

LAPOX® L-238 (ARPN-36) | K-10 | K-86



Technical Data Sheet | Polymers Business

Ambient cure colorless epoxy gel coat

Lapox L-238 (ARPN-36)	100	pbw
Lapox K-10	40	pbw
Lapox K-86	1 - 3	pbw

Description

Lapox L-238 (ARPN-36) is a semi-solid multifunctional epoxy novolac resin with superior chemical resistance. When cured with selected hardeners, these products provide excellent elevated temperature properties and superior chemical resistance. It is a multifunctional epoxidised phenol novolac resin with functionality 3.6. Accelerator | Hardener Lapox K-86 is supplied in the form of crystalline powder. It can be used either as a hardener or in small dosages or as an accelerator to reduce the prolonged curing schedule.

Applications

Adhesives
Binder for abrasive
Mica paper
Structural and electrical laminates
Tapes
Tooling

Processing

Prepreg

Typical specifications

Lapox L-238 (ARPN-36)

Properties	Unit	Test method	Values
Appearance	-	Visual	Clear, semi-solid
Colour	GS	ASTM D1544	Max 4
Density at 25°C	g/cm ³	ISO 1183	1.05 - 1.15
Viscosity at 25°C	m Pas	ASTM D2196	20,000 - 50,000
Epoxy content	Eq/kg	ASTM D1652	5.52 - 5.68

Lapox K-10

Properties	Unit	Test method	Values
Appearance	-	Visual	White powder
Melting point	°C		175 - 181

Lapox K-86

Properties	Unit	Test method	Values
Appearance	-	Visual	White to light-yellow hygroscopic powder
Melting point	°C		Min 75

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Processing properties

Properties	Mixing Ratio	Pot life	Gel time of the mix	Drying time
Condition	Resin : Hardener : Accelerator : Solvent	25°C	120°C	-
Test standard	-	ASTM D2471	DIN 16945	-
Units	pbw	Hours	Minutes	°C / hours
Typical values	100 :32 - 40 : 1 : 125	>8	7 - 12	80°C / 1 hour to 2 hours 130°C / 15 minutes

Dissolve the entire hardener in the solvent to get a clear solution. Undissolved hardener particles or any other contamination should be avoided. They may cause crystallisation of hardener when mixed with Lapox L-238 (ARPN-36). Add the hardener solution to Lapox L-238 (ARPN-36) and adjust the solids content by further addition of solvent. All the recipes have solids content in the range of 55% to 60% and initial viscosity in the range of 20 mPas to 60 mPas. Mix them thoroughly to a homogenous mass. The mixture is stable and has a useful life of several weeks at room temperature.

Solvent Selection

One can use ketone solvents such as acetone, methyl ethyl ketone or methyl isobutyl ketone to dissolve the hardener and to adjust the viscosity of the resin | hardener mixture. Hardener Lapox K-86 dissolves readily in all these solvents. Many users prefer acetone from the point of view of cost. However, the disadvantages with uses of acetone are faster evaporation and lower flash point.

Prepregs

Complete drying to remove moisture of the material to be impregnated such as glass fiber, carbon fiber, paper, mica, mica paper etc., is necessary before impregnating with the ready mixture. Impregnation is carried out in a resin bath. The excess resin is removed by passing the impregnated material through rollers or doctor blades. Pre-impregnates are then dried to the required condition.

The time required for drying depends upon several factors such as:
Temperature of the oven | drying tower,
The air flow,
Residence time in the oven | drying tower.

A typical drying schedule is 1 hour to 2 hours at 80°C or 15 minutes at 130°C. It, however, depends upon the heat history during drying. Since partial curing takes place during drying, care must be taken not to exceed the drying time as otherwise the prepregs will not have adequate flow in the press which will result in poor inter-laminar adhesion.

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Technical Data Sheet | Polymers Business

Processing conditions for Laminates

Description	Typical Values
Pressure	1.5 Mpa
Dwell time	15 Minutes
Temperature	150 °C
Press time	60 Minutes
Cure time in oven	5 hours at 200°C
Glass to resin ratio	2 : 1 (w/w)

Curing

The required number of pre-shaped pre-impregnates may be placed together and cured in a press or autoclave under a pressure of 1 MPa to 7 MPa at 150°C for 1 hour. The press or autoclave may then be cooled gradually to 100°C for better dimensional accuracy. Post curing may be carried out at 180°C for 3 hours for complete development of mechanical and electrical properties. The 'un-accelerated system (Lapox L-238 + Hardener Lapox K-10) requires curing for 5 hours at 200°C for developing the optimum properties. If the composites are consolidated, for whatever reason, at lower temperature, they have lower deflection temperature, which improves upon Subsequent oven curing at higher temperatures.

Aging Characteristics

The systems used under high temperature conditions should have sufficient aging resistance. It is, therefore very important to age them over a very longer period of time and then check the percentage retention of flexural strength. All the systems perform very well on aging even for twelve months at 180°C. It has been observed, however, that all the curative systems show a considerable fall (about 40% to 50%) when aged for 3,000 hours at a temperature of 200°C and tested at room temperature.

HDT values - Casted samples

Curing temperature	HDT °C (Curing schedule, Hours)
100 °C / 5 hours	115 - 120 (12)
140 °C / 5 hours	155 - 160 (3)
180 °C / 5 hours	200 - 205 (2)
200 °C / 5 hours	205 - 210 (1)

Curing conditions

Cured at 3 hours / 175°C + 2 hours / 250°C

Laminate properties

Description	Unit	Results
Flexural strength	MPa	135
Flexural modulus	GPa	3.35
Flexural strain at yield	%	7.0
Water absorption 2 week boiled	% w/w	4.01

Note: Biaxial, woven roving of 400 gsm, laminate thickness of 4 mm

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Packaging	Lapox L-238 (ARPN-36) is available in 30 kg, 110 kg and 240 kg carboys. Lapox K-86 is available in 1 kg HDPE bottles. Other packing may be considered on request.
Storage and handling	Lapox L-238 (ARPN-36) and hardeners Lapox K-10 and K-86 have shelf-life of 2 years if stored in their original sealed containers. It is recommended to use resin and hardener only when they are clear and free from cloudiness. Hardener is sensitive to moisture. Container must be closed properly immediately after use. Both resin and hardener may cause irritation to sensitive skins. If contact does occur to such operators then the resin and hardener should be washed off immediately with soap and warm water, consult doctor immediately. 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.

Manufacturing site

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