Araldite® CW 229 US Resin / Aradur® HW 229-1 US Hardener

Product Description

Araldite® CW 229 US Resin with Aradur® HW 229-1 US Hardener is a liquid, heat curing two-component epoxy casting system 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 applications. 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.

Features

- Resin and hardener components are easily processed liquids
- 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
- Recognized insulation component with Thermal Index of 200°C

Typical Properties*

Property	Araldite® CW 229 US Resin	Aradur® HW 229-1 US Hardener
Appearance	Beige Viscous Liquid	Beige Viscous Liquid
Density, g/cm^3	1.76 - 1.83	1.90 - 1.98
Viscosity at 25ºC, cP	80,000 - 200,000	25,000 - 75,000
Flash point, Closed Cup, °C	135	140

*Properties are based on Huntsman test methods. Copies are available upon request

Processing

Araldite® CW 229 US Resin and Aradur® HW 229-1 US Hardener system is ideally suited for processing by conventional techniques. The optimum gelation and cure schedule in this case is dependent on the design of the part. When casting very large parts with this system, an extended cure cycle is recommended to reduce formulation of high stress areas within the cured 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 80ºC - 100°C, mix materials at 40ºC - 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 60ºC - 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 - 6 hours at 140°C. Cool slowly to 100°C or less over a period of several hours prior to de-molding.

APG Casting:
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 140ºC - 160°C. Fill the mold in 2 - 5 minutes with the mixed material at 50°C to 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, 4 - 6 hours at 140°C, or 10 hours at 130°C.

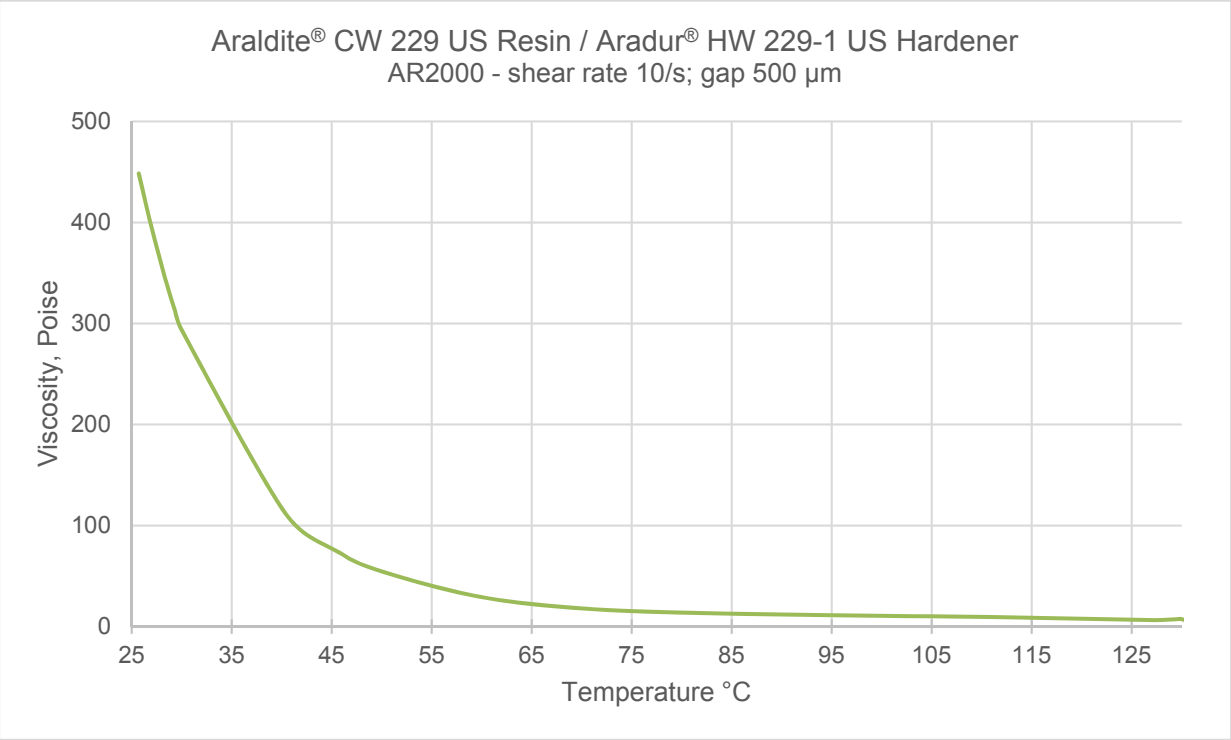
Mixing Ratio

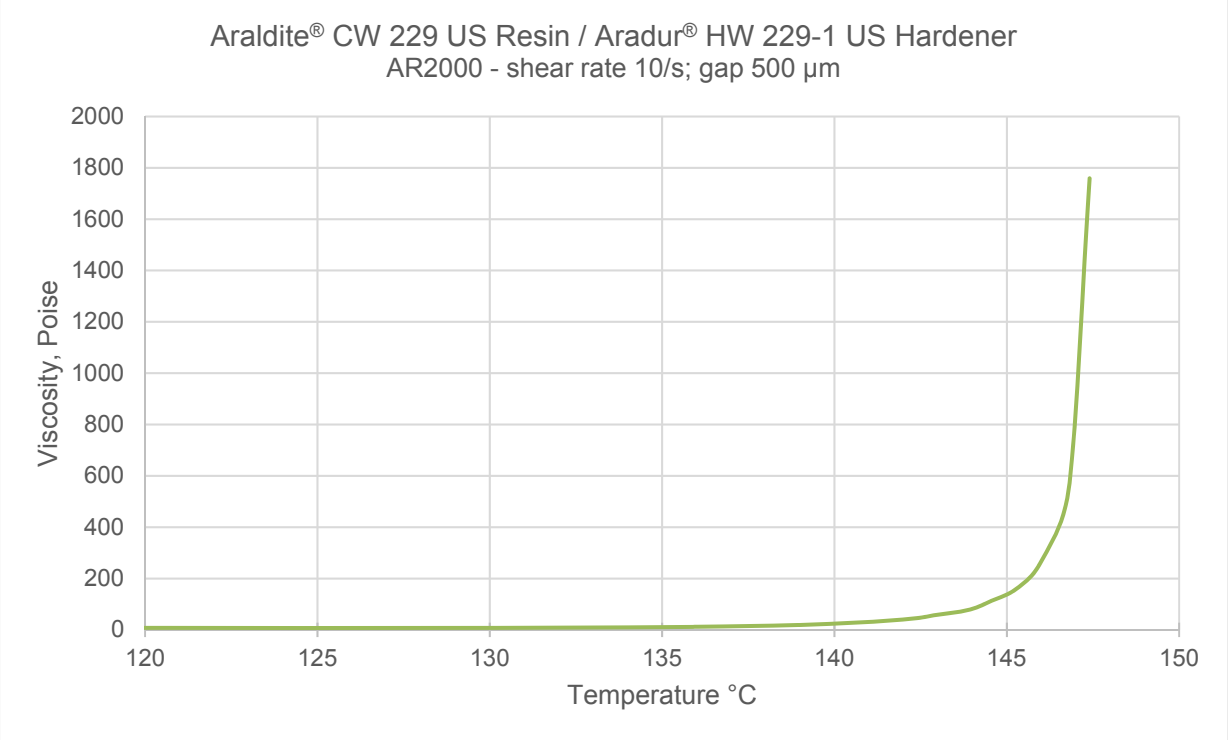
Product	Parts by weight	Parts by Volume
Araldite® CW 229 US Resin	100	100
Aradur® HW 229-1 US Hardener	100	90

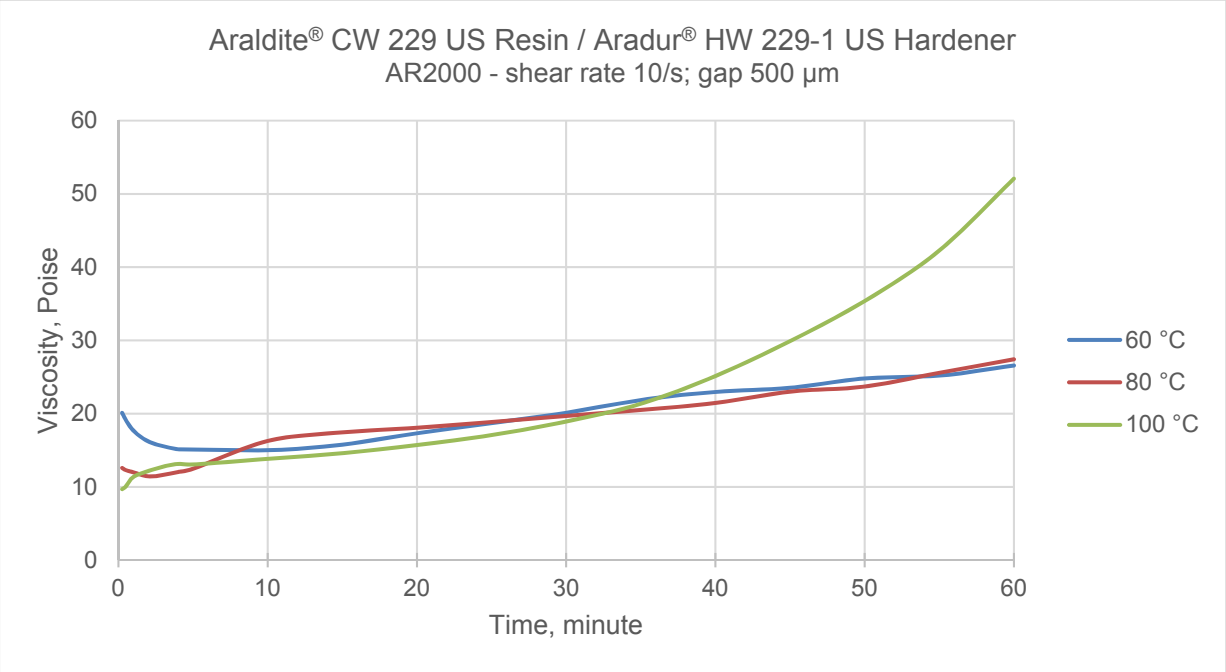
Processing Data

Mixed Properties	Value
Viscosity, cP at 25°C at 50°C at 70°C	 35,000 - 65,000 2,500 - 3,500 700 - 1,200
Density, g/cm^3	1.80 - 1.85
Gel time, 10g sample, min at 130°C at 150°C	 13 -15 8 - 9

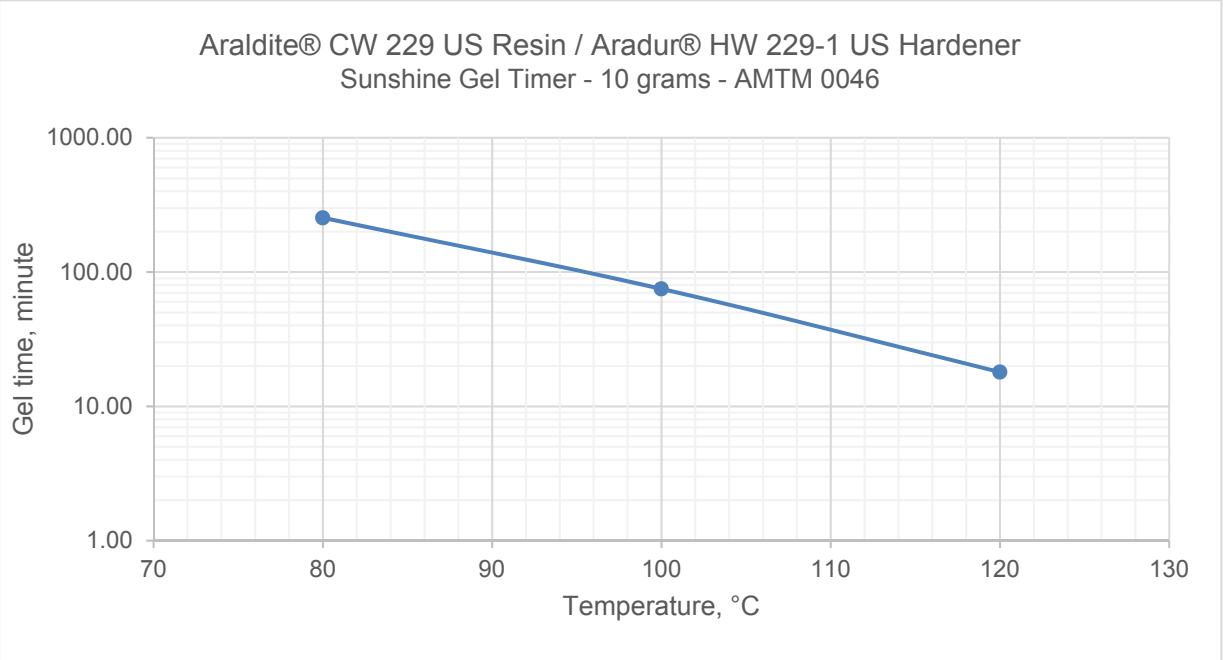
Viscosity Profile







Gel time at different temperatures



Typical Physical Properties

Unless otherwise stated, the data were determined with typical production batches using standard test methods. They are typical values only, and do not constitute a product specification.

Property	Value	Test Method
Tensile strength, psi	11,000-12,500	ASTM D638
Elongation at break, %	0.80 - 1.20	ASTM D638
Tensile modulus, psi	1.50 - 1.55 x 10^6	ASTM D638
Flexural strength, psi	18,000 - 19,000	ASTM D790
Flexural modulus, psi	1.40 - 1.50 x 10^6	ASTM D790
Hardness	92 - 96	Shore D
Glass transition temperature, °C	110 - 120	DSC
Coefficient of thermal expansion, ppm/°C	See Figure 1	TMA
Water absorption, 24 hours at 23°C,	0.020 - 0.025	ASTM D 570
Thermal conductivity, W/m·K	0.7 - 0.8	ISO 8894-2/90
Density, g/cm^3	1.81 - 1.85	ASTM D792
Thermal endurance	See Figures 5 & 6	UL 746B
Double Torsion Test Critical stress intensity factor (K_{1C}), MPa·m½ Specific energy at break (G_{1C}), J/m² (calculated)	 2.8 - 3.0 740 - 790	

Typical Electrical Properties

Property	Value	Test Method
Dielectric strength, V/mil at 3 mm	420 - 480	IEC 60243
Dielectric constant, at 60 Hz	See Figure 2	IEC 60250
Dissipation factor, at 60 Hz	See Figure 3	IEC 60250
Volume resistivity, ohm-cm	See Figure 4	IEC 60093
Thermal endurance	See Figures 5 & 6	IEC 216

Figure 1. Coefficient of Thermal Expansion as a function of temperature

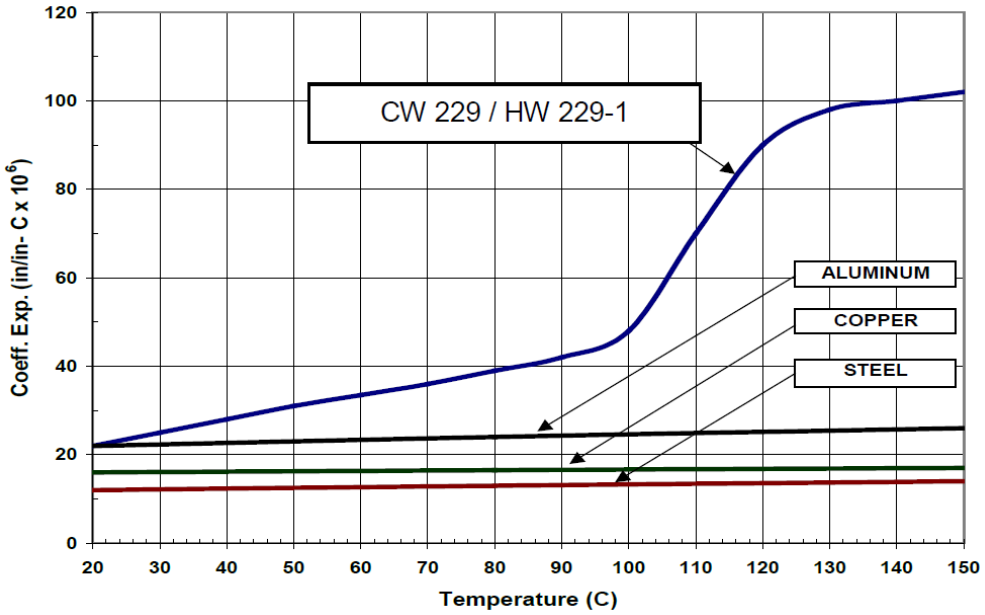


Figure 2. Dielectric constant vs. temperature at 60 Hz

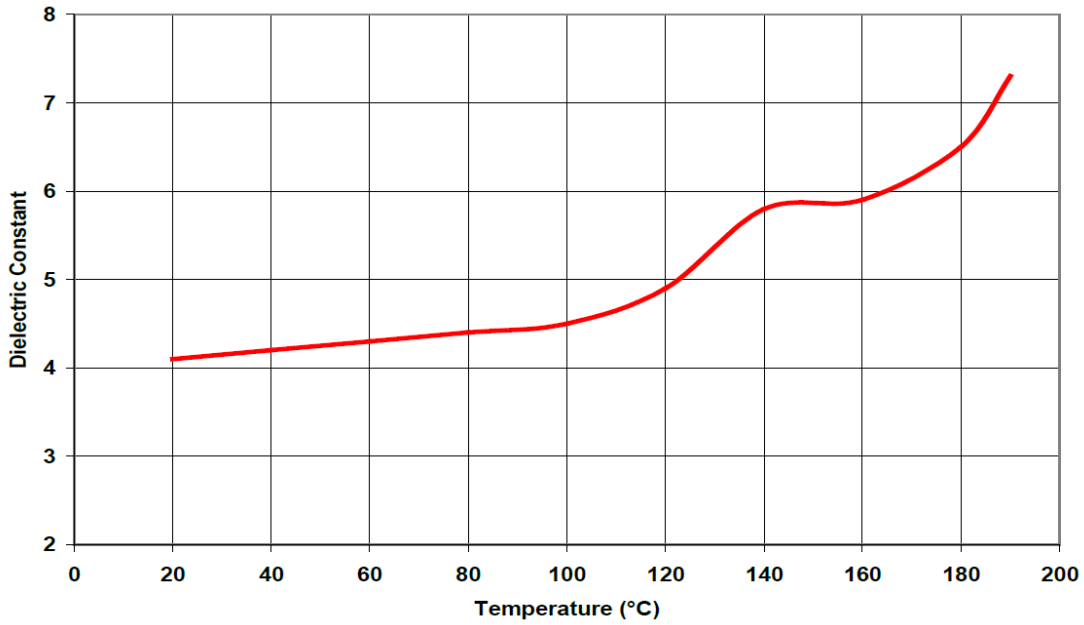


Figure 3. Dissipation factor vs. temperature at 60 Hz

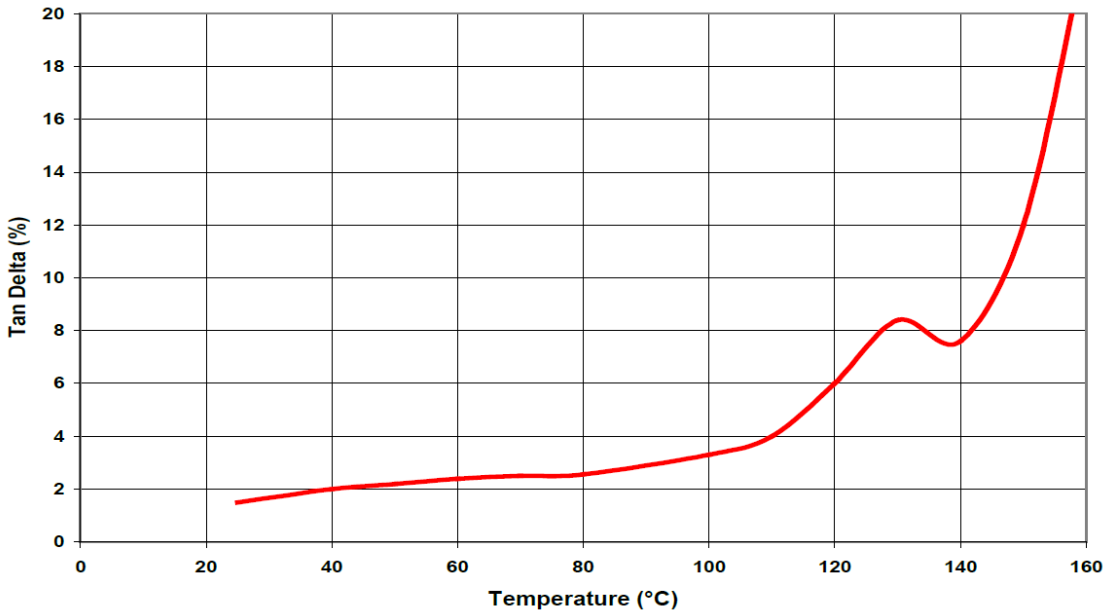


Figure 4. Volume resistivity vs. temperature

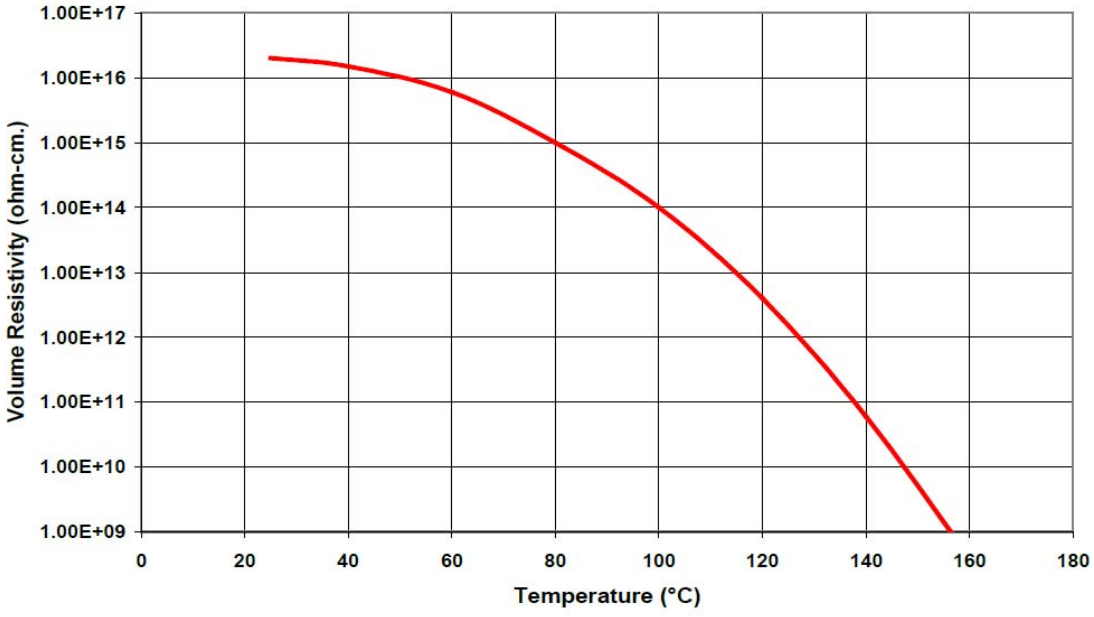


Figure 5. Thermal endurance

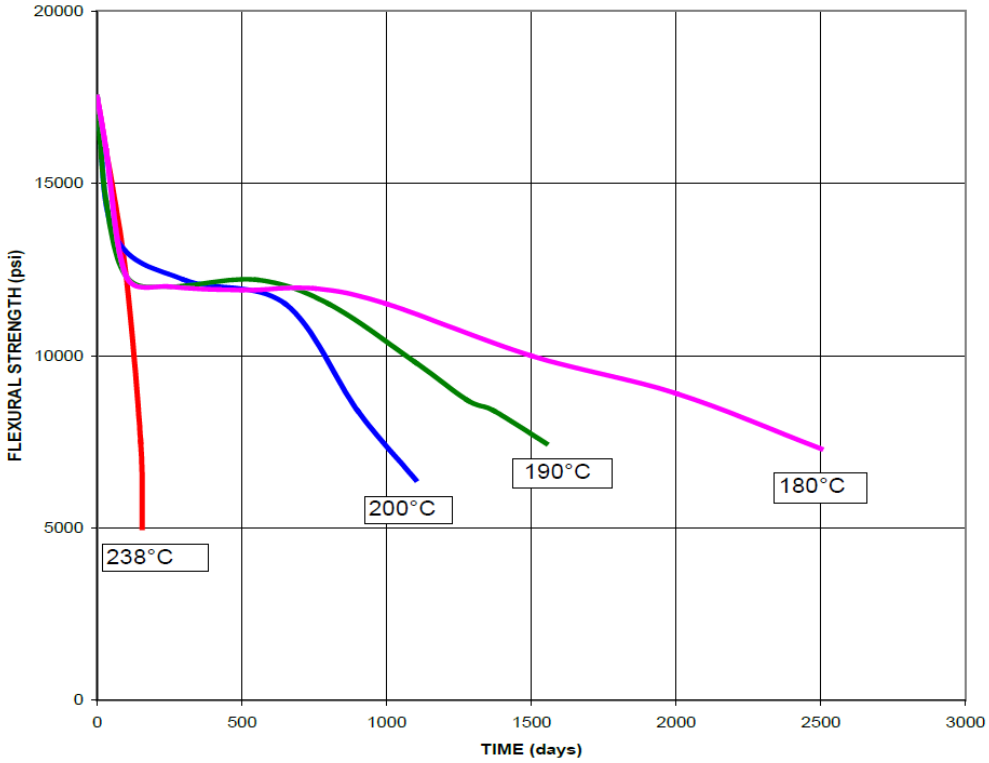
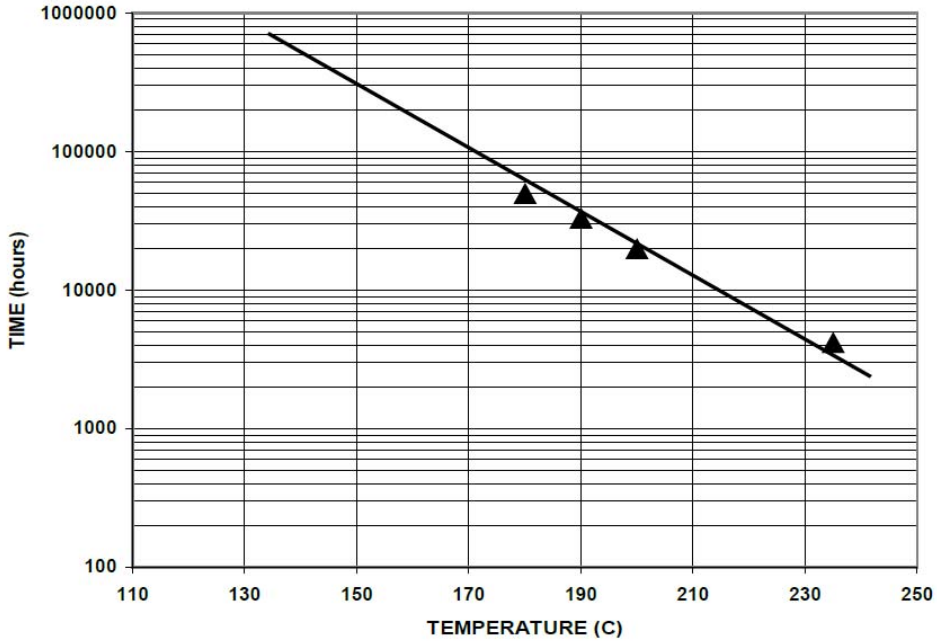


Figure 6. Thermal endurance - 50% Flexural strength



Storage

Araldite® CW 229 US Resin contains some curing catalyst and / or accelerator. It should preferably not be stored for long periods at temperatures exceeding 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 performance properties of the cured system.

Aradur® HW 229-1 US Hardener contains some curing catalysts and / or accelerators. Storage at elevated temperatures (>80°C) for extended periods (e.g. >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. Nitrogen blanketing is highly recommended as well as the use of a desiccant venting device unless the material is going to be used rapidly after opening.

Araldite® CW 229 US Resin and **Aradur® HW 229-1 US Hardener** should be stored in a dry place, in the sealed original container, at temperatures between 2°C and 40°C (35.6°F and 104°F). Under these storage conditions the shelf life is **1 year** (from date of manufacture). The product should not be exposed to direct sunlight. As with most pre-filled systems, the fillers present in these components have a tendency to separate during storage. This filler separation will not negatively affect the final product properties and quality provided that both components are thoroughly homogenized. The filled components should be stirred carefully by using a low shear mixer prior to processing. Do not use high speed or high shear mixers and take precautions to prevent air entrapment.

Precautionary Statement

Huntsman Advanced Materials Americas LLC maintains up-to-date Safety Data Sheets (SDS) on all of its products. These sheets contain pertinent information that you may need to protect your employees and customers against any known health or safety hazards associated with our products. Users should review the latest MSDS to determine possible health hazards and appropriate precautions to implement prior to using this material.

First Aid!
Refer to SDS as mentioned above.

KEEP OUT OF REACH OF CHILDREN

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