HUNTSMAN

®Araldite Trickle Impregnation Resin System

Araldite	**CY 246**	**100 pbw**
Hardener	**XB 5911**	**32 pbw**

Liquid, 2-component trickle impregnation system, solventless and free of DDM

Applications

Impregnation and mechanical reinforcement of highly stressed electric motor windings for ratings up to 1000 W and higher.

Application method

Trickle process using any of the common impregnation equipment.

Features

Produces homogeneous winding impregnations with excellent mechanical and electrical properties.
Very high adhesion
High thermal loading capacity

Edition: **July 2003**
Replaces Edition: March 2003

Product data

(guideline values)

Araldite CY 246 Liquid, unmodified Epoxy Resin based on Bisphenol A

Viscosity	at 25°C	ISO 12058	mPa s	9000 - 10800
Epoxy content		ISO 3001	Eq/kg	5.35 - 5.55
Density	at 25°C	ISO 1675	g/cm³	1.15 - 1.20
Flash point		ISO 1523	°C	> 200
Vapour pressure	at 20°C	(Knudsen)	Pa	< 0.01

Hardener XB 5911 Liquid, formulated Amine Hardener

Viscosity	at 25°C	ISO 12058	mPa s	120 - 230
Density	at 25°C	ISO 1675	g/cm³	ca. 1.0
Flash point		ISO 1523	°C	> 118
Vapour pressure	at 20°C	(Knudsen)	Pa	< 0.01

Storage

Store the components at 18-25°C, in tightly sealed and dry original containers. Under these conditions, the shelf life will correspond to the expiry date stated on the label. Product specific advise regarding storage can be found on product label. After this date, the product may be processed only following reanalysis. Partly emptied containers should be closed tightly immediately after use.
For information on waste disposal and hazardous products of decomposition in the event of fire, refer to the Material Safety Data Sheets (MSDS) for these particular products

Method / Processing

(guideline values)

The Trickle Method

The trickle method of applying solvent-free ®Araldite epoxy impregnating resin systems is suitable for insulating the round-wire windings of any axially symmetrical coil with windings parallel to the coil's axis.
This very economical impregnation method is used mainly for insulating and reinforcing the motor windings of electrical power tools and household appliances. Besides facilitating simplified design, it is processed under favourable conditions and opens the way to efficient, automatic production.
The process guarantees homogeneous distribution of the impregnation mix, thus enhancing the balance of the component. The excellent mechanical and dielectric properties of the ®Araldite epoxy trickle resin systems - even at increased service temperatures and severe dynamic loads - contribute to a higher service life of the impregnated components.

Processing

Preheat the stator or rotor to 120-130°C for the impregnation process.
Mount it in a fixture for rotation at 15-20 rpm. Incline the axis at 15-20° to the horizontal. Trickle the carefully prepared resin/hardener mix onto the upper end of the winding. When it strikes the hot winding, the mix will become very fluid and flow into the winding under the influence of gravity, capillary action and centrifugal force. All air will be expelled from the winding as the mix penetrates.
When the mix reaches the lower end of the winding, discontinue trickling and shift the unit's axis to the horizontal. Continue rotation in this position until the mix has gelled and solidified. This procedure keeps the mix from dripping off, thus minimising losses and cleaning work. A post-cure at an elevated temperature (≥ 30 min at 130°C) is recommended.
The length of time required for impregnation up to gelling of the mix depends on the size of the winding, the diameter of the wire and the reactivity of the impregnation system as well as the preheating temperature of the windings. It is advisable to run preliminary tests to establish the exact cycle time and resin quantity required per winding. With ideal settings up to 600 units can be impregnated per hour, depending on the trickling equipment used and the size of the given winding.

Additional points

Compatibility between the wire enamel and the trickling resin system can vary among wires of different manufacturers even for enamels with the same chemical structure. Where doubt exists, always run a few practical tests before starting regular production.
To enhance heat dissipation in the winding - especially in the case of high power ratings and heavy wire diameters - fillers can be added to the trickle impregnation resin system. The amount added depends on the final properties required and on the processing capabilities of the trickle impregnation equipment used. For example, certain automatic trickle units are capable of processing only impregnation systems with viscosities ≤ 2000 mPa·s. The viscosity can be adjusted by preheating the mix to about 40°C in the storage tank.

Viscosity increase and Geltime

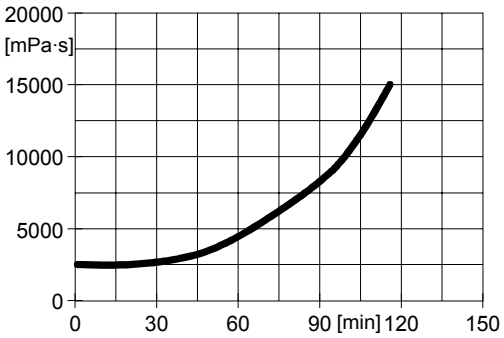

Fig.4.1: **Viscosity increase at 25°C**
(measurements with Hoeppler)

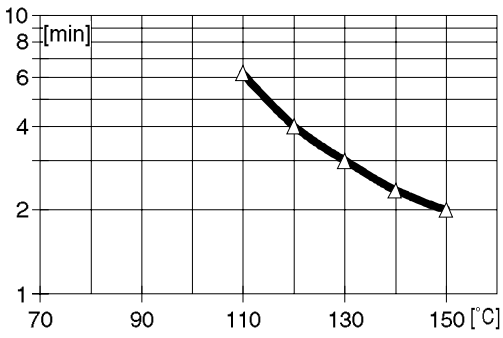

Fig.4.2: **Geltime at thin layer as a function of temperature**
(measurements on heating plate)

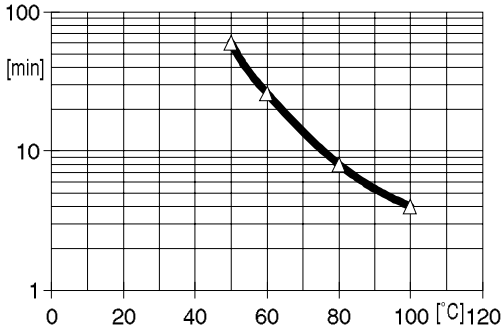

Fig.4.3: **Geltime measured with Gelnorm Instrument as a function of temperature**
(DIN 16945/6.3.1)

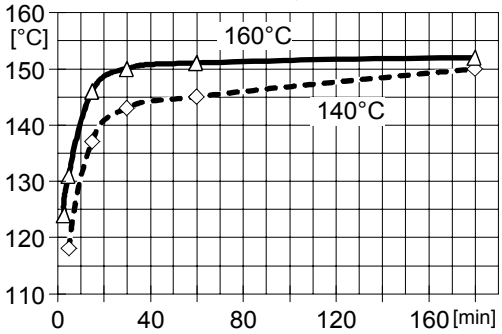

Fig.4.4: **Glass transition temperature as a function of cure time**
(isothermic reaction, IEC 61006)

Electrical Properties

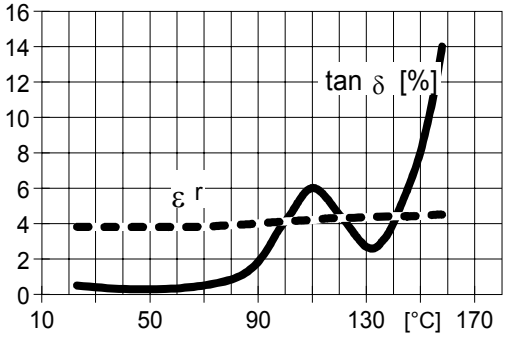

Fig.4.5: **Loss factor (tan δ) and dielectric constant (εr) as a function of temperature**
(measurement frequency: 50 Hz, IEC 60250/ DIN 53483)

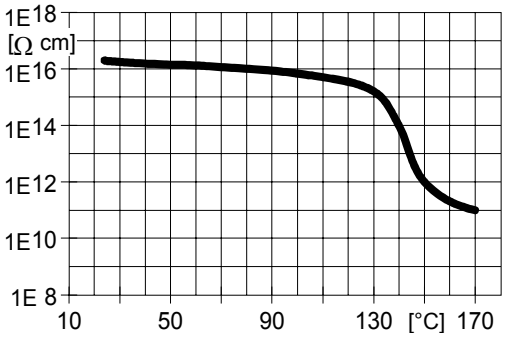

Fig.4.6: **Volume resistivity (ρ) as a function of temperature**
(measurement voltage: 1000 V, IEC 60093/ DIN 53482)

Mechanical and Physical Properties

(guideline values)
Determined on standard test specimen at 23°C
Cured for 3h at 80°C + 3h at 130°C

Tensile strength	ISO 527	MPa	75 - 85
Elongation at break	ISO 527	%	5 - 7
E modulus from tensile test	ISO 527	MPa	2300 - 2800
Flexural strength	ISO 178	MPa	125 - 135
Surface strain	ISO 178	%	8 - 9
E modulus from flexural test	ISO 178	MPa	2450 - 2850
Impact strength	ISO 179	kJ/m²	40 - 50
Glass transition temperature (DSC)	ISO 3146	°C	140 - 150
Water absorption (specimen: 50x50x4 mm)	ISO 62		
30 min at 100°C		% by wt.	0.15 - 0.25
Decomposition temperature (heating rate: 10K/min)			
	DTA	°C	$\geq$ 350

Industrial hygiene

Mandatory and recommended industrial hygiene procedures should be followed whenever our products are being handled and processed. For additional information please consult the corresponding Safety Data Sheets and the brochure "Hygienic precautions for handling plastics products" (Publ. No. 24264/e).

Handling precautions

Safety precautions at workplace:	
protective clothing	yes
gloves	essential
arm protectors	recommended when skin contact likely
goggels/safety glasses	yes
respirator/dust mask	recommended
Skin protection	
before starting work	Apply barrier cream to exposed skin
after washing	Apply barrier or nourishing cream
Cleansing of contaminated skin	Dab off with absorbent paper, wash with warm water and alkali-free soap, then dry with disposable towels. Do not use solvents
Clean shop requirements	Cover workbenches, etc. with light coloured paper Use disposable breakers, etc.
Disposal of spillage	Soak up with sawdust or cotton waste and deposit in plastic-lined bin
Ventilation:	
of workshop	Renew air 3 to 5 times an hour
of workplace	Exhaust fans. Operatives should avoid inhaling vapours.

First Aid

Contamination of the **eyes** by resin, hardener or casting mix should be treated immediately by flushing with clean, running water for 10 to 15 minutes. A doctor should then be consulted.
Material smeared or splashed on the **skin** should be dabbed off, and the contaminated area then washed and treated with a cleansing cream (see above). A doctor should be consulted in the event of severe irritation or burns. Contaminated clothing should be changed immediately.
Anyone taken ill after **inhaling** vapours should be moved out of doors immediately. In all cases of doubt call for medical assistance.

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APPROVED TO
ISO 9000 ff

All recommendations for use of our products, whether given by us in writing, verbally, or to be implied from results of tests carried out by us are based on the current state of our knowledge. Notwithstanding any such recommendations the Buyer shall remain responsi-ble for satisfying himself that the products as supplied by us are suitable for his intended process or purpose. Since we cannot control the application, use or processing of the products, we cannot accept responsibility therefore. The Buyer shall ensure that the in-tended use of the products will not infringe any third party's intellectual property rights. We warrant that our products are free from defects in accordance with and subject to our general conditions of supply.