



# 2020

# ThermoWood Technical Data Sheet

ThermoWood is a product which is manufactured using a special high temperature kilning process which has been developed in Finland. ThermoWood not only protects the timber with a high heat and steam process but also brings up some chemical changes as well. ThermoWood is the brand which is allowed to be used only by the member of The International ThermoWood Association. With the ThermoWood Process the sugar inside the timber gets caramelized and that causes the colour change, making the timber more stable and durable compared to regular Kiln Dried timber. Thanks to the thermal modification, the swelling and bending range of the timber has been minimised.

### **The ThermoWood process**

The thermal modification process has been developed by VTT in accordance with Finish Wood Industry. The ThermoWood method is under the license of The International ThermoWood Association and its members. ThermoWood products are presented in two various processes. These are; Thermo- S (For interior applications with a thermally modification process of 180deg – Pine, Ash and Iroko wood species). Thermo-D (For exterior applications with a thermally modification process of between 200deg – 212deg – 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 100deg. Thereafter the temperature is increased steadily to 130deg 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 190deg (Thermo-S) and 212deg (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 80-90deg 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. After the process the equilibrium moisture content and permeability of the wood has been reduced, as well as, the working and twisting tendency compared to regular wood has been minimized.

### **Durability**

During the ThermoWood Process the biological durability of ThermoWood products are being increased due to the hemicellulose breakdown. As these are the nutrients of the bacteria causing decay and fungus which are pulled out during the ThermoWood process. ThermoWood products have a durability against various types of fungus as well as being durable against wood destroying basidiomycetes.

The ThermoWood process does not protect the materials from algae and fungus on the surface. These organisms feed from the environment and does not cause structural changes on ThermoWood products. The algae on the surface which can be seen as an aesthetic issue and can be easily prevented with the surface treatment (Such as wood preservative oil, water-based varnish).

### **Service Life**

Compared to regular wood, ThermoWoods 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. ThermoWood products are nature and human friendly.

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

TMT has certified that ThermoWood Ash products have 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 the terms of British standards.

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

The effect of weather on cladding products are 6 times less as compared to ThermoWood decking products.

According to EN 335-1 ve EN 350-2 the durability class of ThermoWood Tulipwood cladding products have a minimum durability of 25 years.

### **Density**

The density of ThermoWood Ash products are 595 – 620 kg/m<sup>3</sup> with a humidity content of 4, 3 – 6% in 20 deg environmental degree with 65% relative humidity.

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

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

The weight density of ThermoWood Tulipwood products are between 420-450 kg/m<sup>3</sup>.

Note: As ThermoWood 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 compare to regular wood. Big differences are observed whilst relating to regular wood.

### **Nail and Screw Holding Strength**

Compared to regular wood, the nail and screw retention of ThermoWood 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 accuracy when installing and stainless-steel screws this can be easily avoided. (A2 Stainless Steel screws are recommended)

### **Gluing**

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

### **Brinell Hardness**

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

The Brinell hardness of ThermoWood Ash products are 30, 5 N/mm<sup>2</sup>.

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

Brinell hardness of ThermoWood Iroko products are measured a 40 N/mm<sup>2</sup>.

## **Emission**

The 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 compared to regular wood.

The smell of ThermoWood products may disappear within a few days but with the surface treatment or rain it may arise again for a short time.

## **Fire Resistance**

According to the Europeans Norms EN 13501 (SBI0-Test) the reaction class towards the fire is rated as 'Class D'.

ThermoWood Charred and Non-Charred cladding products can achieve BS476 Class O and 1 Euroclass B BS EN 13823 with special techniques and fire-retardant liquids.

## **Insulation**

Insulation properties of ThermoWood products have been increased by 20%. ThermoWood products are ideal for use externally for cladding, saunas, windows, doors and decking.

## **Colour**

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

ThermoWood Ash gains a dark brown colour  
ThermoWood Pine gains a light brown colour  
ThermoWood Iroko becomes a honey colour  
ThermoWood Tulipwood become a dark honey colour

Due to the fact ThermoWood is a natural product, it will go through the weathering process, the colour it changes to is a silver/grey. This process does not affect the durability of the product. In order to prolong the weathering process please see the maintenance guide. *Natural colour differences in each single board may occur.*

## **Moisture Content**

During the packing of ThermoWood products in our factory the humidity content is between 4 – 6%, this percentage may change due to the atmospheric environment. In dry climates with 95% of relative humidity the maximum balance humidity rate is about 11.9%.

Prior to installation all external timber cladding and decking needs to be unwrapped from its packaging and allowed to acclimatise to the high UK moisture levels that we experience over any 12 month period.

## **Maintenance**

Maintenance is recommended for ThermoWood. For decking products, the advice is every 12-18 months and for cladding products the suggested period is between 5 & 8 years. When laying ThermoWood decking it is recommended that a minimum of 50mm gap is left between the ground and the decking. This is to make sure there is enough space left for air circulation – it is also suggested that significant ventilation is left if closing the surround of the decked area. When installing ThermoWood products, excluding profiled cladding, a 5mm gap between each board (cladding or decking) should be left to allow for any slight movement and for ventilation purposes.

*Maintenance periods may vary depending on the oil/stain used, for additional information please see Maintenance Guide.*

## **Environment**

As an FSC Certified company our products are purchased via sustainable forests. During production of ThermoWood no water is wasted this is due to controlled water consumption, the natural resources are protected and no harm is given to the environment.

## **Working with the product**

Like regular woods ThermoWood products can be cut to size with no problem. It is recommended that eye protection is worn during the cutting process due to dust particles being smaller in size as the ThermoWood is at a drier state to regular woods.

## **Health and Safety**

ThermoWood products are 100% natural, there are no chemicals used during the ThermoWood process meaning that there is nothing to cause harm to nature or to human beings. However, if wood splinters penetrate the skin it is highly recommended to remove it as soon as possible.

As ThermoWood's dust particles are smaller than regular woods wearing eye protection and mask is recommended when cutting ThermoWood products.

## **Storage**

The packages of timber should be stored on a flat ideally unheated surface with wooden battens at a recommended distance of 600mm between the packs this is to avoid any distortion and to prevent it from touching the ground.

On arrival, all external cladding and decking should be unwrapped and allowed to acclimatise to the high UK moisture levels that we experience over any 12-month period.