



INTERIORS & EXTERIORS



TECHNICAL DATA SHEET



## Thermowood

ThermoWood is a product which is manufactured using a special high temperature kilning process which has been developed in Finland. Scientifically heat treatment of wood has been studied by Stamm and Hansen in the 1930's in Germany and by White in the 1940's in the United States. In the 1950's Germans Bavendam, Runkel & Buro continued research on the subject. Kollman & Schneider have published their findings in the 1960's and Rusche and Burmester in the 1970's. In the 1990's the most intensive and comprehensive studies has been conducted by VTT in Finland.

The Thermowood process method has been developed by VTT. Thermowood not only protects the timber with the steam process but also brings up some chemical changes as well. As a result, natural friendly Thermowood brand has come up.

Thermowood is the brand which is allowed to be used only by the members of The International Thermowood Association.

With the Thermowood process the sugar inside the timber gets caramelized that causes the colour change which makes the timber more stabile and durable compared to regular Kiln Dried timber . Thanks to the thermal modification, the swelling and bending range of the timber has been minimized.

## Thermowood Process

In means of Industry, the thermal modification process has been developed by VTT in accordance with Finnish Wood Industry. The Thermowood method is under the license of the International Thermowood Association and its members.

novaThermowood products are presented in two various processes. These are;

Thermo- S ( For interior applications with a thermally modification process of 180°C - Pine, Ash and Iroko wood species)

Thermo – D (For exterior applications with a thermally modification process of between 200°C - 212°C– Pine, Ash and Iroko wood species.

**Thermally Modified Timbers can be divided into three main phases:**

**Phase 1. Temperature increase and high temperature kilning:** The kiln temperature is raised at a rapid speed using heat and steam to a level of around 100 °C. Thereafter the temperature is increased steadily to 130 °C during which time the high temperature drying takes place and the moisture content in the wood reduces to nearly zero.

**Phase 2. Intensive heat treatment:** Once the high temperature kiln drying has taken place the temperature inside the kiln is increased to a level between 190 °C (Thermo-S) and 212 °C (Thermo-D) Once the target level has been reached the temperature remains constant for 2–3 hours.

**Phase 3. Cooling and moisture conditioning:** The final stage is to lower the temperature down using water spray systems. Once the temperature has reached 80–90 °C re-moisturising and conditioning takes place to bring the wood moisture content to a useable level between %4-6.

## Basic Specifications

### Stability

As a result of the ThermoWood process the stability is increased compared to regular wood.

Due to structural changes of the wood with high heat treatment the internal stress has been reduced. Also thanks to the Thermowood process the equilibrium moisture content and permeability of the wood has been reduced. As a fact, the working and twisting tendency compared to regular wood has been minimized.

### Durability

During the Thermowood process the biological durability of novaThermowood products are being increased due to the hemicellulose breakdown (arabinose, galactose, xylose, mannose). As these are the nutrients of the bacteria causing decay and fungus which are pulled out during the Thermowood process, it is not possible for the bacteria to attack the wood.

novaThermowood products have a durability against various types of fungus.

novaThermowood products are durable against wood destroying basidiomycetes

The Thermowood process does not protect the materials from algae and fungus on the surface. These organisms feed (>23% humidity and over) from the environment and does not cause any structural changes on novaThermowood products. The algae on the surface which can be seen as an aesthetic issue can be easily prevented with the surface treatment (such as wood preservative oil, water based varnish)

<b>DURABILITY LEVEL</b>	<b>Durability Class 1 High Durability</b>	<b>Durability Class 2 Durable</b>	<b>Durability Class 3 Average Durability</b>	<b>Durability Class 4 Low Durability</b>	<b>Durability Class 5 Without Resistance</b>
<b>DURABILITY PERIOD</b>	Min. 25 Years	15-25 Years	10-15 Years	5-10 Years	Max. 5 Years
<b>WOOD SPECIES</b>	<b>Thermowood Ash</b> <b>Thermowood Iroko</b> <b>Thermowood Beech</b>  Teak Iroko	<b>Thermowood Pine</b> <b>Thermowood Spruce</b>  Bangkirai	Plantation Teak Fir Larch Oak	Pine Spruce Eur. Larch	Ash Beech Poplar Red Pine Maple
<b>REMARKS</b>	Outdoor - Contact with ground, not protected  Always Wet	Outdoor - without ground contact, protected  Frequently Wet	Outdoor - without ground contact, protected  Rarely Wet	Indoors and/or covered areas  Dry	Indoors  Dry

Application Class	Application	Durability Class	novaThermowood Timbers
0	Interior settled products,continuously dry and protected from insects	-	-
1	Interior settled products,continuously dry but free for insects	Durability Class 3	-
2	Occasionally within humidity,timbers without any reactions towards ground or moisture.	Durability Class 3	-
3	<b>Exterior settled products without any contact to the ground</b>	Durability Class 2	<b>novaThermowood Pine</b>
4	<b>Exterior settled products continuously having contact with the ground and humidity</b>	Durability Class 1	<b>novaThermowood Ash /Iroko</b>

## Service Life

Compared to regular wood, novaThermowood are %80 more efficient for outdoor usage. The swelling and shrinkage behaviour of the wood has been minimized and rotting has been prevented by natural transactions. novaThermowood products are nature and human friendly.

The durability of novaThermowood products are as per European norms EN 350 ve EN 335-1.

TMT has certified that novaThermowood Ash products has a biological durability of minimum 25 years as per CEN/TS 15083-1:2005 technical norms in case of a direct touch to the ground and continuously wet conditions.

According to EN 113 norms tested by VTT,it has been proved that the minimum durability of Thermowood Pine cladding products are 30 years in terms of British standarts.

According to EN 335-1 ve EN 350-2 the durability class of novaThermowood Iroko decking products have a minimum durability of 25 years.

The effect of weather circumstances to Cladding products are 6 times less as compared to novaThermowood decking products.

## Density

The density of novaThermowood Ash products are 623 kg/m<sup>3</sup> with a humidity content of 4,3 -6% in 20°C environmental degree with %65 relative humidity.

The weight density of novaThermowood Pine products are in between 350 -480 kg/m<sup>3</sup>. This is valid with a humidity content of 4-7% in 20°C environmental degree with %65 relative humidity.

It has been examined that nova with a humidity content of 4-6% in 20°C environmental degree with %65 relative humidity, the weight density of Thermowood Iroko products are between 650-675 kg/m<sup>3</sup>.

Note: As novaThermowood products are %100 natural, a weight density difference of %10 is possible among the pieces.

## Modulus of Elasticity and Strength

Due to lack of humidity in Thermally modified Thermowood products and structural changes happening during the process, the impact bending strength values are lower as compared to regular wood. But big differences are observed while relating to regular wood.

## Nail and Screw Holding Strength

Compared to regular wood, the nail and screw retention of novaThermowood products do not display a great difference. Due to the cell wall changes during the Thermowood process, nail and screw holding strength becomes lower of about %20. By using accurate and stainless steel screws this can be easily avoided.

## Glueing

It has been examined that the glueing of novaThermowood products are on the same level as regular wood products. Proposed glues are MUF, Polyurethane, PVA and Epoxy.

## Brinell Hardness

After Thermowood process the Brinell strength is higher compared to non-heat treated products.

The Brinell hardness of novaThermowood Ash product is 30,5 N/mm<sup>2</sup>.

Brinell hardness of novaThermowood Pine products are 15 N/mm<sup>2</sup>.

Brinell hardness of novaThermowood Iroko products are measured as 40 N/mm<sup>2</sup>

## Emission

Thermowood process has its own characteristic smell. This smell might not be liked by everyone but the test results of VTT (KET 3300495) has shown that the emissions are not harmful in fresh air.

The test results of TVOC – Total Volatile Organic Compounds has shown that the rates are much lower as compared to regular wood.

The smell of Thermowood products may disappear within a few days but with the surface treatment or rain it might raise up again for a short time.

## Fire Resistance

According to the European Norms EN 13501 (SBI-Test) the reaction class towards the fire is rated as “Class D”. If required, by using chemicals the fire resistance can be developed to “Class 1” as for British Fire Resistance Class.

## Insulation

Heat conductivity of novaThermowood has been reduced %20. According to the test of VTT the heat conductivity of novaThermowood Pine products are in  $\lambda_{10}$  rates due to 0,099 W/(m K) whereas this rate for non Thermowood Pine products are 0,12 W/ (m K).

As per these valuations, it is significant that novaThermowood products are proper for usage fields such as exterior cladding, saunas, Windows and doors.

## Colour

As novaThermowood products are totally natural, it is well known that the colour change is subject to the glucose amount inside of the timber itself. Due to high heat treatment, the sugar inside the wood gets caramelized and the colour of the wood changes.



novaThermowood Ash products gains a dark Brown colour.

novaThermowood Pine products gains a Light Brown colour.

novaThermowood Iroko products becomes honey-coloured.

As a natural product, the colour change of novaThermowood products into silver grey is a natural reflection. This colour change has no effect on the durability of the product. In order to prevent the colour change, the maintenance should be done as mentioned on the maintenance guide.

See: Maintenance Guide

## Moisture Content

During the packing of novaThermowood products in our factory, the humidity content is in between %4-6. This percentage may change +/- due to the atmospheric environment of the application field.

In dry climates with %95 of relative humidity, the maximum balance humidity rate of novaThermowood products are about %11,9.

## Maintenance

A maintenance is recommended for novaThermowood Decking products every 1-1,5 years. For novaThermowood Cladding products, this period is between 5-8 years.

It is advised to leave 10 cm gap between the ground and novaThermowood Decking products. It has to be ensured that enough space is being left to provide the air circulation. It is recommended not to close the surrounding of the decking area which prevents the air circulation beneath the decking.

The maintenance period depends on the Oil-Laquer advised by the company itself. For additional details check the manual, warrant and our maintenance guide.

## Environment

As a FSC certified company, all the products purchased by Novawood are from sustainable forests. During the production of novaThermowood no water is being wasted. In other words, due to



controlled water consumption the natural Resources are protected and any harm is given to the environment.

## Working with the Product

Just like regular woods,novaThermowood products can be cut as well. Considered that the product is more dry than regular wood,always keep in mind that the dust particle size is smaller and easier to fly around. Therefore,it is highly recommended to protect your eyes during the application.

## Health and Safety

novaThermowood products are definitely natural and harmless with any chemicals included. Therefore, there are no materials in novaThermowood products giving harm to the nature and human beings.In other words novaThermowood products are completely healthy.

However, if wood splinters penetrate the skin it is highly recommended to remove it as soon as possible. As the dust of novaThermowood is smaller wearing a mask during the application is a must.

## Storing-Warehousing

The packages should be stored flat with sufficient supports such as wooden battens with a distance of 600 mm between the packs to avoid disortion .It is recommended to store novaThermowood in a dry area by preventing its touch to the ground. Unheated warehouses are suitable.