THERMOWOOD®

TECHNICAL DATA SHEET
LDCWOOD® THERMOWOOD®

MANUFACTURING

The manufacturing process is based on the use of high temperature and steam. No chemicals are used in the treatment. The process improves performance, dimensional stability and biological durability.

Furthermore, the process leads to improvement in the insulation properties by reducing the thermal conductivity (λ value) of the final material. The specific ThermoWood® treatment process is patented, and the trademark is owned by the International ThermoWood® Association (ITWA).

As an official member of the ITWA, LDCwood® has the permission to produce ThermoWood®. LDCwood® only applies the Thermo-D process, where the used temperature exceeds 200 °C. The letter 'D' in 'Thermo-D' stands for 'durability'. Along with appearance and dimensional stability, biological durability is a key property in the end use applications of products in this treatment class.

KEY CHARACTERISTICS

The improvement of biological durability is a result of the removal of natural food sources in the wood as well as the changes of its chemical and structural composition. Levels of resistance to fungal decay increase as higher temperatures are used (see also use class).
The equilibrium moisture content (EMC) may be decreased to less than 40–50 % of the EMC of the same, untreated timber. Consequently, the dimensional stability is improved. Stability increases with higher treatment temperature.

Generally, the strength of the modified wood has a direct correlation with density. The modification process slightly lowers the density and therefore has some effects on the strength values. Although, the specific weight-strength-value remains practically unchanged, ThermoWood® should not be used in load bearing structures.

As with most materials, ThermoWood® is unable to resist the effects of ultraviolet radiation. Over a fairly short period of time, when exposed to direct sunlight, the colour changes from the original brown appearance to an attractive grey weathered colour. In addition, the ultraviolet radiation can cause small surface shakes to occur. If desired a pigment-based surface protection can be applied to prevent colour changes and other natural effects of the weather.
Table 1 gives an overview of some interesting characteristics of timber species modified by LDCwood®.

Table 1: Density, EMC, Modulus of rupture (MOR), Modulus of elasticity (MOE) and durability class along EN113-2 (DC) of ThermoWood® (average of measurements)

	Density (air dried) [kg/m^3]	EMC (20 °C – 65% RH) [%]	MOR [N/mm^2]	MOE [N/mm^2]	Durability Class (according to EN 350-1)
Thermo® Ayous	353	4,9	25,0	7 089	1 (very durable) [1]
Thermo® Fraké	537	5,0	54,7	14 880	2 (durable) [1]
Thermo® Spruce	420	7,3	47,5	10 133	2 (durable) [1]
Thermo® Pine	420	6,4	38,1	9 262	1 (very durable) [1]
Thermo® Ash	554	6,6	90,6	13 320	2 (durable) [2]
Thermo® Poplar	367		54,8	7 630	3 (moderately durable) [2]
Thermo® Radiata Pine	386				3 (moderately durable) [2]

[1] Certified by WOOD.BE

[2] Certified by SHR

QUALITY CONTROL

ThermoWood® is produced in accordance with an independent quality control system that is audited by two accredited, notified bodies: Finotrol and Wood.be.

LDCwood® maintains a carefully established procedure to guarantee the quality of its ThermoWood®. Quality control is carried out at process level by means of permanent monitoring and evaluation of the wood core temperature for each production batch.

The quality control system (Wood.be-1697) is audited at least three times a year by WOOD.BE and two time a year by Finotrol (FC 124-01).

During these audits, samples are taken to enable product-level control by measuring density, weight loss during treatment and equilibrium moisture content (EMC).

As such, the ability of thermal modification within set quality requirements and the traceability of the delivered products was independently verified.

ENVIRONMENTAL ASPECTS

ThermoWood® is a natural wood product with no chemicals used in the process. ThermoWood® waste can be handled similar as any other untreated wood waste. The material is biodegradable. At the end of its service life, it can be used for recycling or energy production.

ThermoWood® allows non-durable wood species to be used as outdoor wood product with an extended service life.

LDCwood® supports sustainable forest management through PEFC, FSC® and OLB certification. These certifications ensure that timber used for production of certified products does not come from protected forests and that protected species have not been used for their production and does not contribute to deforestation or negatively impact on local communities.

In order to enhance its environmental performance, LDCwood® is certified ISO 14001, an internationally agreed standard that sets out the requirements for an environmental management system. It helps organizations improve their environmental performance through more efficient use of resources and reduction of waste.

APPLICATIONS

ThermoWood® is recommended to be used in use classes 1 to 3 in accordance with EN 335 without the need for any further chemical protection (=outdoor use above ground contact). For sub use class 3.2 the higher temperature treatment is recommended.
The treatment is throughout the wood piece and is not subject to leaching.

ThermoWood® can be used for furniture, wall panels, cladding, decking, ... The customer should evaluate if ThermoWood® is suited for the envisaged application based on the declared features.

PROCESSING

Sawing does not significantly differ from sawing untreated wood. Good dust extraction systems will be needed in each processing step in the factory.

Standard planing equipment can be used when further processing ThermoWood®. Best results are achieved when hard metal blade cutters are used. Similar processing parameters to planing wood with low densities should be followed.
To get a good surface quality when milling, blades must be sharp. Otherwise tearing may occur. The best results are obtained when there is sufficient solid wood material behind the blade. Processing must be pre-planed carefully. There is very often no need for sanding, because after planing or milling the wood had an excellent surface quality.

To prevent colour changes and other natural effects of weathering it is recommended that surface treatment is used. Oil-based substances work well and in a similar way as with untreated wood. When working with water-solvent substances it has to be taken into account that ThermoWood® has a lower water absorption rate than untreated wood, this can have an effect of drying time and penetration. The manufacturer's instructions should be followed.

For the same hydrophobic features, when gluing ThermoWood®, the glue manufacturer's specific instructions must always be referred to. The use of mechanical fasteners requires some attention. The modification process can reduce splitting strength of wood. The use of self-tapping screws or pre-drilling of holes must be made to avoid cracking of the material. It is recommended to use low threated screws. It is very important to use stainless steel screws with countersunk heads for external usage or in other humid environments.

Regarding nails, best results are gained when using a compressed air nail gun with adjustable nailing depth on the gun. Using a traditional

hammer increases risk of splitting due to accidental hammer contact with the wood. It is very important to use stainless steel or other rust-free nails when fixing ThermoWood® outside or in humid conditions. It is also recommended to use small oval head nails as this also helps to reduce the risk of splitting.

ADDITIONAL INFORMATION

In processing, sharp tools should be used to achieve best results. The dust has smaller particle size than normal wood. Special attention must be paid to the dust extraction system and when working in confined spaces, the use of dust masks is advised.
For some applications (use class 3), transversal wood sections should be sealed with an appropriate sealant to prevent uptake of free water. Although, colour variations are limited within one production batch, larger colour differences can occur between batches as this is linked to natural variations in the forest stands.

LDC WOOD

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LDCwood® is member of the International ThermoWood® Association.
FSC® (C001899), PEFC (PEFC/07-32-24), BSI ISO 14001 Certified
OLB (OLB-CERT/COC-190606) : registration by an independent organization according to the OLB system, which enables the tracking of wood whose origin and legality are certified.
Origin and Legality of Wood © Bureau Veritas Certification.
Finotrol - Certified 124-01