Ciba Specialty Chemicals

Electronic Polymers

vantico

Heavy Electrical

®Araldite Powder Coating

Araldite KU 610

A formulated, one-component system based on epoxy resin and an amine hardener

Applications

Non-porous, insulating coatings which withstand high electrical stresses and can be applied to metal components of all kinds

Processing methods

Spray with or without electrostatic charging and cure

Properties

Good protection against corrosion
Good adhesion
Very good mechanical and electrical properties, e.g. good flexibility and high dielectric strength

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Replaces Edition: April 2000

General instructions

The powder is sprayed onto the pre-heated substrate where the particles fuse to form a continuous film which is then cured.
If electrostatic spray guns are used the substrate being coated need to be pre-heated, although subsequent curing will still be necessary. Pre-heating facilitates application of thick coatings.
Electrostatic equipment is best used for coating bulky parts having a large surface area and poor heat retention, or for parts having complex shapes. Powder wastage, amounting to around 5% when cyclone equipment is used, can be reduced to about 1% by using special recovery units.
Fluidized bed coating, electrostatic fluidized bed coating or spraying, and conventional spraying techniques are described in "Applications for Araldite No. 40' (The insulation and encapsulating of electrical and electronic assemblies with Araldite epoxy resin powders").
We shall be happy to provide advice on selecting the equipment best suited to your requirements.

Substrates

In principle, any material which withstands the required pre-heating and curing temperatures may be coated with Araldite KU 610.
Coverage of sharp edges and corners will obviously not be as good as on rounded edges and corners.

Pretreatment

If maximum adhesion is not the prime consideration, or if a part is to be coated all over, cleaning and degreasing with normal organic solvents will suffice (e.g. trichlorethylene, perchlorethylene, acetone, or the Chlorothene NU made by Dow Chemical Corporation). For maximum adhesion, the surface to be coated must be roughened by sandblasting, sanding or pickling before it is degreased with the usual solvents.

Pre-heating

A soon as possible after pretreatment, the parts to be coated should be heated to at least 150°C. To make sure that no new oxide layer forms on the surface of the part to be coated, pre-heating should take not more than 30 to 60 minutes.

Coating

Depending on the application method selected and the coating thickness required (cf. "General", above), a spray gun is used to coat the pre-heated part as evenly as possible with Araldite KU 610. Spraying can be continued until the heat retained by the part being coated no longer suffices to fuse the powder particles being applied.
When electrostatic equipment is used, spraying can be continued until the charge built up in the powder surface reaches a level at which similar polarity results in repulsion of new particles and no more powder can be deposited. Pre-heating the part to be coated will delay build-up of the particle-repulsing charge and facilitate the production of thicker coatings.

Remarks

The gelling and cure times given above cover the time during which heat is applied directly to the coating, i.e. the actual temperature acting on the resin coating. They do not include the time required to heat up the article to be coated.

Storage

Araldite KU 610 should be stored at 18-25°C, dry in tightly sealed original containers. 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 tightly closed and stored cool immediately after use.. It should not be stored at temperature above 40°C.
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.

Processing

(guideline values)

Curing

Post-treatment
Spraying is followed by curing. The gelling and cure times required are as follows:

Curing temperature °C	**Geltime min**	**Minimum cure time (incl.geltime) hours**
130	55 - 70	approx. 10
140	35 - 45	5
150	25 - 30	3
160	16 - 20	2
180	6 - 9	1
200	3 - 4	0.5

The quoted gelling and curing times refer to the direct effect of temperature on the epoxy resin coating and do not include the time required to preheat the substrate to the required temperature

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Araldite KU 610

Appearance			blue-grey powder
Particle size	sieve analysis	µm	< 100
Density		g/l	610
Softening point	Kofler		
	hot bench	°C	70 - 75
Melting point	Kofler		
	hot bench	°C	90 - 100
Flash point		°C	150
Edge coverage	square-section rod	%	> 35

Properties of coatings cured for 1 hour at 180°C

Density	ISO 1183-3	g/cm^3	1.42
Glass transition temperature	ISO 11357-2	°C	105-115
Ball indentation hardness	ISO 2039-1	N/mm^2	96
Erichsen distensibility			
(film thickness 0.1 mm)	ISO 1520	mm	6 - 8
Tensile shear strength	ISO 4587	mPa	27-31
Impact resistance	special test Ciba		1 kg/ > 90 cm
(ball dropped on reverse side)			
Water absorption *			
1 hour, 100°C		%	1.49 - 1.52
10 days, 20°C		%	1.02
Water vapour diffusion	Deeg & Frosch	g/cm.h.mm Hg	$5 \cdot 10^{-8}$ (approx).

Dielectric constant ε_r (50Hz)			
20°C	IEC 60250		4.3
50°C			4.5
100°C			5.1

Dissipation factor tan δ (50 Hz)			
20°C	IEC 60250	%	0.8
50°C			1.2
100°C			5.7

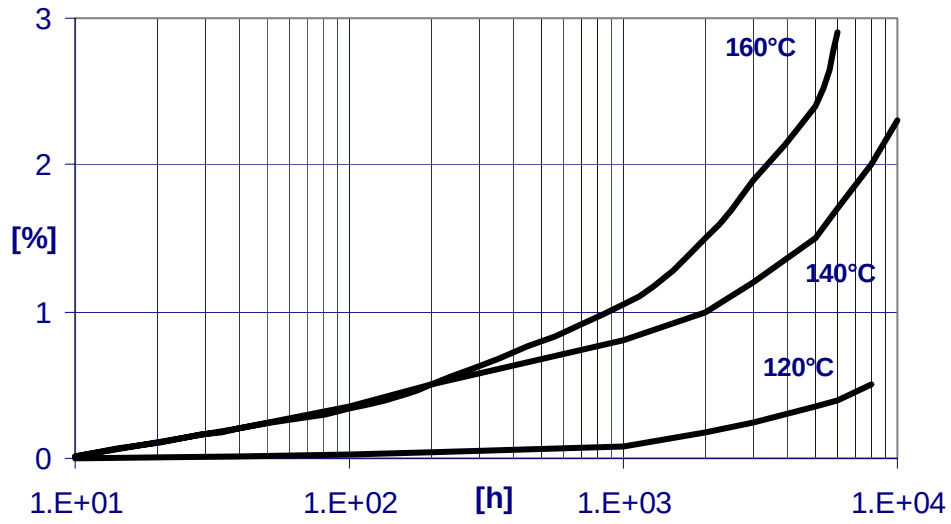
Volume resistivity δ at			
20°C	IEC 60053	Ω cm	$6 \cdot 10^{15}$
50°C			$5 \cdot 10^{14}$
100°C			$5 \cdot 10^{11}$
after 240 hours immersion in water, determined at 20°C			$2 \cdot 10^{15}$

Dielectric strength 50 C/s 25°C,			
(film thickness			
approx. 0.48mm)	CIBA-test	kV/mm	46

* Aluminium sheet, 70x70x1,5 mm coated one side only, film thickness 0,5 mm

Weight loss on heat ageing of Araldite KU 610 powder coatings

Curing schedule:	60 min at 180°C
Test specimens:	sheet iron 1.5x70x150 mm
Coating thickness:	approx. 750 µm



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 of Ciba Specialty Chemicals Inc. (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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