145 g

HiWood

Wood Redefined for High Performance

HiWood PA Prepreg Fiber Paper (UD)

Technical Data Sheet

DESCRIPTION:

This grade is a continuous wood fiber reinforcement pre-impregnated with a polyamide-based thermoplastic. It is primarily used to create continuous wood fiber-reinforced composite structures through thermoforming or stamping, eliminating the need for additional impregnation. The polar groups in polyamide chemistry enable strong interfacial bonding with wood fibers, ensuring effective adhesion within the composite.

This grade is ideal for the forming of flat or other simple structures. For forming complex structures, 83 g/m² is recommended due to greater flexibility.

Most plant fibers possess inherent moisture absorption characteristics, so it's recommended to mold parts in an environment with a relative humidity no higher than 55%.

KEY ADVANTAGES

- Excellent specific strength & modulus
- Superior vibration damping
- Wood aesthetic appearance
- Easy to process
- 100 % recyclable
- Environmentally friendly

SPECIFICATION

Length	1200–1500 mm
Width	120–220 mm
Consolidated thickness**	0.088±0.007 mm
Areal density	120-170 g/m²
Fiber direction	UD along length
Color	Natural wood
Surface texture	Natural wood

** It is measured at a molding pressure of 0.8 MPa. Please adjust the number of layers based on the actual batch thickness and molding pressure.

COMPOSITION

Wood	85-92 wt.%
PA-based thermoplastic	8-15 wt.%
% Bio-content	85-92 wt.%
% Recyclability	100%
% Biodegradability	85-92 wt.%

GENERAL PROPERTIES

Processing temperature	130 °C
Maximum service temperature of composite	80 °C

TYPICAL PHYSICAL & MECHANICAL PROPERTIES

Density	1.25~1.35 g/cm	
Tensile strength (//)	300-450 MPa	ISO 527-5
Tensile modulus (//)	40-50 GPa	
Elongation at break (//)	0.7-1.2%	
Tensile strength (⊥)	35-45 MPa	
Tensile modulus (⊥)	7-8 GPa	
Poisson's ratio	0.4-0.5	
Flexural strength (//)	400-500 MPa	ISO 14125
Flexural modulus (//)	35-45 GPa	
Hardness	90 shore D	ISO 868
Loss factor @ 25℃ (DMA single cantilever)	4.2%-4.5%	0.01 % strain, 1 Hz

Note: average values obtained from 3rd party following ISO standards should serve only as guidelines. Composite performance is affected by the forming technique, equipment, environmental conditions, etc.

Freshape SA | www.freshape.com
Avenue d'Epenex 4A, 2nd floor, 1020 Renens, Switzerland

HiWood

Wood Redefined for High Performance

HiWood PA Prepreg Fiber Paper (UD)

Technical Data Sheet

STORAGE

The product should be stored in a dry, cool, and rainproof place. It must be kept in sealed packages to prevent moisture absorption. Before composite forming, pre-drying is recommended to remove excess moisture (e.g., 80°C for 30 minutes). When stored properly, the product remains usable for at least 12 months.

RECOMMENDED MANUFACTURING METHODS

1. Low-pressure molding (autoclave, vacuum bagging, etc.)
2. Compression molding
3. Roll wrapping

PROCESSING TEMPERATURE

The processing temperature should be set between 130°C and 150°C. Holding time depends on the material's thickness. For example, a 2 mm thick structure requires approximately 10 minutes at the set temperature. It is then gradually cooled to ambient temperature and should be left in a controlled environment at ≤ 25°C and ≤ 50% RH for 48 hours to allow complete polymer relaxation.

MANUFACTURING GUIDANCE

1. Material preparation

Before manufacturing, ensure the products have been stored correctly according to the provided guidelines. The product should be pre-dried to remove excess moisture (e.g. 80 °C for 30 min) right before manufacturing. Note that PA starts melting from 105 °C, which should be avoided during pre-drying.

2. Layup method

The stretchability of HiWood fiber paper is lower than fabrics. Therefore, it is essential to pre-flatten complex curvatures before layup. "Surface flattening" (a feature available in many commercial 3D modeling software) is recommended to accurately map the material to the desired shape. The HiWood paper should then be cut accordingly to ensure a precise fit and optimal layup for complex geometries.

If needed, a heat gun can be used to locally melt HiWood PA prepreg, allowing it to adhere to the previous layer with tools such as a scraper. Note that HiWood PA prepreg is coated with polyamide on only one side. Incorrect layering may result in delamination.

Note: due to its low thickness, HiWood PA prepreg fiber paper (UD), 83 g/m² is easier to bend. This grade is therefore recommended for forming complex geometries.

Freshape SA | www.freshape.com
Avenue d'Epenex 4A, 2nd floor, 1020 Renens, Switzerland

3. Number of layers

To ensure sufficient material (i.e., adequate ply count) and to prevent delamination caused by failure to reach the required molding pressure (0.8 MPa), it is recommended that the initial ply count for trial production be calculated as:

Ply count ≈ Part thickness × 1.1 ÷ Compacted ply thickness (0.088).

Based on the results of the first trial, adjust the material quantity by increasing or reducing the number of plies as needed. If the molding pressure differs from 0.8 MPa, the ply count should be adjusted accordingly.

4. Pressure

0.5 ~ 1 MPa to ensure good interlayered bonding. It's advised not to apply pressure immediately after placing the prepreg in the mold, as it may cause resin deficiency or wrinkles. Wait until the prepreg reaches a temperature between 120-140°C or use stepwise pressurization to ensure the resin melts and adheres better to the wood fiber paper. Proper adhesion reduces friction, allowing the paper to slide slightly and adapt to the mold, preventing wrinkles.

5. Waterproof coating

For waterproof applications, a 0.2 mm-thick epoxy coating uniformly covering the HiWood surface is recommended. Alternative coatings may be used, with thickness varying based on waterproof efficiency. A 1,000-hour humidity test (90% RH, 30°C) showed <5% water uptake and <5% loss in mechanical performance when HiWood-reinforced samples were coated with 0.2 mm of epoxy.

EXAMPLE*

Pressure	0.8 MPa (autoclave)
%Reinforcement	85~92 vol.%
Composite density	1.25~1.35 g/cm^3
Performance	Flexural strength: 400~500 MPa Flexural modulus: 35~45 GPa

TROUBLESHOOTING

a. Delamination

- Layering up the wrong side
- Thermoplastic not melted/cooled down properly
- Moisture in HiWood paper

b. Void

- Thermoplastic not melted/cooled down properly
- Insufficient molding pressure
- Impurity on HiWood surface
- Moisture in HiWood paper
- Locally uneven lamination

c. Wrinkle & Dislocation of HiWood

- Inappropriate layup method
- Resin movement during curing
- Premature application of pressure

d. Others

For other common composite manufacturing issues, refer to standard guidelines or seek expert guidance as needed.

Freshape SA | www.freshape.com
Avenue d'Epenex 4A, 2nd floor, 1020 Renens, Switzerland