C.

Reactivity Characteristics:

Sunshine gel time @ 130°C (10 grams): 13 – 15 minutes
 @ 150°C (10 grams): 8 – 9 minutes
Viscosity vs. Time, Brookfield HATDV, spindle 28 @ 100 rpm

Mechanical and Physical Properties	Specific gravity	1.81 – 1.85
	Tensile strength, psi	11,000 - 12,500
	Tensile modulus, psi	1.50 - 1.55 x 10 ⁶
	Ultimate tensile elongation, %	0.80 – 1.20
	Flexural strength, psi	18,000 - 19,000
	Flexural modulus, psi	1.40 - 1.50 x 10 ⁶
	Hardness, Shore D	92 - 96
	Glass transition temperature, °C	110 - 120
	Coefficient of thermal expansion, in/in-°C	See Figure 1
	Water absorption, 24 hours @ 23°C, %	0.020 - 0.025
Thermal Conductivity, W/m-K	0.7 - 0.8	

Electrical Properties (typical values)	Dissipation factor, 60 Hz	See Figure 2
	Volume resistivity	See Figure 3
	Dielectric constant, 60 Hz	See Figure 4
	Dielectric strength, V/mil @ 3 mm	420 – 480
	Thermal endurance	See Figures 5 & 6

Figure 1

Coefficient of Thermal Expansion

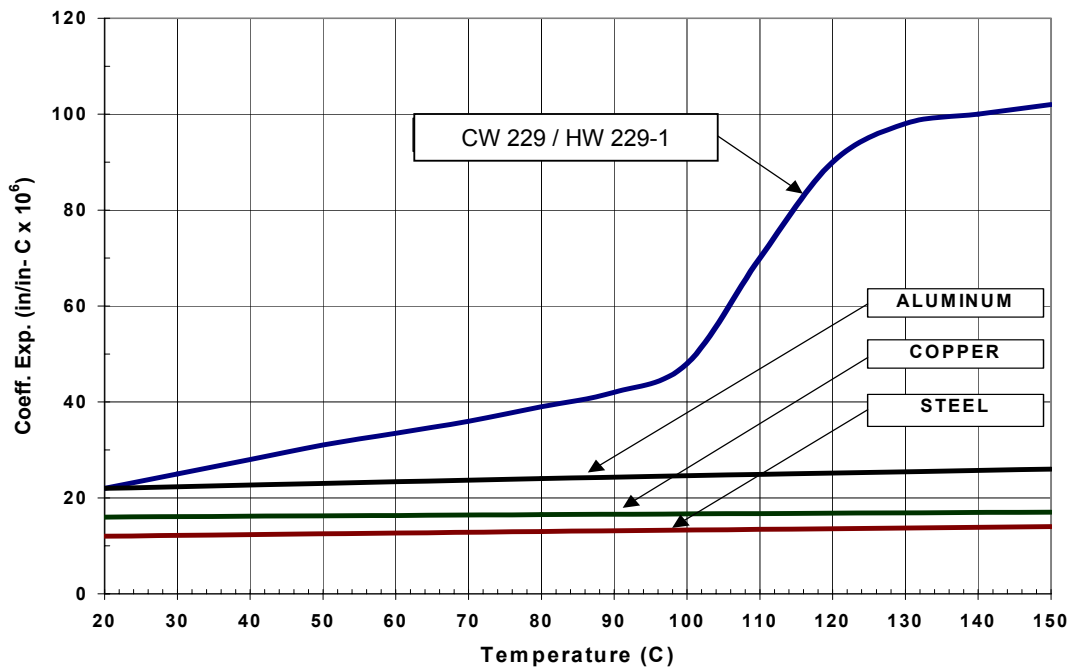


Figure 2

Dissipation Factor vs. Temperature @ 60 Hz

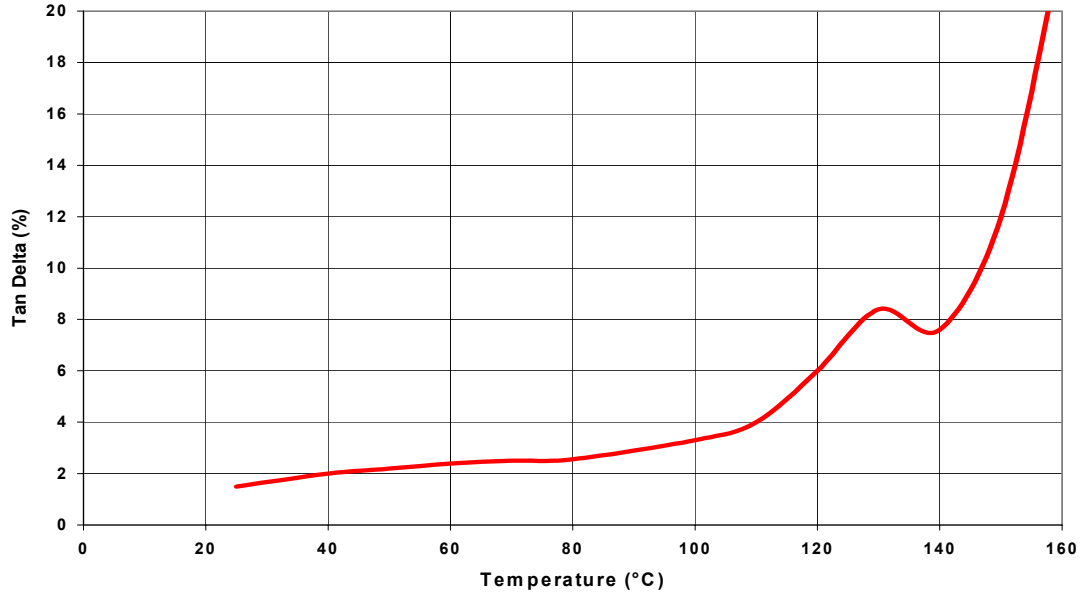


Figure 3

Volume Resistivity vs. Temperature

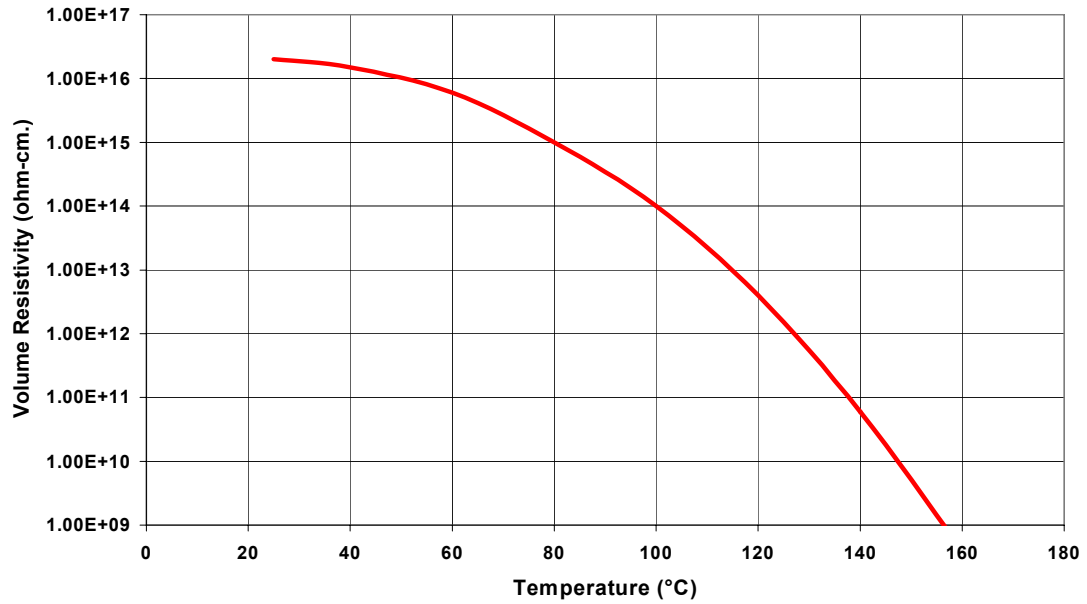


Figure 4

Dielectric Constant vs. Temperature @ 60 Hz

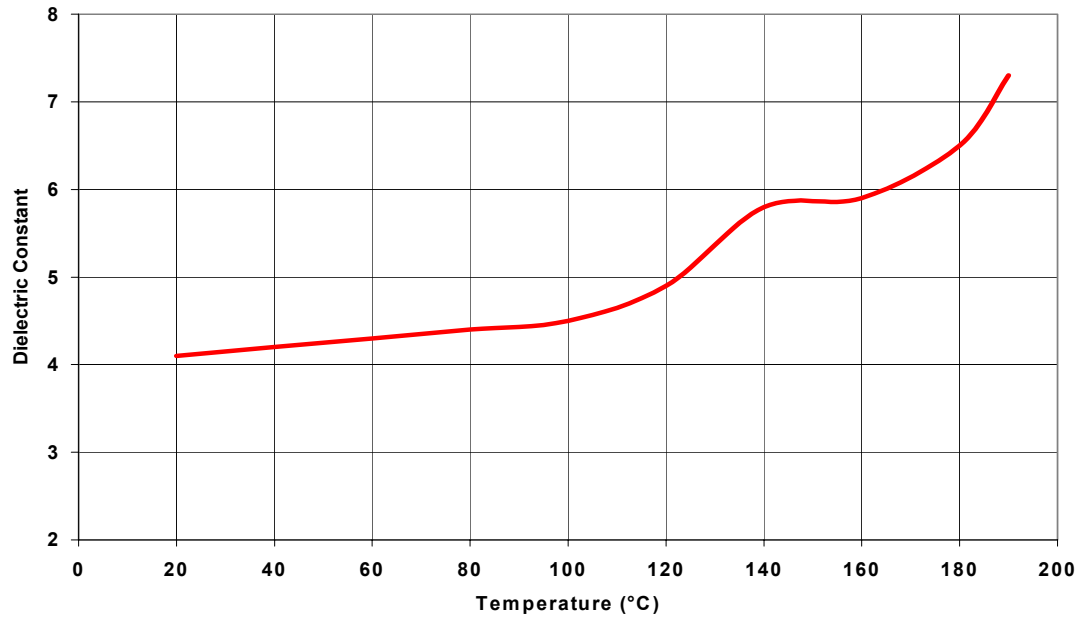


Figure 5

Thermal Endurance

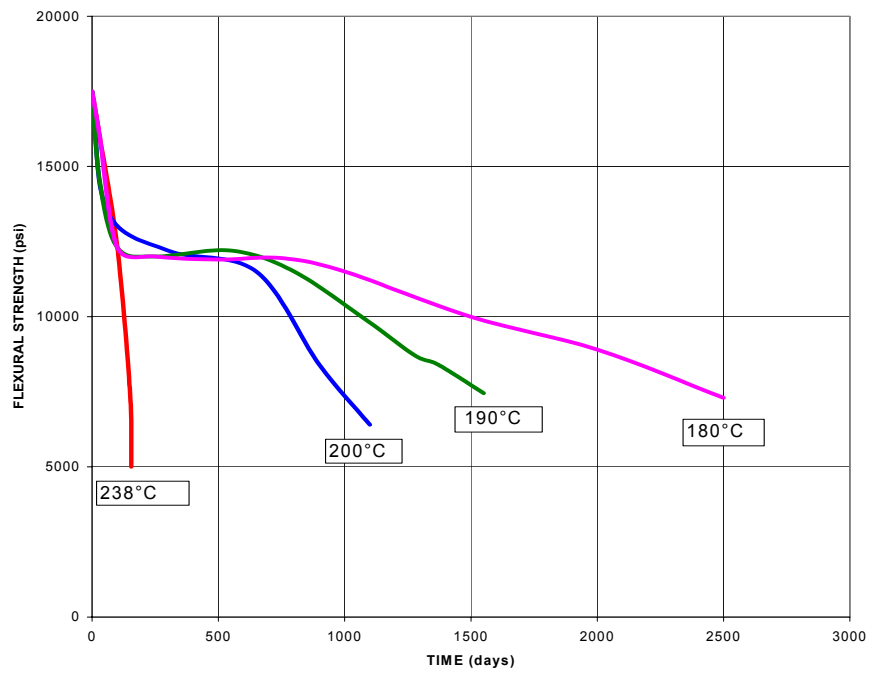
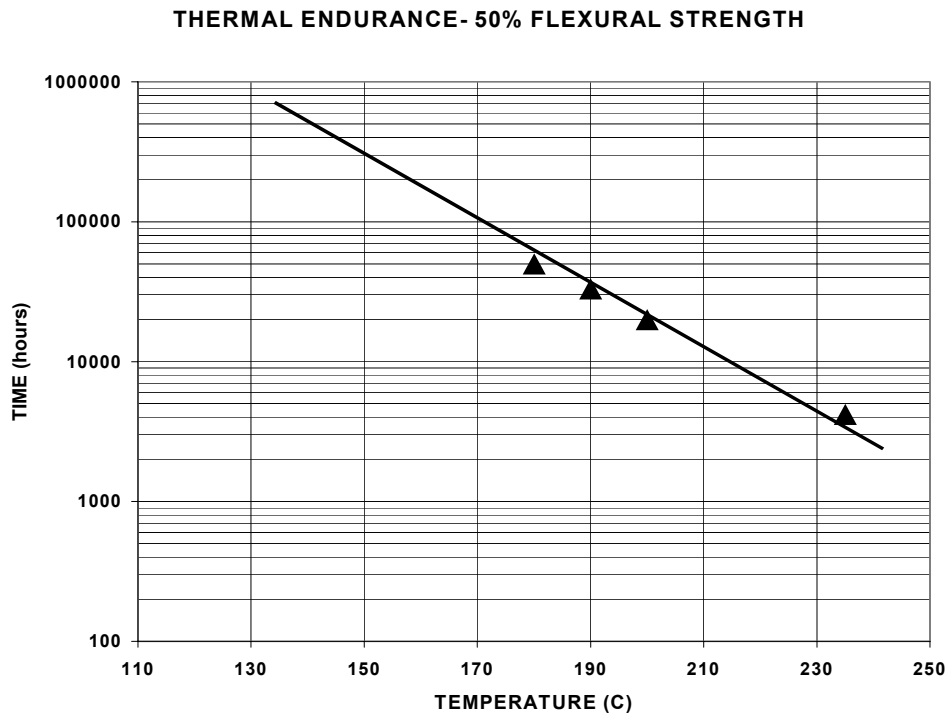


Figure 6



**Handling/Safety
Precautions**

Mandatory and recommended industrial hygiene procedures should be followed whenever our products are being handled and processed. For additional information please consult the corresponding material safety data sheets.

Araldite CW 229

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.

Aradur HW 229-1

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.

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.

Important

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Note

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with Aradur HW 229-1
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