HiWood

Wood Redefined for High Performance

68 g

# HiWood Fiber Paper (UD)

## *Technical Data Sheet*

## DESCRIPTION:

This grade is a continuous wood fiber reinforcement engineered in a thin paper format. Designed for versatile composite fabrication, it enables the creation of high-performance wood fiber-reinforced structures using techniques like hand layup, with or without applied pressure. Its exceptional mechanical properties make it ideal for manufacturing lightweight, structurally robust components.

**The lower thickness of this HiWood grade allows for greater flexibility, making it ideal for more complex structures which require sharper bending angles to construct.**

**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% biodegradable, 100% recyclable
- Environmentally friendly

## SPECIFICATION:

| | |
|---|---|
| Length | 1200–1500 mm |
| Width | 120–220 mm |
| Consolidated thickness** | 0.053±0.005 mm |
| 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 | 100% |
| % Bio-content | 100% |
| % Recyclability | 100% |
| % Biodegradability | 100% |

## TYPICAL PHYSICAL and MECHANICAL PROPERTIES:

| | |
|---|---|
| Density | 1.35-1.45 g/cm$^3$ |
| Areal density | 60-76 g/m$^2$ |
| Tensile strength (//) | 420-650 MPa |
| Tensile modulus (//) | 55-75 GPa |

Note: Tensile properties were theorized from the known rule of mixture based on the tensile measurements of laminate manufactured from wood fiber papers. They should serve only as guidelines. Performance is affected by equipment, environmental conditions, etc.

## 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.



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## RECOMMENDED MANUFACTURING METHODS:

1. Hand lay-up
2. Low-pressure molding (autoclave, vacuum bagging, etc.)
3. Compression molding

## RESIN

HiWood fiber paper is a densely packed natural fiber reinforcement in the form of a thin, paper-like sheet. Unlike traditional reinforcements, it does not necessarily require resin impregnation into the microstructure. Instead, a uniform distribution of resin between adjacent HiWood fiber papers is sufficient to achieve strong bonding.

For forming structures with zero or small curvatures, there are no specific restrictions on resin viscosity. For structures with large curvatures, resins with high initial adhesion or handling viscosities (10,000 ~ 25,000 mPa·s) are recommended to ensure optimal performance.

As natural fibers are sensitive to prolonged high-temperature exposure, resins cured at ≤140°C generally pose no limitations, and users should follow the resin manufacturer's instructions. Curing above 140°C should not exceed 2 hours, and resins with a maximum curing temperature of 150°C are not recommended.

## 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 ℃ for 30 min) right before manufacturing.

**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.

**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 (0.053).**

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.



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**4. 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 | Composite Density | Performance |
|---|---|---|
| 0.8 MPa (autoclave) | 1.25-1.35 $g \cdot cm^{-3}$ | Flexural strength: 400-500 MPa<br>Flexural modulus: 35-45 GPa |

* Epoxy: 10,000 mPa·s, curing at 120 ℃ for 0.5 h

## TROUBLESHOOTING

**a. Delamination**

- Insufficient resin
- Resin not distributed evenly between layers
- Resin not cured properly

**b. Void**

- Insufficient resin
- Resin not distributed evenly between layers
- Resin not cured properly
- Insufficient molding pressure
- Impurity on HiWood surface
- Moisture in HiWood paper

**c. Wrinkle & Dislocation of HiWood**

- Inappropriate layup method
- Resin movement during curing

**d. Others**

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

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