ARALDITE® GY 6010 N Resin

Product Description

ARALDITE® GY 6010 N Resin is an unmodified liquid epoxy resin based on Bisphenol-A and epichlorohydrin. It is a medium viscosity, general purpose epoxy resin applied widely in both room temperature and heat cured systems.

Applications

- Coatings
- Electrical
- Civil Engineering
- Composites
- Adhesives

Features

- Superior mechanical and electrical properties
- Excellent chemical resistance
- Good heat resistance
- Excellent adhesion
- Outstanding versatility
- Easy to cure with a variety of different type of hardeners
- Compatible with many different fillers, diluents, and accelerators
- Conforms to FDA listings in 21 CFR 175.300

Typical Properties*

Property	Value
Appearance	Clear, slight haze
Color, Gardner, max	1
Epoxy value, eq/kg	5.2 - 5.5
Hyrdrolyzable Chlorine, ppm	0 - 700
Epoxy equivalent, g/eq	182 - 192
Viscosity @ 25°C, cP	11,000 - 14,000
Density @ 25°C, g/cm^3	1.15 - 1.18

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

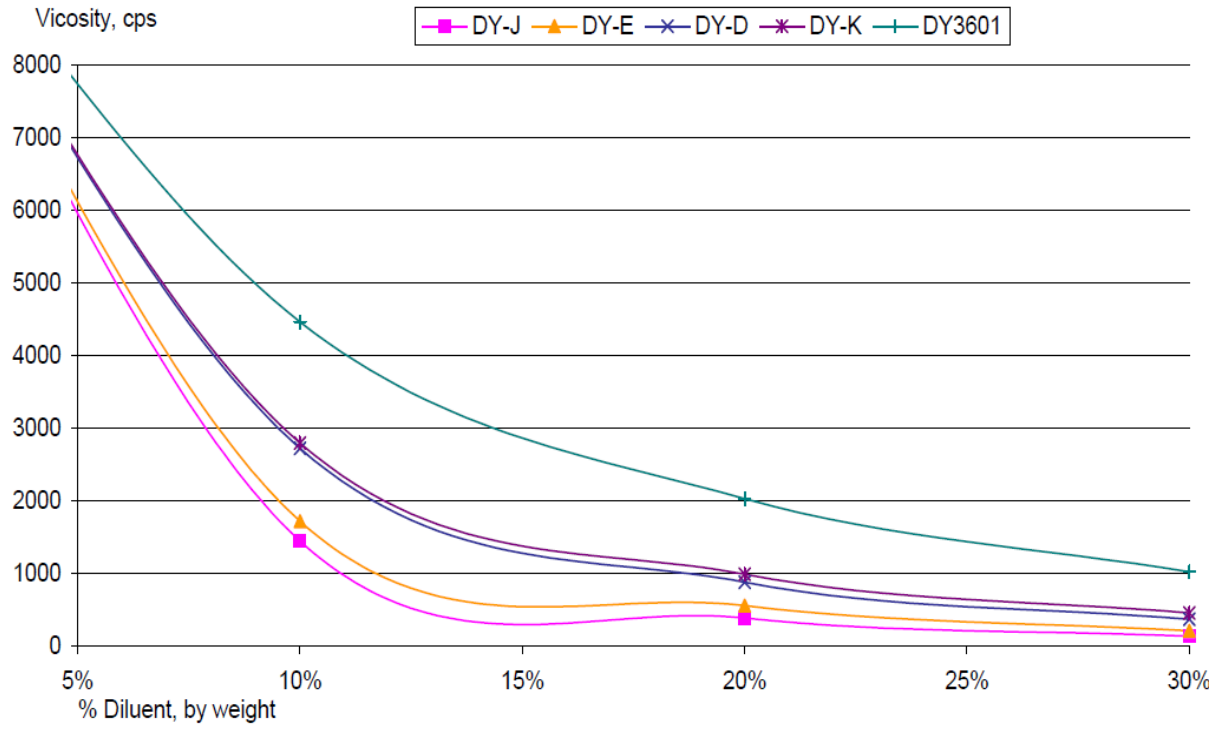
Processing

The addition of reactive diluents to ARALDITE® GY 6010 N Resin influences wet properties of coatings and performance of the cured films. Depending on the diluent used, it is expected that:

1) The viscosity and the reactivity of the system will be reduced.
2) Mechanical properties of the cured system will be impaired.
3) Thermal stability of the system will be reduced.
4) Resistance to water and aqueous solutions at elevated temperatures will be reduced.
5) Resistance to acids and organic solvents at ambient temperatures will be reduced.

The extent to which the above properties are affected depends on the reactive diluent content and its chemical nature.

Figure 1. Dilution viscosity of ARALDITE® GY 6010 N Resin with various reactive diluents (by weight)



Hardeners

The final properties of a cured ARALDITE® GY 6010 N Resin system at ambient temperature depend, to a great extent, on the hardener selection. Because of its versatility, ARALDITE® GY 6010 N Resin can be cured with most types of hardeners such as those shown in the following table.

Hardeners used with ARALDITE® GY 6010 N

Product	Huntsman ARADUR® Hardeners	Mixing Ratio phr*	Pot Life 100 g @ 25°C Hrs:Min
Modified Aliphatic amines	ARADUR® 956-2 ARADUR® 943	25 20	0:35 0:15
Cycloaliphatic amines	ARADUR® 2964 ARADUR® 2963 ARADUR® 265-1 ARADUR® 355 ARADUR® 847	50 45 50 26 40	0:35 0:45 0:40 0:30 0:40
Polyamides	ARADUR® 283 ARADUR® 360	70 60	2:30 7:30
Anhydrides	ARADUR® HY 906 NMA ARADUR® 917 MTHPA	80-90 80-90	-- --

*Parts per hundred parts by weight resin

Typical cure schedules

Hardeners	Cure cycle
ARADUR® HY 906*	2 h @ 10°C (212°F) + 2 - 4 h @ 150 - 200°C (302 - 398°F)
ARADUR® 956-2	7 days @ room temperature or 24 h @ 40°C or 2 - 8 h @ 100°C

*Accelerators such as Accelerator 960-1, DY 062 (benzyldimethyl amine), are usually used with ARADUR® HY 906

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.

Systems containing ARALDITE® GY 6010 N and polyamide hardeners such as ARADUR® 9506 Hardener reacting rapidly at relatively moderate temperatures (e.g., 5 min @ 100°C), and provide excellent properties after curing at 150°C. The following tables provide information on the effect of cure times on adhesive tensile shear strength. The mixing ratio of ARADUR® 9506 Hardener is not critical and can be varied. As might be expected, the physical properties are dependent on the amount of hardener that is used, and the effect of some mix ratios on physical properties is also shown in the following tables.

Properties of ARALDITE® GY 6010 N Resin / ARADUR® 2964 Hardener

Property	Value
ARALDITE® GY 6010 N Resin, pbw	100
ARADUR® 2964, pbw	50
Viscosity of mix @ 25°C, cP	1000
Gel time @ 25°C, min	30
Dust-dry time @ 25°C, h	4
Through cure @ 25°C, h	7
Flow @ 25°C	Very good
Transparency	Clear
Surface appearance	Smooth, glossy
Exudation	None
Impact test, in/lb after 2 months, 20°C after 2 months, 60°C	 70 70
Mandrel test 15 mm mandrel, after 2 months, 20°C after 2 months, 60°C	 180° 60°
Boiling water test, 6 h @ 96°C Adhesion on sandblasted mild steel sheet	 Unchanged
After curing @ 20°C, 100% RH Full-time cure, h Surface appearance Transparency Exudation	 Approx. 30 Smooth, glossy Clear None

Properties of ARALDITE® GY 6010 N Resin / ARADUR® 9506 Hardener

Property		Value
ARALDITE® GY 6010 Resin, pbw		100
ARADUR® 9506, pbw		35
Viscosity of mix @ 25°C, cP		120,000
Gel time (1g on cure plate), sec	@ 100°C @ 121°C @ 150°C	300 124 54
Heat deflection temperature,* °C		97
Tensile strength,* psi		11,500
Elongation,* %		4.6
Tensile modulus,* psi x 10^5		4.9
Weight loss after 48 h @ 200°C,* %		2.0
Volume resistivity* (Ω·cm)	@ 25°C @ 100°C @ 150°C	1.1 x 10^{16} 9.0 x 10^{12} 1.3 x 10^9
Tensile shear strength, cured 6.5 min @ 150°C, psi	@ 25°C @ 82°C @ 149°C	1620 1050 100
Tensile shear strength, cured 10 min @ 159°C, psi	@ 25°C @ 82°C	1630 1050
Tensile shear strength, psi		
Cured 10 min @ 100°C	Tested at: 25°C Tested at: 82°C	560 -
Cured 10 min @ 121°C	Tested at: 25°C Tested at: 82°C	560 880
Cured 10 min @ 150°C	Tested at: 25°C Tested at: 82°C	1560 1050
Cured 10 min @ 177°C	Tested at: 25°C Tested at: 82°C	1630 820

*Cure: Gel @ 90°C + 3 h @ 150°C

Effect of Mix Ratio on Physical/Mechanical Properties

ARADUR® 9506 (phr) with ARALDITE® GY 6010 N	Gel time @ 150°C, sec	Heat deflection temperature, °C	Tensile shear strength @ 25°C, psi
25	76	78	1270
30	58	90	-
35	54	97	1620
40	45	95	1480
45	41	90	1690

FDA Status

ARALDITE® GY 6010 N Resin is included in Section 175.300 of Title 21 of the Code of Federal Regulations (21 CFR 175.300) for resinous and polymeric coatings.

Storage

ARALDITE® GY 6010 N Resin should be stored in a dry place, in the sealed original container, at temperatures between **2°C and 40°C (36°F and 104°F)**. Under these storage conditions the shelf life is **2 years** (from date of manufacture). The product should not be exposed to direct sunlight.

Like most liquid epoxy resins, ARALDITE® GY 6010 N may crystallize when stored below room temperature. Heating the resin to 60 - 70°C (140 - 160°F), preferably in a hotbox for several hours, will reliquefy it and restore its original properties.

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 supersedes 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.

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