



Renewable solution for laminates and films

LIGNIN-BASED BINDERS ENABLE SUSTAINABLE IMPREGNATION

Lignin phenol formaldehyde (LPF) resins based on UPM BioPiva™ lignin in combination with our proprietary resin technology is a step towards sustainability.

UPM's resin technology makes it possible to replace petro-based phenol and part of formaldehyde in phenolic resins without compromising performance, and simultaneously lower their carbon footprint.

LPF resins and corresponding binder formulations are versatile. They can be tailored according to the requirements of your existing manufacturing process and equipment. The replacement level of phenol by lignin can be up to 50% in impregnation resins in applications such as high-pressure laminates (HPL) and phenolic surface films (PSF).

For best performance and to maximize the content of renewable lignin in LPF resins, UPM BioPiva™ lignin is incorporated into the resole type resin structure during synthesis. It's not just a blend! This is where our knowhow and solution make the difference. Our Technical service team will support you with years of experience to ensure the smooth transition into more sustainable production.

A BROAD RANGE OF LPF RESINS FOR PAPER IMPREGNATION

Phenolic resins are commonly used binders in paper impregnation, including applications such as industrial and decorative laminates and phenolic surface films. A broad range of LPF resin formulations based on UPM's resin technology is available for these applications and end uses. Our leading resin recipes and formulation knowhow are available to you together with high quality UPM BioPiva™ lignin. Our lignin-based solution fulfils the industry requirements and substantially increases the share of renewable raw materials of the resin and final products.

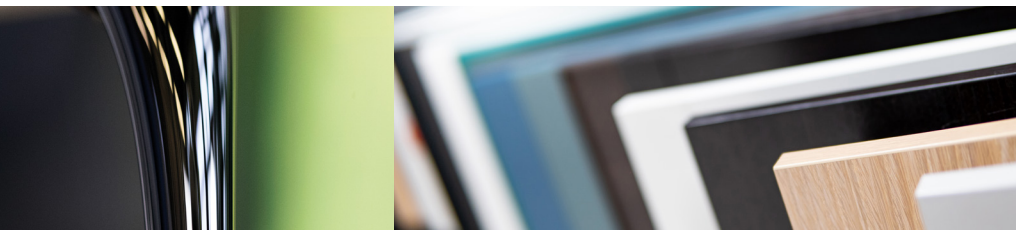
The current solution enables the replacement of phenol by lignin up to 50%. Our technical team is constantly developing our lignin products and corresponding resin technology towards a fully renewable, phenol free, lignin-based binder. Our technical service team can recommend a solution which will meet your specific needs.

For higher phenol replacement and performance, the following manufacturing parameters are recommended to ensure a good penetration into a kraft paper:

- Dilution of the resin to a lower viscosity range e.g., with water and methanol
- Temperature of the resin kept around 40°C during impregnation
- Use of pre-wetting unit or using of porous kraft paper

LPF resins for paper impregnation can be customized based on the customer requirements, product range and machinery. Our technical team can help you choose the optimal UPM BioPiva™ lignin product for your manufacturing process requirements and performance needs.





HIGH PRESSURE LAMINATES

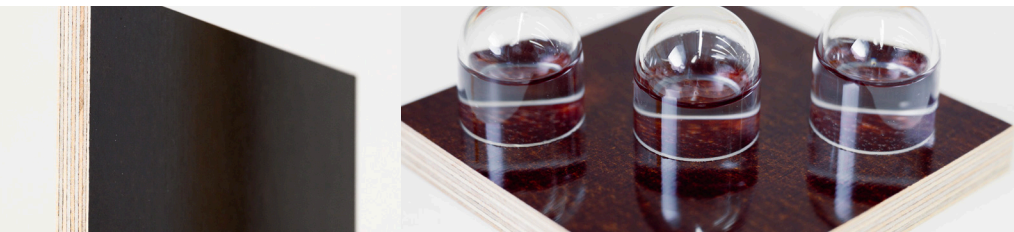
TYPICAL VALUES OF LPF RESIN

Dry solid content	%	~50
pH		~ 9
Alkalinity	%	~1
Free phenol	Wt-%	< 5
Free formaldehyde content	%	< 1
Viscosity, 25°C	mPas	~ 50–150
Water tolerance		infinity
Bio-based carbon content	%	30–40

HPL – PROVEN PERFORMANCE

Lignin based phenolic resins are applicable for both thin and compact laminates, and depending on the formulation also suitable for postforming application. The requirements for indoor panels (EN-438-3) are fully met with LPF resin up to 50% phenol replacement. LPF resins, based on UPM BioPiva™ lignin and UPM's resin technology, are designed as low formaldehyde emission resins providing low process and product emissions.

	LPF resin – 30% phenol replacement	LPF resin – 50% phenol replacement
Thin laminates		
Density	✓	✓
Resistance to immersion in boiling water	✓	✓
Dimension stability at elevated temperature	✓	✓
Post formability	✓	
Resistance to water vapour	✓	✓
Compact laminates		
Density	✓	✓
Resistance to immersion in boiling water	✓	✓
Dimension stability at elevated temperature	✓	✓
Resistance to water vapour	✓	✓
Resistance to wet conditions * (EN-436-6 Exterior use) * Additives might needed	✓	



PHENOLIC SURFACE FILMS

TYPICAL VALUES OF LPF RESIN

Dry solid content	%	47–49
pH		~ 10
Alkalinity	%	~3
Free phenol	%	< 3
Free formaldehyde content	%	< 1
Viscosity, 25°C	mPas	~ 250
Biobased carbon content	%	30–40

HIGH QUALITY LPF RESINS FOR INDUSTRIAL OVERLAYS

The requirements of high quality surface films, both from production, abrasion resistance, and surface appearance point of view can be met up to 50% of phenol replacement. The water resistance of the overlay can be further improved by common additives used by the industry. Depending on the application and end use, the resin formulation and its properties are carefully adjusted for optimum penetration and curing of the resin, and for durability and strength of the final product. We can offer you the LPF resin formulation without any additives; the selection and use of additives are in your skilled hands.

DISCLAIMER

All information given in this Technical Data Sheet is based on our present knowledge and experience on the date of this statement. Please acknowledge that the Technical Data Sheet is not intended to provide any additional warranty for the products, and it is subject to limitations on liability set out in the agreement between UPM or its subsidiaries and you. In particular, no warranty, whether expressed or implied, or guarantee of product properties in the legal sense is intended or implied. All information given in this Technical Data Sheet is intended for persons having the required skill and knowledge and do not relieve you from verifying the suitability of the information, or the product used, for a specific purpose prior to use by testing. The testing must be carried out by qualified experts only and in your sole responsibility. Use or application of such information and the product is at your sole responsibility and risk, and UPM or its subsidiaries shall not be liable for any damage or injury resulting from the use of the products or this information. This Technical Data Sheet has been prepared and is to be used only for the herein specified product. If the product is used as a component in another product, the information in this statement may not be applicable.



www.upm.com

UPM Biochemicals

Alvar Aallon katu 1
P.O. Box 380
00101 Helsinki, Finland
Tel. +358 (0) 2041 5111
Fax +358 (0) 2041 5110

www.upmbiochemicals.com
Lignin webshop:
shop.upmbiochemicals.com

For further information, please
contact our technical service
team at: lignin@upm.com