HUNTSMAN

Advanced Materials

DATA SHEET

Araldite® CY 9729
Aradur® HT 907
Accelerator DY 9741

Cycloaliphatic Liquid Epoxy Resin Casting System

General

A low viscosity, unfilled, casting system exhibiting superior mechanical and electrical properties to meet the most demanding indoor and outdoor applications. This system can be processed by Automatic Pressure Gelation (APG), Pressure Gelation (PG) or Conventional Casting.

Features

Greater toughness than porcelain and equal, or superior, to competitive epoxies
Better thermal shock resistance
Improved weatherability compared to aromatic Bisphenol-A epoxies
Low dielectric loss and excellent tracking resistance for applications > 105°C
Greater toughness and far closer dimensional tolerances result in greater reliability

Applications

High voltage circuit breaker bushings
SF_6 inner frusta
Air transformer bushings
Oil transformer bushings
Stand-off insulators
Weather sheds on suspension and dead end insulators
Arc shields
Station and line post insulators
Surge arrestor castings
Phase separators
Structural switchgear parts

Typical Properties*

Araldite CY 9729	
Appearance	Clear to cloudy liquid
Specific Gravity	1.115 – 1.145
Viscosity, cPs @ 25°C	300 – 500
Weight per epoxide	181 – 193
Flash point, Closed Cup, °C	188
Aradur HT 907	
Appearance	Clear light amber liquid
Specific Gravity	1.15 – 1.20
Viscosity, cPs @ 40°C	< 100
Melting point, ºC	34 – 38
Flash point, Closed Cup, °C	138
Accelerator DY 9741	
Appearance	Clear light amber liquid
Specific Gravity	1.00 - 1.15
Viscosity, cPs @ 25°C	30 – 150
Flash point, Closed Cup, °C	111
Mixed Araldite System	
Specific Gravity	1.90 – 1.95
Viscosity, cPs @ 25°C	25,000 – 30,000

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

Packaging & Storage

Araldite CY 9729: Store at 18 – 25°C in dry and well sealed condition; if possible, in its original container. If only partly used, be sure to re-close container properly.

Aradur HT 907: Store 70 – 90°C. This product is moisture sensitive and packaged under a blanket of dry nitrogen. Maintain factory seal, after use re-blanket with dry nitrogen and tightly seal.

Accelerator DY 9741: **Combustible liquid. Do not cut or weld containers**. Keep away from heat, sparks, and open flame. Use with adequate ventilation. In case of fire, use CO2, dry chemical or foam. Stored in sealed containers. Keep containers closed to prevent moisture absorption and contamination.

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
Araldite CY 9729	100
Aradur HT 907	74
Accelerator DY 9741	2 - 4

Processing data

(average values)

Mixed viscosity @ 25ºC, cPs	50,000 – 70,000
Gel time, 10 g sample, min	
@ 120ºC	29 – 35
Recommended cure time, hours	
@ 80ºC	5 +
@ 140ºC	10

Processing and Cure

Processing is best accomplished using Automatic Pressure Gelation (APG) Process. Moldings can be produced using Araldite products with either a one-component or a two-component system. In the one-component process the resin and hardener with accelerator are each separately heated to 50 - 70°C and blended with filler. The mixed resin and hardener have a pot life of 90 – 120 minutes at 70°C, as determined by a maximum viscosity of 20,000 cPs. At lower pot temperatures, longer pot lives are obtained.

In the two-component Araldite system, the resin and hardener components are handled in the same manner as in the one-component system, except that they are mixed in an in-line static mixer immediately prior into the mold. Thus, the resin and hardener are separately heated, mixed with filler and degassed. At this stage, the two components are stable indefinitely (one month or more) with two exceptions: 1) agitation should continue to keep the filler from setting, and 2) water should not be allowed to contaminate either side. If agitation is stopped for more than one day, the filler may settle out and be difficult to redisperse. Tests have shown that the addition of 1% water to a mixture of Araldite products will substantially reduce the heat distortion temperature of a molded part and degrade its dielectric loss properties. Significant advantages of a two-component system include 1) ease of clean up and 2) the ability to stop molding and resume later, even after an overnight break.

The cure cycle for parts depends on the size of the part, the mold temperature and the molding equipment's ability to supply heat to the resin. With the recommended 150°C mold temperature, for a two-inch diameter part in a steel mold, in-mold time will be about 9 minutes. Smaller parts or high mold temperatures will result in shorter cycles. Larger parts or lower mold temperatures will increase cycle times. An in-mold time of 13 minutes is expected for parts with a 4-inch diameter and 17 minutes is expected for parts with a 7-inch diameter at a mold temperature of 150°C.

All parts should be posted-cured soon after removal from the mold. A post cure cycle of 4 hours at 160°C is recommended, although shorter periods may be satisfactory for smaller parts.

Mechanical and Physical Properties

NOTE:
The mechanical properties of this system, when molded, compare favorably with those of competing epoxy insulating materials and porcelain. (All moldings 60% by weight filled with oven-dried silica.)

Property	Araldite System	Bis-A Based Epoxy	Porcelain
Tensile strength, psi	8,100	9,000	6,000
Elongation, %	1.0	0.8	0.01
Heat distortion temperature, °C	137	123	800
Tensile modulus, psi	1.3×10^6	1.7×10^6	8.0×10^6
Thermal shock rating	8.4	8.5	Low
Izod toughness, ft-lbs/in	2.5	1.6	0.1

a) Tested with a steel washer cast in resin and alternately subjected to heat and cooling cycles that increase by 20°C and decrease by 10°C each cycle after starting at 60°C and 20°C respectively.

b) Un-notched sample, ⅛ inch (3.2 mm) wide, ½ inch (12.8 mm) thick.

This cured Araldite system possesses higher heat distortion temperatures and also offers excellent toughness and resistance to thermal shock. The tensile strength and modulus are lower at 60% filler loading, but higher stiffness can readily be attained by increased filler levels. This is easily accomplished due to the lower viscosity of this Araldite® system.

The comparison with porcelain is important. The high heat distortion temperature and modulus-stiffness of porcelain are its well known advantages. In many instances, however, they can result in design “overkill”. Porcelain’s resulting notch sensitivity causes it to have lower tensile strength and poor toughness. Porcelain parts must be constructed larger and heavier than is necessary with epoxies. This means epoxy parts weigh less and are more mechanically reliable.

Electrical Properties (typical values)

Property	Araldite System	Bis-A Based Epoxy	Porcelain
Maximum service temp, °C	125	125	145
Dielectric constant			
@ 25°C, 60 Hz	3.6	3.6	6.3
@ 125°C, 60 Hz	4.2	4.2	-
@ 145°C, 60 Hz	-	-	7.0
Power factor, %			
@ 25°C, 60 Hz	3.7	3.0	1.8
@ 125°C, 60 Hz	8.9	9.2	-
@ 145°C, 60 Hz	-	-	20 +
Volume resistivity			
@ 25°C, 10^{13} ohm·cm	410	90	-
@ 125°C, 10^{13} ohm·cm	2.1	1.4	-
Dielectric strength, V/mil			
⅛ inch (3.2 mm) sample	449	463	240
Carbon track resistance			
ASTM D-2303 (minutes)	2,000 +	100	-

The main differences between Araldite CY 9729 and Bisphenol-A type epoxies are carbon track resistance and volume resistivity. The volume resistivity of the Araldite cycloaliphatic epoxy system when molded is between 2 and 4 times higher than that of the aromatic Bisphenol-A type epoxy.

The greatest difference between the cycloaliphatic and the aromatic epoxy appears in carbon track resistance. In the test at 2.5 Kv, the aromatic epoxy quickly formed a conductive carbon track and failed. The cycloaliphatic-based moldings failed about twenty times more slowly by gradual erosion rather than tracking.

Porcelain does not track like organic materials, but its dielectric loss, power factor and dielectric strength are significantly inferior to that of the cured Araldite resin. Even more detrimental is porcelain's tendency to crack, disintegrate and fail after arc flashovers caused by lighting or salt buildup on an insulator.

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 CY9729
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. Wash thoroughly after handling

Aradur HT 907
DANGER! Corrosive - causes eye burns and severe skin irritation. Causes respiratory irritation. May cause skin burns. May cause allergic skin and respiratory reactions. Do not get in eyes, on skin, or on clothing. Avoid breathing vapor or mist. Avoid prolonged or repeated contact with skin. Keep container closed. Use with adequate ventilation. Wash thoroughly after handling.

Accelerator DY 9741
DANGER! Combustible. Corrosive - causes skin and eye burns. Harmful if swallowed. May cause allergic skin reaction. Keep away from heat and flame. Do not get in eyes, on skin, or on clothing. Avoid breathing vapor or mist. 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

The following shall supersede any provision in Buyer's forms, letters and papers. **THERE IS NO WARRANTY OR CONDITION, WHETHER EXPRESS OR IMPLIED BY ANY STATUTE OR OTHERWISE, INCLUDING WARRANTIES AND CONDITIONS OF MERCHANTIBILITY OR OF FITNESS FOR A PARTICULAR PURPOSE, FOR THE PRODUCT OR PRODUCTS REFERRED TO HEREIN. TECHNICAL ADVICE FURNISHED BY THE SELLER SHALL NOT CONSTITUTE A WARRANTY OR CONDITION, STATUTORY OR OTHERWISE, WHICH IS EXPRESSLY DISCLAIMED, ALL SUCH ADVICE BEING GIVEN AND ACCEPTED AT BUYER'S RISK**. While the information contained herein is believed to be accurate, Seller makes no representations as to the reliability of the results or as to the results of Buyer or as inducements to infringe any relevant patent, now or hereafter in existence. Testing for intended use is the sole responsibility of Buyer. The product(s) has not been tested for, and is therefore not recommended for, uses for which prolonged contact with mucous membranes, abraded skin, or blood is intended, or for uses for which implantation within the human body is intended. **UNDER NO CIRCUMSTANCES SHALL SELLER BE LIABLE FOR INCIDENTAL, CONSEQUENTAL OR OTHER DAMAGES FROM ALLEGED NEGLIGENCE, BREACH OF WARRANTY OR CONDITION, STRICT LIABILITY OR ANY OTHER LEGAL THEORY, ARISING OUT OF MANUFACTURE, SALE, USE OR HANDLING OF THE PRODUCT OR PRODUCTS REFERRED TO HEREIN**. The sole remedy of Buyer and the sole liability of Seller for any claims shall be limited to Buyer's purchase price of the product(s) which is the subject of the claim or the amount actually paid for such product(s), whichever is less.

Note

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Araldite CY 9729 with
Aradur HT 907 and
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