
®Araldite Powder Coating

Araldite® KU 600-1 BD (blue)

Araldite® KU 600P-1 BD (brown)

Powder coating for electrical and electronic components

One-component system based on epoxy resin and a basic catalyst

Electrical engineering: economical application of high-performance insulating coatings of metal components, particularly busbars and switches

Applications

Electronics: protective coatings for ceramic condensers

Fluidized bed coating

Processing methods

Good adhesion to substrate
Very good combination of mechanical, electrical and thermal properties
Good resistance to chemicals

Properties

General instructions

Substrates

In general, all materials which will withstand the required preheating and curing temperatures can be coated with Araldite KU 600-1.

Components being coated should not have sharp edges or projections since these greatly reduce edge coverage. Components with soft-soldered joints are equally unsuitable, since the solder usually will not withstand preheating temperatures.

Pre-treatment

If maximum adhesion of the coating is not required or a component is to be coated all over, cleaning and degreasing with the usual organic solvents will suffice (e.g. Dow Chemical Co's[®] Chlorothene NU, Du Pont's[®] Freonte, or acetone, etc.).

For optimum adhesion of the coating, the substrate should first be sandblasted, abraded or etched, and then degreased with the usual solvents.

Preheating

The pre-treated components are best preheated to 180-200°C in a circulating air oven for 30-60 minutes. Preheating should be brief, particularly in the case of metals, so that no new oxide layer is formed.

The actual preheating temperature used will depend on the required thickness of the coating and the heat retention properties of the component to be coated. The optimum preheating temperature is best determined by preliminary tests.

Masking

Areas which are not to be coated should be masked before or after preheating. It is best to use material with poor thermal conductivity (e.g. silicone rubber, polyfluorocarbons, etc) or suitable self-adhesive tape, e.g. aluminium-coated paper or [®]Teflon (E.I. du Pont de Nemours & Co., Inc.).

Immersion in fluidized bed

The component to be coated is taken from the preheating oven and dipped in the fluidized powder. The uniformity of the coating produced can be improved by agitating or vibrating the immersed component.

The thickness of the film applied in a single dipping operation depends on the preheating temperature, the heat retention of the component, and the immersion period. It can be varied between 0.5 and 2.5 mm by modifying the preheating temperature and/or the immersion period.

Thick insulating films are best built up by several successive dipping operations. This method produces the most homogeneous thick coatings.

Excess powder adhering to the component - especially to its horizontal surfaces - after dipping can be shaken off, blown off with compressed air, or removed by vibration.

Remarks

In fluidized bed coating, preheated components are dipped into or passed through the whirling powder, which melts and forms a continuous film when it comes into contact with a hot surface. Further heating cures the film, which then forms a firmly-adhering insulating coating.

Fluidized bed coating installations of various types and sizes are commercially available.

Storage

Araldite KU 600-1 should be stored at 6-18°C, dry in tightly sealed original containers. Product specific advice 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 must not be stored at temperature above 40°C.

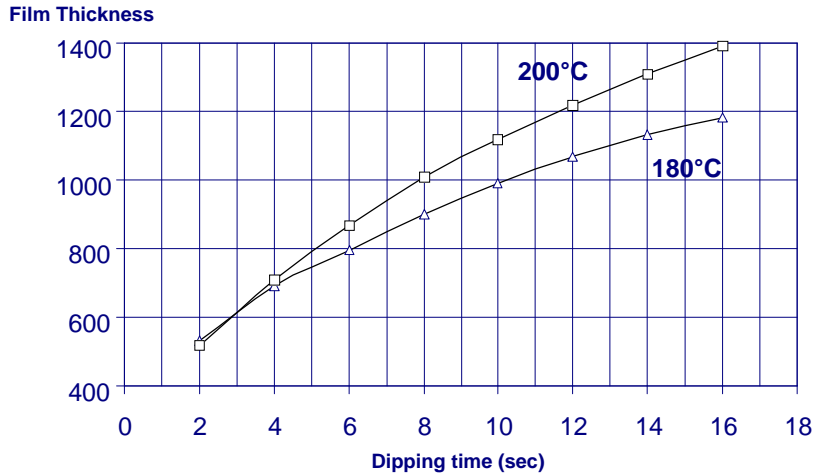
For information on waste disposal and hazardous products of decomposition in the event of fire, refer to the Material Safety Data Sheets (MSDS) for these particular products.

Processing

(guideline values)

Film thickness (μm) vs. dipping time (sec) and preheating temperature ($^{\circ}\text{C}$) -
Araldite KU 600-1 applied to 1.5 mm tin plate

Coating



Araldite KU 600-1 coatings applied by the fluidized bed method are cured as follows:

Curing

<u>Temperature</u>	<u>Gel time</u>	<u>Curing time</u>
180°C	6 - 9 min	60 min
200°C	2 - 3 min	30 min

Coatings applied to heat-sensitive components (e.g. electronic components) may be cured for 2 hours at 160°C or 5 hours at 140°C

The properties of the cured coatings are almost identical with those cured at higher temperatures.

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.

Araldite KU 600-1			
Appearance KU 600-1 BD			blue-grey powder
Appearance KU 600P-1 BD			brown powder
Particle size distribution	sieve analysis	< 40 μ m > 250 μ m	=< 14%** < 1 %
Bulk density		g/l	680 to check!
Softening range	Kofler Bank	$^{\circ}$ C	70 -75
Melting range	Kofler bank	$^{\circ}$ C	90 -100
Edge coverage	square-section rod	%	> 50
Properties of coatings cured for 1 hour at 180$^{\circ}$C			
Density	ISO 1183-3	g/cm ³	1.42
Glass transition temperature	ISO 11357-2	$^{\circ}$ C	105 – 115
Erichsen distensibility reverse (film thickness 0.6-0.7 mm)	ISO 61520	mm	1 - 2
Direct impact resistance (film thickness 0.6-0.7 mm)	special test	KG.cm	160
Water absorption *		%	
1 hour, 100 $^{\circ}$ C		%	1.49 - 1.52
10 days, 20 $^{\circ}$ C			1.02
Water vapor diffusion	Deeg & Frosch	g/cm.h.mm Hg	5 \cdot 10 ⁻⁸ (approx).
Chemical resistance	VDE 0368		resistant to transformer oil (105 $^{\circ}$ C) ammonia, etc.
Dielectric constant ϵ_r (50Hz)			
20 $^{\circ}$ C	IEC 60250		4.3
50 $^{\circ}$ C			4.5
100 $^{\circ}$ C			5.1
Dielectric loss factor tan δ (50Hz)			
20 $^{\circ}$ C	IEC 60250	%	0.8
50 $^{\circ}$ C			1.2
100 $^{\circ}$ C			5.7
Volume resistivity			
20 $^{\circ}$ C	IEC 60053	Ω cm	6 \cdot 10 ¹⁵
50 $^{\circ}$ C			5 \cdot 10 ¹⁴
100 $^{\circ}$ C			5 \cdot 10 ¹¹
after 240 h immersion in water, measured at 20 $^{\circ}$ C			2 \cdot 10 ¹⁵
Dielectric strength 50 Hz, 25 $^{\circ}$ C, (film thickness \approx 1.8-2mm)	Huntsman	kV/mm	14 -15

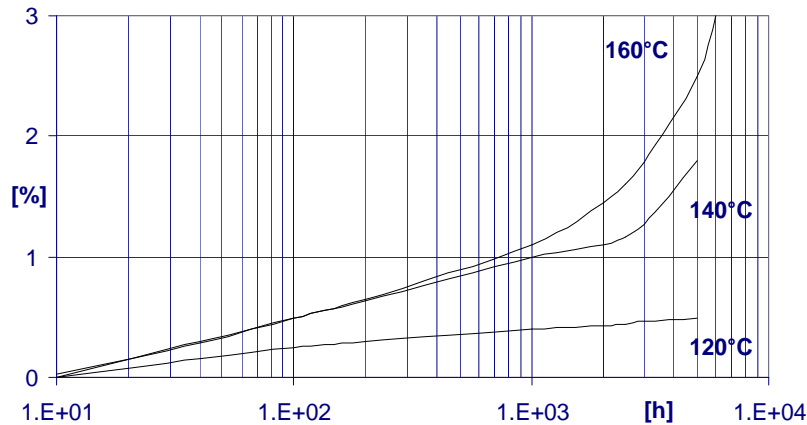
* Aluminium sheet, 70x70x1,5 mm coated one side only, film thickness 0,5 mm

Properties

(guideline values)

Loss of weight (%) vs. heat ageing period (hours)

Loss of weight vs. heat ageing



These curves were obtained by testing Araldite KU 600-1 powder applied to iron plate (1.5x70x150 mm) and cured for 1 hour at 180°C; film thickness approx. 750 µm. They indicate by extrapolation that, if the permissible loss of weight is to be 2% over 25'000 hours, the maximum service temperature of the coating is 135°C. Similarly, if the loss of weight may be 10% (VDE 0368), the maximum service temperature would be 160°C.

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".

Handling precautions	Safety precautions at workplace:	
	protective clothing	yes
	gloves	essential
	arm protectors	recommended when skin contact likely
	goggles/safety glasses	yes
	respirator/dust mask	recommended
	Skin protection before starting work after washing	Apply barrier cream to exposed skin 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 of workplace	Renew air 3 to 5 times an hour 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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Note	Araldite® is a registered trademark of Huntsman LLC or an affiliate thereof in one or more countries, but not all countries.
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