

# Araldite<sup>®</sup> CW 229 US Resin / Aradur<sup>®</sup> HW 229-1 US Hardener

## Product Description

Araldite<sup>®</sup> CW 229 US Resin with Aradur<sup>®</sup> HW 229-1 US Hardener is a liquid, heat 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 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

- 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 <sup>®</sup> CW 229 US Resin	Aradur <sup>®</sup> HW 229-1 US Hardener
Appearance	Beige Viscous Liquid	Beige Viscous Liquid
Density, g/cm <sup>3</sup>	1.76 - 1.83	1.90 - 1.98
Viscosity @ 25°C, 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 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 - 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 140°C - 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	
@ 25°C	35,000 - 65,000
@ 50°C	2,500 - 3,500
@ 70°C	700 - 1,200
Density, g/cm <sup>3</sup>	1.80 - 1.85
Gel time, 10g sample, min	
@ 130°C	13 - 15
@ 150°C	8 - 9

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

### Typical Electrical Properties

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

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

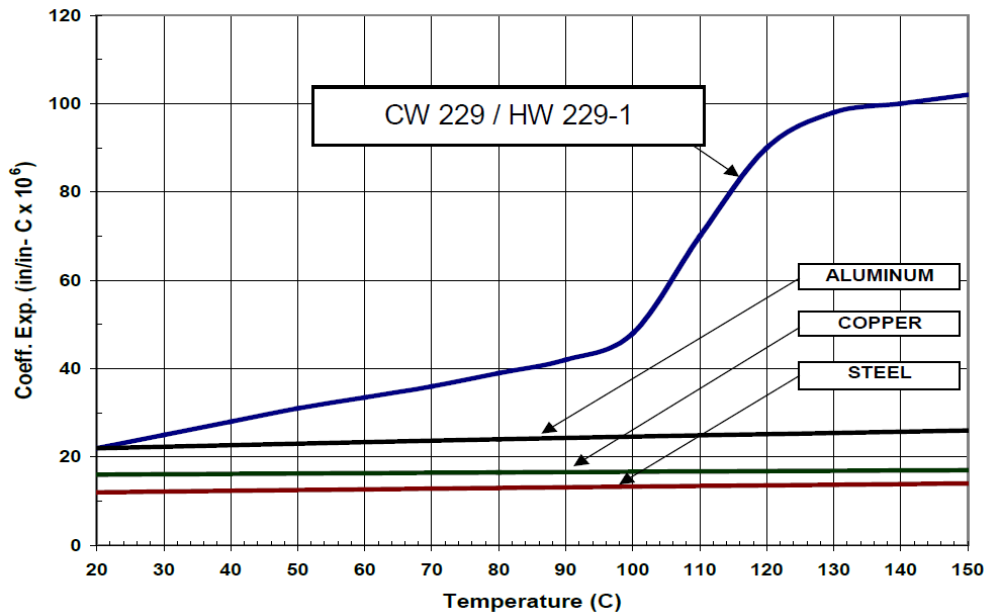


Figure 2. Dielectric constant vs. temperature @ 60 Hz

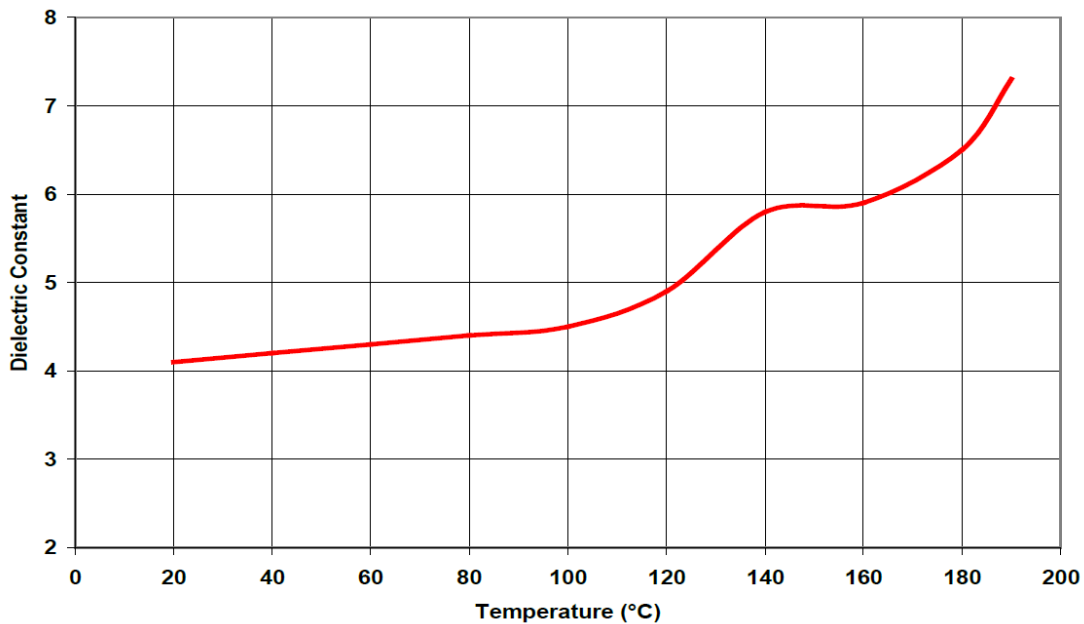


Figure 3. Dissipation factor vs. temperature @ 60 Hz

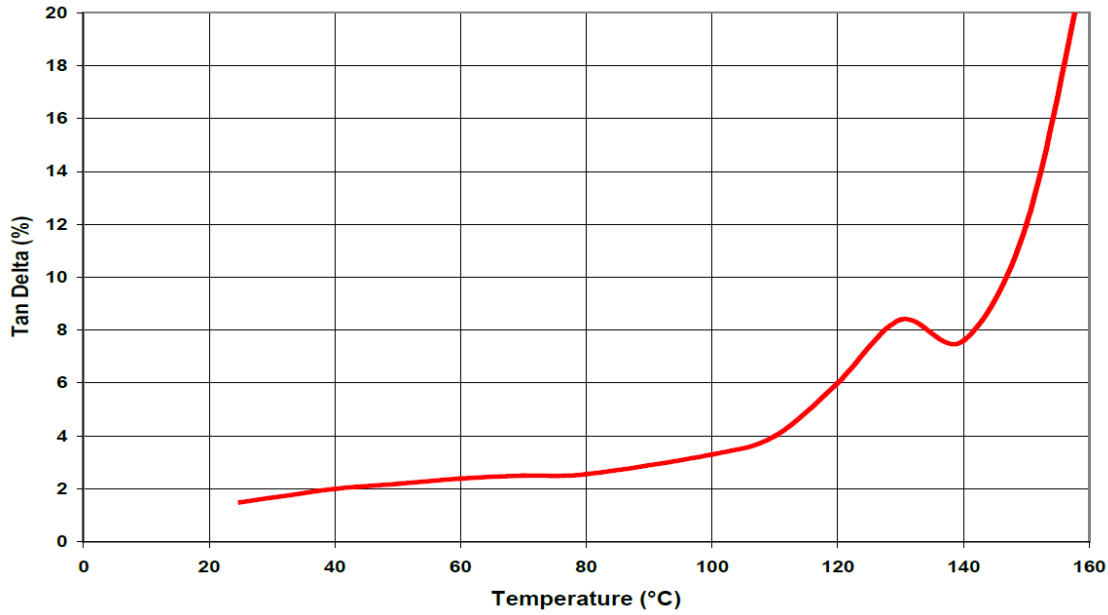


Figure 4. Volume resistivity vs. temperature

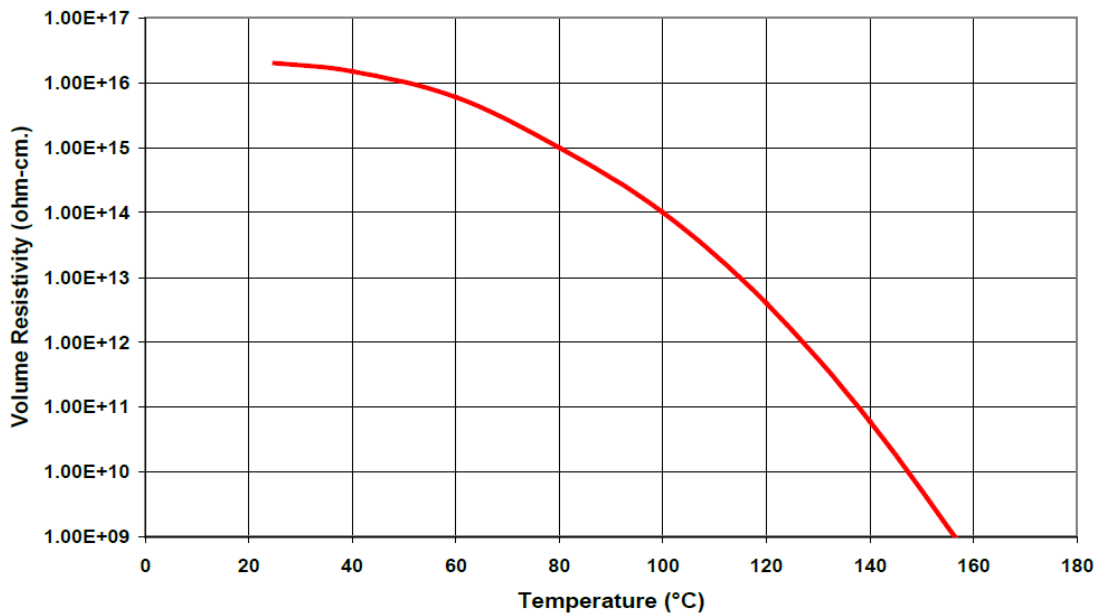


Figure 5. Thermal endurance

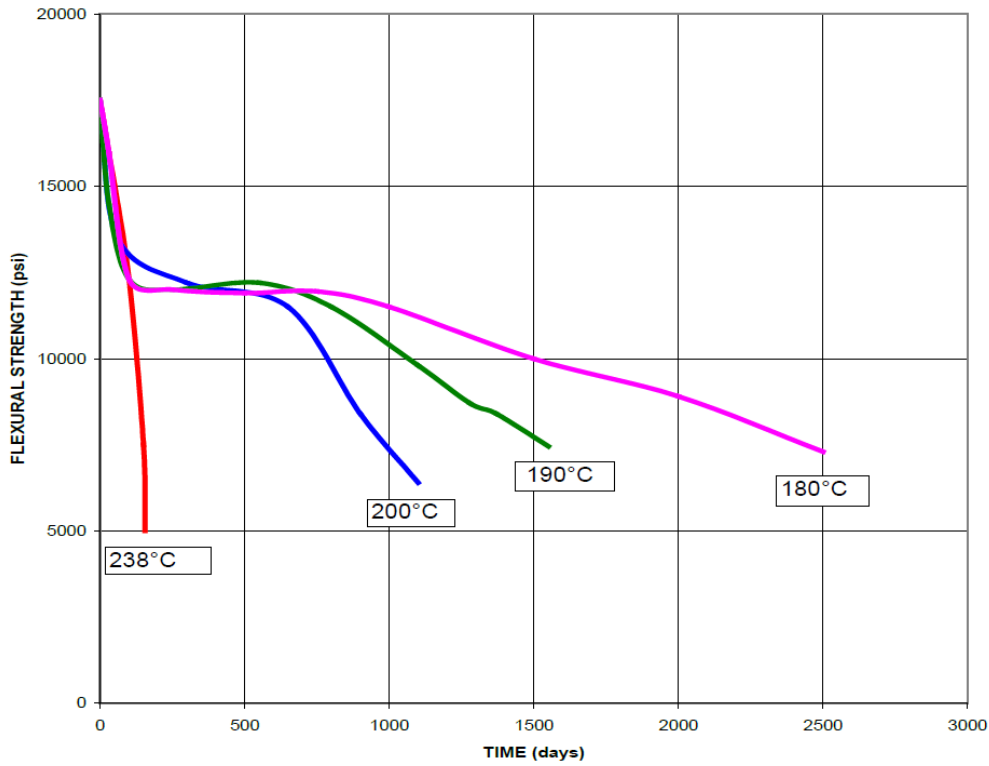
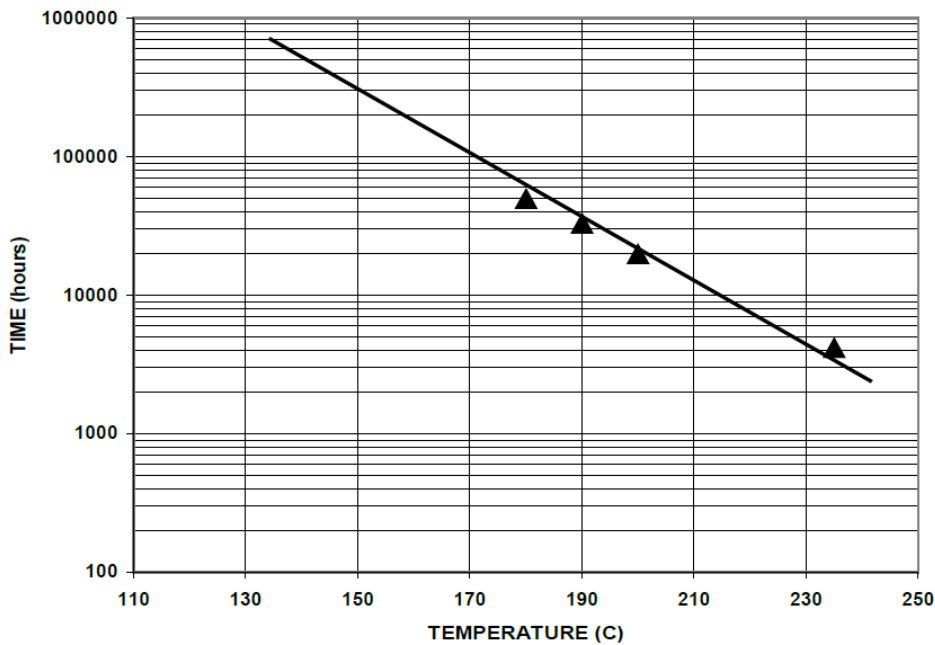


Figure 6 Thermal endurance - 50% Flexural strength



### 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**

**FOR PROFESSIONAL AND INDUSTRIAL USE ONLY**

### Important Legal Notice

Sales of the product described herein ("Product") are subject to the general terms and conditions of sale of either Huntsman Advanced Materials LLC, or its appropriate affiliate including without limitation Huntsman Advanced Materials (Europe) BVBA, Huntsman Advanced Materials Americas Inc., or Huntsman Advanced Materials (Hong Kong) Ltd. ("Huntsman"). The following supercedes Buyer's documents.

Huntsman warrants that at the time and place of delivery all Products sold to Buyer shall conform to the specifications provided to Buyer by Huntsman.

While the information and recommendations included in this publication are, to the best of Huntsman's knowledge, accurate as of the date of publication, NOTHING CONTAINED HEREIN (EXCEPT AS SET FORTH ABOVE REGARDING CONFORMANCE WITH SPECIFICATIONS PROVIDED TO BUYER BY HUNTSMAN) IS TO BE CONSTRUED AS A REPRESENTATION OR WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, NONINFRINGEMENT OF ANY INTELLECTUAL PROPERTY RIGHTS, OR WARRANTIES AS TO QUALITY OR CORRESPONDENCE WITH PRIOR DESCRIPTION OR SAMPLE, AND THE BUYER ASSUMES ALL RISK AND LIABILITY WHATSOEVER RESULTING FROM THE USE OF SUCH PRODUCT, WHETHER USED SINGLY OR IN COMBINATION WITH OTHER SUBSTANCES.

No statements or recommendations made herein are to be construed as a representation about the suitability of any Product for the particular application of Buyer or user or as an inducement to infringe any patent or other intellectual property right. Buyer is responsible to determine the applicability of such information and recommendations and the suitability of any Product for its own particular purpose, and to ensure that its intended use of the Product does not infringe any intellectual property rights.

The Product may be or become hazardous. The Buyer should obtain Material Safety Data Sheets and Technical Data Sheets from Huntsman containing detailed information on Product hazards and toxicity, together with proper shipping, handling and storage procedures for the Product, and should comply with all applicable governmental laws, regulations and standards relating to the handling, use, storage, distribution and disposal of, and exposure to the Product. Buyer shall also take all steps necessary to adequately inform, warn and familiarize its employees, agents, direct and indirect customers and contractors who may handle or be exposed to the Product of all hazards pertaining to and proper procedures for safe handling, use, storage, transportation and disposal of and exposure to the Product, and the containers or equipment in which the Product may be handled, shipped or stored.

**[Product Brand]** is a registered trademark of Huntsman LLC or an affiliate thereof in one or more, but not all countries.

© 2015 Huntsman Advanced Materials Inc.

#### Main Offices:

**Huntsman Corporation**  
10003 Woodloch Forest Dr  
The Woodlands, TX 77380  
888-564-9318

**Huntsman Advanced Technology Center**  
8600 Gosling Rd.  
The Woodlands, TX 77381  
281-719-7400