

LAPOX® ARC-31 | AH-114 | AC-13



Technical Data Sheet | Polymers Business

Hot cure epoxy impregnation system

Lapox ARC-31	100	pbw
Lapox AH-114	100	pbw
Lapox AC-13	0.1 - 2.0	pbw

Description

Lapox ARC-31 is a liquid, modified bisphenol-A based epoxy resin. Lapox AH-114 is a liquid modified anhydride hardener for elevated temperature cure. Lapox AC-13 is a liquid accelerator. It permits the lower cure temperature and appreciable shorter cure time which deliberately reduces both shrinkage and the cracking when encapsulating metal component.

Advantages

The components casted by this system is able to provide excellent combination of properties with high thermal shock resistance.

Applications

Dry type power transformer
Encapsulation and impregnation of transformer coils
Generators and motors
High voltage chock coils

Processing

Encapsulation
Impregnation

Typical specifications

Lapox ARC-31

Properties	Unit	Test method	Values
Appearance	-	Visual	Clear liquid
Colour	GS	ASTM D1544	Max 4
Viscosity at 25°C	m Pas	ASTM D2196	2,500 - 3,500
Epoxy content	Eq/kg	ASTM D1652	5.0 - 5.4
Specific gravity at 25°C	-	ASTM D792	1.15 - 1.20
Flash point	°C	ASTM D93	> 100
Shelf-life	Year	-	1

Lapox AH-114

Properties	Unit	Test method	Values
Appearance	-	Visual	Clear, yellow liquid
Colour	GS	ASTM D1544	Max 8
Viscosity at 25°C	m Pas	ASTM D2196	150 - 250
Specific gravity at 25°C	-	ASTM D792	1.15 - 1.22
Flash point	°C	ASTM D93	150
Vapour pressure at 20°C	Pa	ASTM D323	0.3
at 60°C			50
Shelf-life	Year	-	1

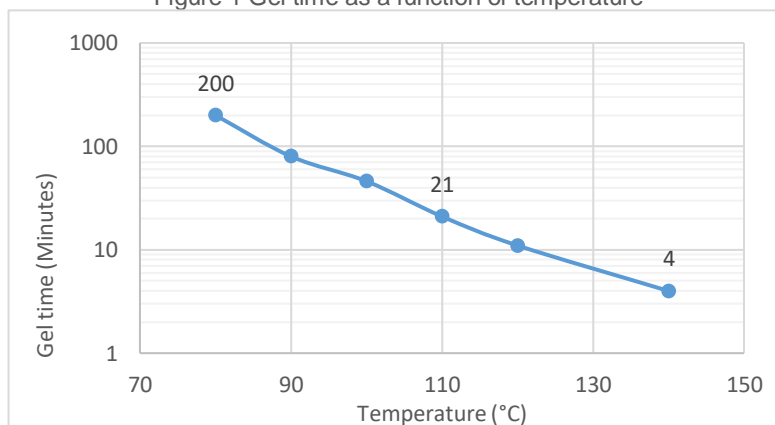
Lapox AC-13

Properties	Unit	Test method	Values
Appearance	-	Visual	Clear, yellow liquid
Colour	GS	ASTM D1544	Max 2
Viscosity at 25°C	m Pas	ASTM D2196	Max 10
Specific gravity at 25°C	-	ASTM D792	0.88 - 0.92
Flash point	°C	ASTM D93	59
Vapour pressure at 20°C	Pa	ASTM D323	300
at 60°C			1,600
Shelf-life	Year	-	1

Processing properties

Properties	Unit	Test method	Values
Mixing ratio (by weight)	-	Visual	Resin: 100 Hardener: 100 Accelerator: 0.5
Initial mix viscosity	m Pas	ASTM D2196	700 - 750 / 25°C
Pot life at 80°C	Minute	ASTM D2471	60
Gel time	Minutes	DIN 16945 / 6.3.1	See figure 1
Curing schedule	°C / hours	-	80°C / 6 hours + 130°C / 10 hours

Figure 1 Gel time as a function of temperature



Processing recommendations

Impregnation mix (without accelerator)

Resin and hardener are blended in a mixer at 20°C to 40°C under a vacuum of 0.1 mbar to 1.0 mbar at 20°C to 25°C the resultant mix has a pot life of about 20 days. After which period it will have double its initial viscosity. The pot life can be prolonged by storing the mix at 0°C to 10°C.

Impregnation mix (with accelerator)

Mixing ratio R: H: A = 100: 100: 0.1 to 2.0

Even at high temperature, non-accelerated system has long gelling and curing times due to which resin leakage from impregnated coils may occur. The addition of accelerator Lapox AC-13 largely solves this problem.

The size of the metal core and the preheating temperature (60°C to 120°C) of the winding should be taken into account to decide amount of accelerator. For impregnation of large windings, desired reactivity of mix can be achieved by adding 0.1 parts to 1.0 parts of Lapox AC-13. Higher amount of accelerator increases the exothermic temperature and reduces the pot life and gel time of the mix. The required flexibility can be imparted by adding 5 to 15 parts of plasticiser Lapox K-14. Application of 0.5 mbar to 4.0 mbar pressure curtails time and ensures defect free impregnation of glass | mica | paper insulation.

Typical properties of neat cured system

Composition: Lapox ARC-31 (100) + Lapox AH-114 (100) + Lapox AC-13 (0.5)

Curing schedule: 6 hours / 80°C + 10 hours / 130°C

Determined on standard test specimen at 25°C

Properties	Unit	Test method	Values
Tensile strength	m Pa	ISO 527	65 - 75
Elongation at break	%	ISO 527	3 - 4
Elastic modulus in tension	g Pa	ISO 527	3.0 - 3.5
Flexural strength	m Pa	ISO 178	125 - 140
Flexural elongation at break	%	ISO 178	4.5 - 6.5
Elastic modulus in flexural	g Pa	ISO 178	3.0 - 3.5
Compressive strength	m Pa	ISO 604	140 - 150
Impact strength	kJ/m ²	ISO 179	10 - 12
Glass transition temperature (DSC)	°C	ISO 11357 - 2	90 - 100
Co-efficient of linear thermal expansion (Mean value for temperature range 20°C - 80°C)	K ⁻¹	DIN 53752	31 - 36 X 10 ⁻⁶
Water absorption 25°C / 10 days	% w/w	IEC 60062	0.1 - 0.2

Typical electrical properties of filled cured system

Cured at 6 hours / 80°C + 10 hours / 130°C

Properties	Unit	Test method	Values
Breakdown strength (50 Hz, 25°C)	kV/mm	IEC 60243	18 - 22
Loss factor (50 Hz, 25°C)	%	IEC 60250	1.5 - 2.0
Dielectric constant (50 Hz, 25°C)	-	IEC 60250	3.8 - 4.2
Volume resistivity at 1,000 V, 25°C	ohm.cm	IEC 60093 / DIN 53482	> 10 ¹⁵
Arc resistance	Seconds	IEC 61621 / ASTM D495	185 - 195
Tracking resistance	V	IEC 60112	> 600

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Packaging	Lapox ARC-31 and Lapox AH-114 are available in 30 kg, 110 kg carboys and 200 kg MS drums. Lapox AC-13 is available in 1 kg and 5 kg HDPE bottles. Other packing may be considered on request.
Storage and handling	Lapox ARC-31, Lapox AH-114 and Lapox AC-13 should be stored in a cool and dry place, preferably in an original sealed container and should not be exposed to direct sunlight. These products can be stored at room temperature (RT), away from humidity and excessive heat. Under these conditions, the shelf-life will correspond to the time stated in respective table in current TDS. Partly used containers should be closed immediately after use. Lapox AH-114 and Lapox AC-13 is sensitive to moisture, storage containers should be ventilated with dry air only. Please refer to the Safety Data Sheet (SDS) for detailed instructions on storage and handling.
Safety	Wear personal protective equipment (PPE). Avoid contact with the eyes and skin. In case of direct contact and irritation, the resin should be washed off immediately with soap and warm water. Avoid breathing vapours, mist or gas. Please refer to the SDS for detailed safety instructions.
Spills and disposal	In case of spills, sweep up and shovel the spilled material. Keep spilled material in suitable, closed containers for disposal. Soak up with an absorbent such as clay, sand or other suitable material. Flush area with water to remove trace residue. Do not allow the product to reach the sewage system. Waste must be disposed of in accordance with federal, state or local regulations, as applicable.
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Note	Lapox [®] is a registered trademark of Atul Ltd.

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