

## UPM BioPiva™ Lignin – A bio-based, sustainably sourced raw material

Lignin is an organic polymer found in the cells of all plants. Lignin is an incredibly versatile material that can be used as a bio-based, sustainable alternative to fossil-based raw materials.

UPM's lignin solutions allow producers to increase the renewable content of materials, while often generating significant cost-savings.

UPM's lignin is 100% bio-based which means that our entire portfolio of lignin products is based on renewable raw materials.

**Material and properties** UPM BioPiva™ is a kraft softwood lignin that can be used in various applications. It is a non-toxic product from renewable sources. For further information please contact technical service.

Specification	Typical value
Appearance	dark brown powder
Solid content 105°C, %	65
Molecular weight Mw, g/mol	5000
Ash content 700°C, %	<3
Sulphur content, %	<3
Storage stability, 20°C	3 months

**Handling** UPM BioPiva™ is delivered in big bags (about 800 kg).

**Safety** UPM BioPiva™ should not be used, stored or transported until the handling precautions and recommendations as stated in the Material Safety Data Sheet (MSDS) are understood by all persons who will work with it. Being a powder particular precautions have to be taken to avoid the risk of dust explosions.

**Storage** By nature the performance of UPM BioPiva™ will decrease over a period of time. To minimize aging effects, the material should be stored in a cool place out of direct sunlight. The recommended storage temperature is 15-25 °C and duration of the storage up to 3 months.



## Developing and producing LPF-resins

Blending lignin into PF-resins	Incorporating lignin into the resin structure
max. 15 weight %	Up to 50 % phenol replacement in HPL

For maximum performance and highest lignin-loadings, the UPM BioPiva lignin needs to be incorporated into the resin structure; re-design the resin chemistry from scratch.

## LPF resin for HPL production

LPF (lignin-phenol-formaldehyde) resin can be modified for customer purposes. The replacement level of phenol by lignin can be up to 50%.

### Typical value of LPF resin for high quality panels (example)

Dry content (resin), 105°C, 3h	47 - 52%
pH	7,5 - 9
Brookfield viscosity (25C, spindel 21)	30 - 50 cp
Free formaldehyde of resin	< 2%
Free phenol of resin	< 6%
Water tolerance of LPF resin without additives	> 1/8

## Modification of the resin for customer purpose depends on customer products and machinery

LPF300 HPL (30% phenol replacement)	LPF500 HPL (50% phenol replacement)
<b>THIN, thickness &lt; 1 mm</b>	
<b>EN-438-3 requirements</b>	<b>EN-438-3 requirements</b>
✓ Density	✓ Density
✓ Resistance to immersion in boiling water	Resistance to immersion in boiling water
✓ Dimension stability at elevated temperature	✓ Dimension stability at elevated temperature
✓ Post formability (≥ 3% plasticiser)	Post formability
✓ Resistance to water vapour	✓ Resistance to water vapour
<b>COMPACT, thickness &gt; 6 mm</b>	
<b>EN-438-4 requirements</b>	<b>EN-438-4 requirements</b>
✓ Density	✓ Density
✓ Resistance to immersion in boiling water	✓ Resistance to immersion in boiling water
✓ Dimension stability at elevated temperature	✓ Dimension stability at elevated temperature
✓ Resistance to water vapour	✓ Resistance to water vapour
<b>EN-436-6 requirements (exterior use)</b>	<b>EN-436-6 requirements (exterior use)</b>
✓ Resistance to wet conditions (1% plasticiser)	Resistance to wet conditions



[www.upm.com](http://www.upm.com)

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