



LIGNIA[®]
Wood made for life

TIMBER, MODIFIED FOR LIFE

LIGNIA[®] is beautiful
high-performance wood,
made to last, whatever
life throws at it.



LIGNIA® DELIVERS BEAUTY AND HIGH PERFORMANCE IN ONE PRODUCT

LIGNIA is the high-performance modified timber produced in the UK for architects, designers and other professionals to specify for the construction industry. LIGNIA is a highly-durable real wood that delivers beauty, high performance and sustainability through a unique modification process.

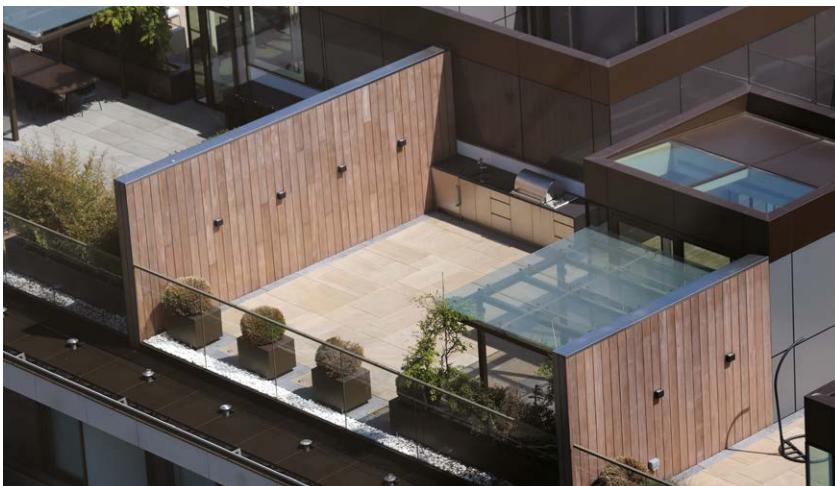
LIGNIA starts out life as a softwood (radiata pine) from FSC®-certified managed plantations, and we modify it in our manufacturing plant in Wales, giving it the appearance and properties of hardwoods.

Using proprietary grading rules we ensure the wood used is carefully selected from large-diameter pruned logs which are cut to produce heart-free boards free of warp and with minimal surface defects.

This is then modified under controlled conditions to produce timber of suitable consistency and quality.

Classified as small movement, LIGNIA has many applications and is often used for decking, flooring, cladding and general joinery such as doors and window frames. LIGNIA comes with a 50-year warranty against rot and fungal decay in above-ground uses and matches or even exceeds in some categories the performance of hardwoods such as ipe or European oak.

LIGNIA undergoes extensive testing at test facilities in the UK, France, Germany and North America, proving that the product is a real alternative to tropical hardwoods, thus making it a highly sustainable choice in construction specification.



LIGNIA, the modified softwood that delivers like a hardwood.

LIGNIA's patent-pending process for modifying softwood involves treating it with a formulated phenol and formaldehyde (PF) resin and then kilning it; on curing, the PF resin condenses to produce a large chemically-stable molecule 'locked' into wood at a molecular level via our proprietary 'lignification' method. The result of this process reduces the already low levels of formaldehyde present, to meet the stringent emission requirements for internal applications in regions around the world.

The timber's properties are enhanced to include increased durability against rot and greater stability, density and hardness with a consistently built-in golden-brown colour.

With its greater durability properties and small movement, it provides all of the advantages of wood as a construction material, with none of the age-old drawbacks.

LIGNIA is produced in the UK in a major modified timber manufacturing plant and is available via distributors all over the world.

Combining technology and nature to help preserve tropical rainforests.



LIGNIA PROVIDES A SUSTAINABLE CHOICE

As a modified FSC® timber LIGNIA is well-placed to offer the construction and joinery sectors an ecologically-viable alternative to the use of uncertified hardwoods, thus helping to reduce deforestation. Climate change and the increasing demand for natural resources by a growing global population, pose significant threats to sustainable development, and so the role that certified wood plays as a renewable material resource is becoming ever-more crucial.

Not only is LIGNIA manufactured from FSC®-certified wood, but our lignification process also improves the durability of the wood, and so products manufactured using LIGNIA have a longer service life, thereby locking-up carbon for a longer period of time. This also reduces the demand for timber because products need replacing less frequently.

Many tropical forests contain high-value trees such as teak and mahogany and often, these are harvested illegally; the resulting felling and extraction of trees can lead to significant forest damage. Harvested from FSC® plantations, LIGNIA is tailored to have many properties similar to these tropical hardwoods making it a desirable and sustainable alternative. The trees used by LIGNIA are harvested like a crop, with less taken out than what grows each year. By choosing LIGNIA we can all increase the planet's forested lands and have no need to cut down so many slow-growing hardwood trees.

Additionally, at end of life, LIGNIA products can be re-fashioned and turned into other products or items, thus further extending its life. It can also be used as biomass fuel with heat and energy recovery, reducing the need to burn fossil fuels.





THE SCIENCE BEHIND LIGNIA'S MODIFICATION PROCESS

LIGNIA is modified in LIGNIA Wood Company's manufacturing plant in Barry, in the UK, and is engineered to last a lifetime. Before the modification begins LIGNIA's team grades the softwood to make sure it is of suitable appearance and with limited defects. The lignification process involves taking FSC® certified softwood (radiata pine), kilning it and then treating it with resin. The resin is 'locked in' at molecular level by curing it which gives it the performance and appearance of hardwoods.

LIGNIA's PF resin contains a large number of small molecules including phenol and formaldehyde. However, once cured, molecules combine to produce a large polymer which is low in emissions. Formaldehyde, a key element of our resin, is a naturally-occurring product that is found in all organic forms of life, in trees, fruit, vegetables, fish, and animals including humans; in fact, we humans produce approximately 40 grams of formaldehyde each day in our bodies (see right). The resin used is a low-formaldehyde resin.

Once LIGNIA is cured the PF is only present in minute quantities. LIGNIA wood is tested independently on a regular basis under BS EN 120 and meets European Emissions Standards E1. Using the JIS 1460A, LIGNIA's formaldehyde emission levels are 0.3mg/l, the lowest classification under the standard.

LIGNIA also has a Toxic Substance Control Act (TSCA) certificate from the HPVA Laboratories in the USA. The certificate shows a result that is below the limit of quantification, ie less than 0.008 ppm.

What is formaldehyde?

Formaldehyde naturally occurs in every wood product on the market and also in the food we eat including fruit, vegetables and poultry. It's a simple organic chemical compound made up of hydrogen, oxygen and carbon.

All life forms on our planet including bacteria, plants, trees, fish and animals (including humans) make formaldehyde, usually every day. It's an essential compound which is present in quite high concentrations in all tissues and in fact is used in the human body to manufacture essential amino acids.

Formaldehyde does not accumulate in the environment or within plants, animals or people as it is metabolised quickly and exhaled. Every time you cut the grass in your garden you are breathing in formaldehyde in very safe levels.





INNOVATION FROM LIGNIA

LIGNIA Wood Company is based in Barry in South Wales, UK in a 50,000 sq.ft state-of-the-art manufacturing plant that is dedicated to modifying timber for the marine and construction sectors. The team is run by real experts in timber who understand not just the mechanics and science of wood but also the end applications in the yachting and building world. LIGNIA has its own R&D plant and research team that are led by wood scientists who are specialists in modifying timber and who carry out continuous testing using LIGNIA's own test rigs that face the sea.

LIGNIA has a modern customised factory but the actual site is over 100 years old with most of this time being dedicated to working with wood.

LIGNIA thus continues a proud tradition of working with wood on one single site. LIGNIA's team is dedicated to producing the finest modified timber for the building sectors around the world.





GENERAL APPLICATIONS

LIGNIA is real wood that is suitable for use indoors and outdoors in a wide range of applications. It is pH neutral making it less likely to cause corrosion. It works well and is easy to fix.

LIGNIA's average density is 650 kg/m³ which means that it can be screwed or nailed like any other timber, but pre-drilling is recommended for thicker pieces.

As LIGNIA is small movement (similar to Western Red Cedar) it is often used by architects and builders for the following applications:

- Decking (quarter / rift sawn)
- Cladding
- Flooring
- Window frames
- Doors
- Outdoor furniture
- Saunas
- Worktops
- Cladding Internal and external



VISUAL GRADE

The following may be present:

Small Knots

5mm or less (no limit on numbers).

Resin Pockets

10mm wide, 50mm long totally encased within timber (less than 50mm board thickness) and 10mm wide, 100mm long totally encased within timber (board thickness greater than 50mm).

Intergrown knot

Tight and totally encased maximum 15mm (in board thickness greater than 50mm only).

Resin Streaks

Three, maximum width 7mm, 100mm in length.

Surface checking

In external applications LIGNIA may exhibit fine surface checking over a period of time if left uncoated. For horizontal decking applications it is advised to use LIGNIA's rift sawn timber, which is a high performance product that reduces such checks.

End Splits

Not to exceed 150mm in length.

Distortion

See the distortion tables in our 'Visual Grade Specification 2019' brochure.

Wane

Up to $\frac{1}{4}$ of board length, 8mm x 8mm for 25mm – 50mm thick boards, up to $\frac{1}{2}$ of board length, 10mm x 10mm for boards greater than 50mm in thickness.

LIGNIA is supplied FSC® certified, kiln-dried, with minimal visual defects, random grained (flat sawn).

It is available in the following dimensions:

Dimensions:

FSC® certified, kiln-dried random grain:

22mm, 25mm, 32mm, 38mm thickness (50mm, 63mm, 75mm later in 2019)

75mm, 100mm, 125mm, 150mm, 200mm widths

2.1m – 6m lengths



**SUPPLIED
ROUGH-SAWN,
RANDOM GRAIN,
4 SIDES CLEAR**

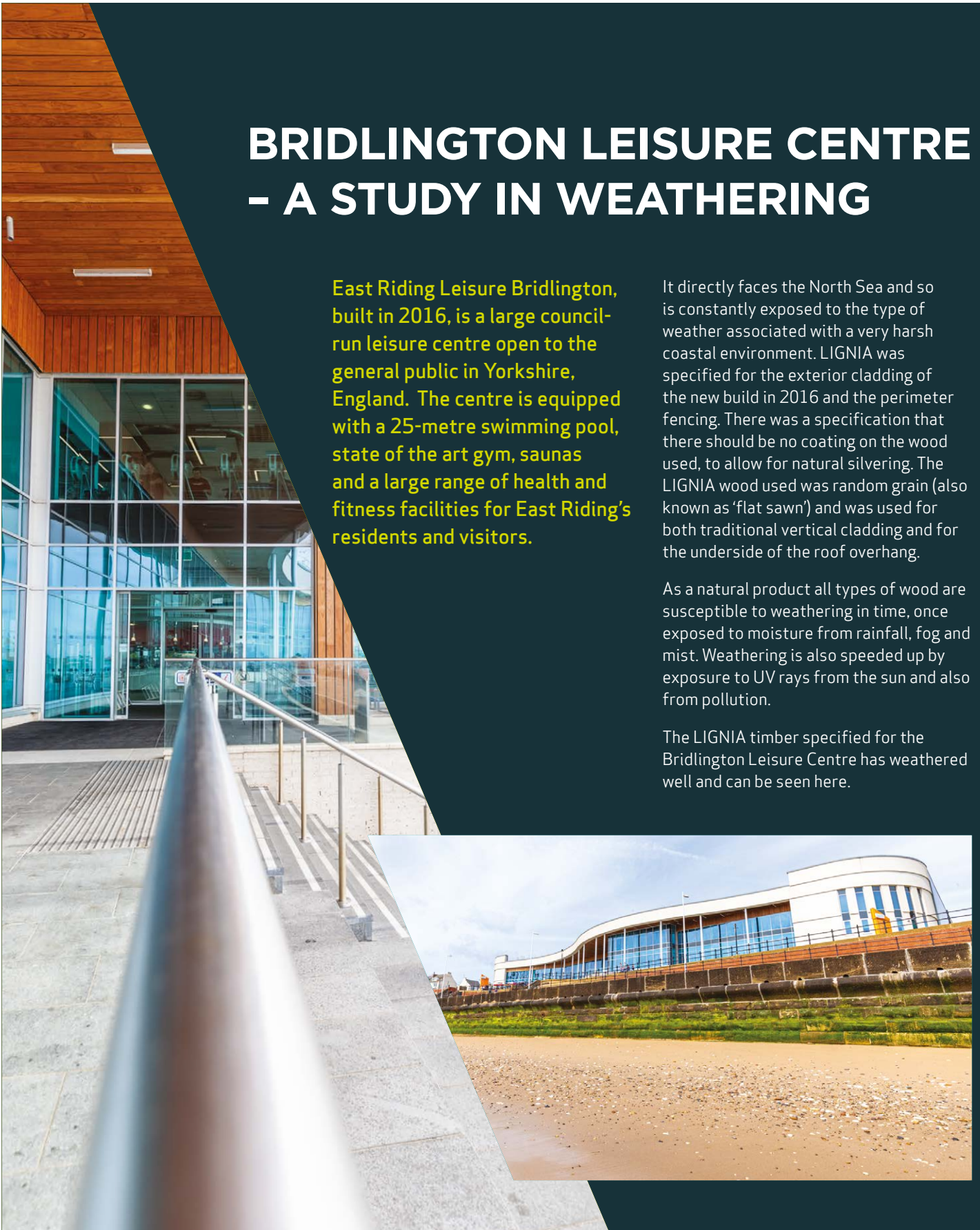
BRIDLINGTON LEISURE CENTRE - A STUDY IN WEATHERING

East Riding Leisure Bridlington, built in 2016, is a large council-run leisure centre open to the general public in Yorkshire, England. The centre is equipped with a 25-metre swimming pool, state of the art gym, saunas and a large range of health and fitness facilities for East Riding's residents and visitors.

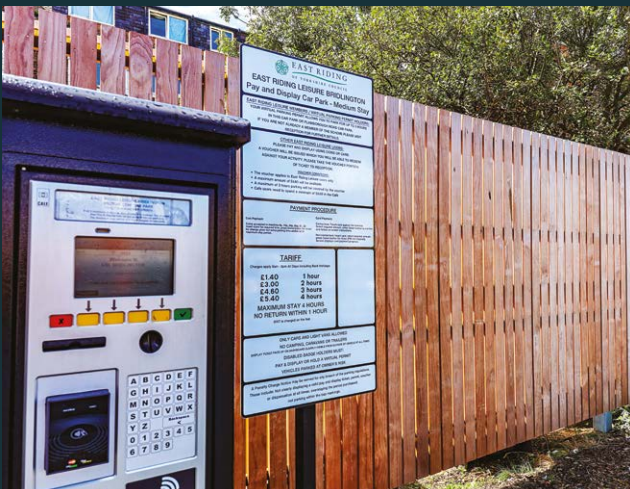
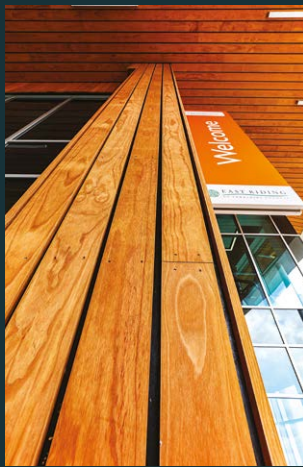
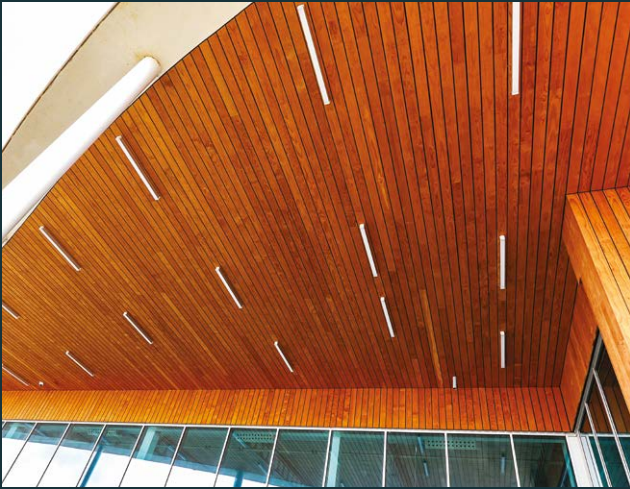
It directly faces the North Sea and so is constantly exposed to the type of weather associated with a very harsh coastal environment. LIGNIA was specified for the exterior cladding of the new build in 2016 and the perimeter fencing. There was a specification that there should be no coating on the wood used, to allow for natural silvering. The LIGNIA wood used was random grain (also known as 'flat sawn') and was used for both traditional vertical cladding and for the underside of the roof overhang.

As a natural product all types of wood are susceptible to weathering in time, once exposed to moisture from rainfall, fog and mist. Weathering is also speeded up by exposure to UV rays from the sun and also from pollution.

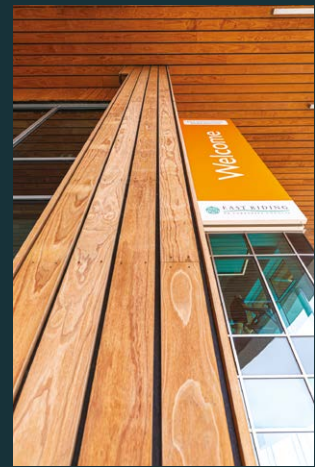
The LIGNIA timber specified for the Bridlington Leisure Centre has weathered well and can be seen here.



2016



2019



LIGNIA PROPERTIES

- Sustainable and legal timber – FSC® certified from managed plantations
- Very low emissions of formaldehyde under BS EN 120, meets European Emissions Standards E1. Using the JIS 1460A, LIGNIA's emission levels are 0.3mg/l, the lowest classification under the standard
- Very low emissions of formaldehyde under TSCA - certificate from HPVA Laboratories in USA show formaldehyde below level of quantification, ie less than 0.008 ppm
- Moisture movement: Radial & tangential cumulative movement 90 to 60% RH (%) 2.02 (Avg 20)
- Durability Class 1 MPA (60-year minimum life against rot and fungal decay in above ground applications)
- Durability against termites – in AWPA E10 subterranean termite (choice) tests, LIGNIA demonstrates high resistance to attack from subterranean termites with only trace, surface nibbles being found (LSU Wood Durability Lab in Baton Rouge, LA)
- Density through modification is increased to an average of 650kg/m³, improving mechanical properties
- Janka hardness test – to 5170 N (Avg 60)
- Dimensional stability – small movement timber, Tangential movement 0.55%, Radial movement 0.65%
- Superior machining finish with minimal sanding required
- Slip resistance - pendulum test BS 7976: 2002 Parts 1 & 3
With shoes:
53 (Avg Dry) 33 (Avg Wet)
Barefoot:
82 (Avg Dry) 44 (Avg Wet)

End Sealing of LIGNIA

It is highly recommended that both ends of LIGNIA wood pieces be end sealed with either paint or wax to prevent moisture ingress, especially when inserted into the ground. LIGNIA has Class 1 durability and is a small movement timber but end sealing is recommended as with all modified timbers.

- Supplied with minimal visual defects and good levels of colour consistency
- pH neutral, so less likely to cause corrosion
- Stick mark may be present on rough sawn LIGNIA but is only a surface mark and disappears once planed
- Coatings – LIGNIA can be painted and performs well when coated
- Points of bending tests indicate strength and stiffness similar to hardwoods such as teak:
Modulus of Rupture: 83.79 N/mm³ (Avg 20)
Modulus of Elasticity: 12044.04 N/mm³ (Avg 20)

	LIGNIA	Western Red Cedar	Sapele	Ipe	European Oak	Douglas Fir
Ease of fixing	✓✓	✓✓✓	✓✓	✓	✓✓	✓✓
Hardness	✓✓	✓	✓✓	✓✓✓	✓✓	✓
Durability fungi	✓✓✓	✓✓	✓	✓✓✓	✓✓	✓
Durability subterranean termites*	✓✓✓	✓	✓✓	✓✓✓	✓✓	
Dimensional stability	✓✓✓	✓✓✓	✓✓	N/A	✓✓	✓✓✓
Weathering	✓✓✓	✓			✓	
Slip resistance dry	✓✓✓	N/A	N/A	N/A	N/A	N/A
Slip resistance wet	✓✓✓	N/A	N/A	N/A	N/A	N/A

Where ✓✓✓ = highest level of performance

SAFETY DATA

Handling and storage

Precautions for safe handling

Handle in accordance with good industrial hygiene and safety practice. Machining of LIGNIA, like all wood products, generates wood dust. Avoid dust formation since fine dust exposed in the air in sufficient concentrations and in the presence of an ignition source is a potential dust explosion hazard.

Hardwood wood dust has been classified by International Agency for Research on Cancer (IARC) as a known human carcinogen (Group 1). For this reason, measures should be in place to avoid wood dust inhalation.

No special measures are necessary when handling LIGNIA, as there is no hazard to health caused by touch or any other contact with the boards.

Care should be taken during handling to protect hands from small splinters of wood. It is recommended that gloves and safety glasses be worn when processing and handling.

Conditions for safe storage including any incompatibilities

Store under dry and ventilated conditions. Keep away from sources of ignition.

Exposure controls/personal protection

Control parameters

Exposure limits Follow workplace regulatory exposure limits for all types of airborne dust (e.g. total dust, respirable dust):

Chemical name	Dust, hardwood & softwood
European Union	TWA: 5 mg/m ³
United Kingdom	TWA: 5 mg/m ³ 8 hr

Recommended monitoring procedures Gravimetric monitoring where necessary

Derived No Level Effect (DNEL) No information available

Predicted No Effect Concentration (PNEC) No information available

Exposure

Appropriate engineering controls Ensure adequate ventilation and/or extraction to minimise airborne dust

Personal protection Dust will be generated during processing; individual protection measures (PPE) include:

Eye protection	Tightly fitting safety goggles to prevent contact with eyes
Hand protection	Protective gloves to prevent skin contact
Skin and body protection	Long-sleeved clothing
Respiratory protection	Tightly with adequate ventilation and/or extraction no respiratory protection required. In case of dust formation, if exposure limits are exceeded or irritation is experienced NIOSH/MSHA approved respiratory protection should be worn. For filtering face piece use P3 or for a powered dust respirator TH2.

Stability and reactivity

Reactivity

Stable

Chemical stability

Stable

Possibility of hazardous reactions

Avoid contact with oxidising agents

Conditions to avoid

Open flames, hot surfaces, sources of ignition

Incompatible materials

Keep away from strong acids, bases and oxidising agents

Hazardous decomposition products

CO, CO₂ aldehydes (including formaldehyde) particulate matter and other organic compounds

Regulatory information

Restrictions on use

None

Exposure controls/personal protection

Information on toxicological effects

General	Exposure to product itself is unlikely to result in any effect. However, exposure to wood dust related to the handling and manufacturing of the product may result in the following:
Eye contact	Dust contact can lead to irritation
Skin contact	Irritation
Inhalation	Irritation of the respiratory tract
Ingestion	An unlikely exposure route
Allergy	Repeated and long-term exposure to wood dust can cause an allergic reaction
Carcinogenicity	Wood dust has been classified by IARC as a known carcinogen
Reprotoxicity	No data to indicate that wood dust affects the reproductive system

Disclaimer

All chemicals may pose unknown hazards and should be used with caution. This Safety Data information applies only to the material as packaged. If this product is combined with other materials, deteriorates, or becomes contaminated, it may pose hazards not included in this sheet. It shall be the user's responsibility to develop proper methods of handling and personal protection based on the actual conditions of use. While this Safety Data information is based on technical data judged to be reliable, LIGNIA Wood Company Limited assumes no responsibility for the completeness or accuracy of the information contained. Users should consider these data for information purposes and be responsible for proper use and disposal of materials and the safety and health of employees, customers and protection of the environment.



FAQS

LIGNIA is an exciting development in construction and we expect you to have questions about its manufacture and use. Some of the answers might be found here, but if not then contact us at lignia.com to find out more.

LIGNIA contains formaldehyde, is this safe to use in a house, structure?

Yes, completely. Resin used in our wood modification process does contain formaldehyde, a naturally occurring chemical that is found in all wood. Our modification process removes this chemical and testing has consistently shown emissions of formaldehyde from our product are at levels considered safe.

Will resin leach out of LIGNIA in service?

No, the LIGNIA modification process polymerises resin, locking it into the wood over the lifetime of the product.

Can I cut into it safely?

Yes, all LIGNIA products can be processed in the same way as any other wood. Once cured, the resin's composition resembles that of lignin, a naturally occurring wood polymer. As for all wood products appropriate measures should be used to prevent dust generated by wood machining operations being inhaled or contacting the eyes.



Should LIGNIA be sealed at both ends?

Yes, as with all modified timbers, LIGNIA wood should be end sealed on both ends with paint or wax to prevent moisture ingress.

Can LIGNIA processing waste (shavings, sawdust and offcuts) be used for animal bedding?

No, the UK Environment Agency classifies wood treated with resin as GRADE C wood waste along with particleboard, MDF and plywood. As such it should not be used for the manufacture of animal bedding. Where pieces are too small to manufacture into product, the best route for disposal is via incineration with energy recovery in a WID-compliant incinerator. Biomass is making a significant contribution to the UK's energy security.

How is LIGNIA made?

Softwood that has been graded to make sure it is of suitable appearance is impregnated with a resin. Wood is next dried, and resin cured at high temperature to lock the resin in place.

How durable is LIGNIA?

Independent laboratory testing has shown LIGNIA to be Very Durable (Class 1 Durability) against decay fungi. Independent testing has also shown improved resistance against termite attack.

Is LIGNIA hard wearing?

Although density of LIGNIA is increased the Taber resistance test showed it to be less resistant to wear than hardwoods such as oak and beech.

Will LIGNIA change colour over time?

Yes, in time. As for other timbers, when exposed uncoated outdoors to the weather LIGNIA will silver over time due to interaction of UV and rainfall with the wood surface. Rate of colour change will depend on level of exposure and will differ with geographic location and elevation

Can LIGNIA be glued and painted?

LIGNIA can be glued and painted in the same way as other timbers. Guidance on suitable adhesives and coatings and their applications are available on request.

Can LIGNIA be screwed and nailed?

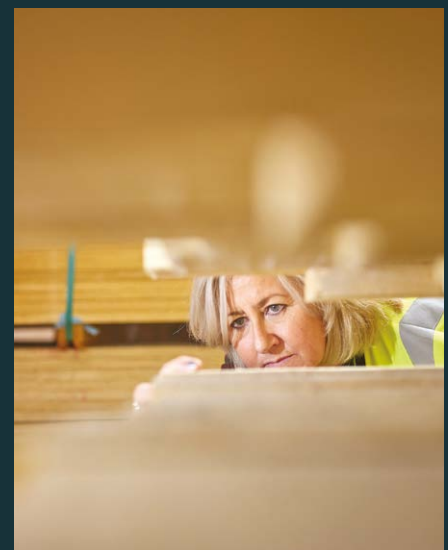
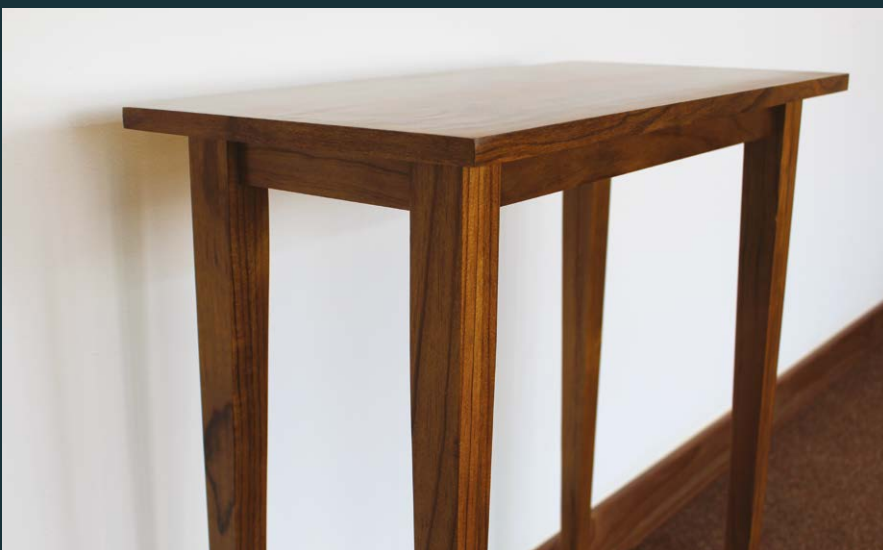
Yes, LIGNIA can be screwed and nailed like any other timber. However, since its average density is 650 kg/m³ to avoid splitting of the wood (for thicker pieces) pre-drilling is recommended. Fixings should be at least 20 mm from the ends and 15 mm from edges of boards respectively to avoid splitting.

How easy is LIGNIA to machine?

LIGNIA saws, planes and sands well to a good finish. Wood working machinery should be set up as if machining a medium density hardwood such as Iroko.

How stable is LIGNIA?

LIGNIA is classed as a Small Movement timber similar to teak or Western Red Cedar. Small movement timbers are preferred for use externally because fluctuations in environmental conditions result in changes to wood moisture content and shrinkage and swelling of wood. Small Movement timbers shrink and swell less and are more suitable for use in joinery, cladding, decking or outdoor furniture.



Does LIGNIA contain knots?

LIGNIA is manufactured from timber graded to be 'free' from knots and other naturally occur blemishes such as resin streaks on the faces of the piece. Our grade means only small knots <5 mm diameter and small resin streaks will ever be present at the surface of our LIGNIA products. LIGNIA faces are entirely free from knots or surface blemishes.

What are emissions from LIGNIA under ambient conditions?

LIGNIA has been tested for formaldehyde emissions using appropriate standards.

Using BS EN 120, LIGNIA was shown to meet the requirements of European Emissions Standards E1 (low emission) classification when tested. Emissions under European E1 Class are 0.1 ppm so our samples are at least 12.5 times lower.

The EPA TSCA Title VI federal regulation emissions limit for formaldehyde is set at 0.05 ppm so LIGNIA emissions are at least 6.25 times lower.

Using the JIS 1460A its emission levels were ≤ 0.3 mg/l, the lowest classification available under the test.

LIGNIA also has a Toxic Substance Control act (TSCA) certificate from the HPVA Laboratories in the USA. This shows a result that is below the limit of quantification, ie less than 0.008 ppm.

Can it be burned?

Yes, the best route for disposal of LIGNIA waste is incineration in a Waste Incineration Directive (WID) boiler with recovery of energy.

Is dust produced from LIGNIA machining carcinogenic?

All wood dusts and not just LIGNIA dust are considered hazardous to health since they can cause skin disorders, respiratory problems and nasal cancer. As such, the

same precautions need to be taken when processing LIGNIA as for any other wood or wood product.

Can LIGNIA be used for structural applications?

The modification process does not reduce the strength of the wood but since LIGNIA is manufactured from wood graded for appearance rather than strength, then it is not suitable for use in structural applications.

Is LIGNIA sustainable?

Yes, highly. LIGNIA is manufactured from softwood harvested from sustainably managed plantation forests. All timber used is FSC® Certified. Carbon dioxide sequestered by these trees as they grow remains locked-in the wood over the life of the product. Since LIGNIA products are durable, there is less of a need to replace these, reducing demand for wood to manufacture replacements. Where LIGNIA products cannot be re-used at the end of their service life they are suitable for use as biomass.

What does the 50-year warranty cover?

The warranty covers LIGNIA against wood destroying fungi in Use class 3 as defined in BS EN 335:2013. This Use class includes situations in which the wood or wood-based product is above ground and exposed to the weather (particularly rain). Typical products which fall under this Use class are decking boards, cladding and windows and exterior doors.

Will there be any surface checking or splitting?

LIGNIA is manufactured from wood graded to exclude splits and allow only a small number of checks. Care is taken during the modification process to prevent checking and splitting. Every piece of LIGNIA is graded at the end of the modification process as part of our quality control procedures. The Company

provides assurance to its customers about the quality of each piece of LIGNIA through our Selling grade available for each LIGNIA product type. The Selling grade places limits on splits and surface checking in pieces.

What is the moisture content of LIGNIA?

As with other timbers, the moisture content of LIGNIA will equilibrate to a level that depends on the environmental conditions (i.e. temperature and relative humidity) it is exposed to.

Is LIGNIA acidic?

No, independent testing and regular QC checks on LIGNIA product have shown it to be pH neutral or slightly alkaline unlike most timbers that are acidic in nature. As it is not acidic, regular stainless steel or other metal fixings can be screwed into LIGNIA wood without causing corrosion.

What process do you use to modify your timber?

LIGNIA is manufactured using a patent pending resin modification process. During manufacture, wood is fully impregnated with resin. The wood is then dried, and the resin cured through heating under high temperature and pressure to polymerise the resin and 'lock it' into the wood altering its properties throughout the piece.

How should LIGNIA be disposed of?

LIGNIA must be disposed of in accordance with local regulations. This applies to unused material, processing waste (dust, shavings and offcuts) and to end of life material.

Is LIGNIA safe to handle?

LIGNIA can be handled like any other timber. On leaving our production facility it is completely dry. However, it is rough sawn and for that reason, we recommend that gloves be worn to avoid splinters.

How should I store LIGNIA?

Effort is made to ensure that the quality of LIGNIA leaving our manufacturing plant meets requirements set out in our Selling grade. However, in common with other timber products it is important that LIGNIA be appropriately handled and stored to prevent damage and degrade as it moves along the supply chain. LIGNIA Wood Company recommend that it be protected from direct wetting and packs to be supported off the ground on bearers extending the full width of the pack and at intervals that keep timbers flat to prevent warp. For further guidance contact LIGNIA.

Is LIGNIA combustible?

Understanding combustibility is important to specifiers of construction products including cladding in the EU and siding and decking in the USA. In the EU (and UK) only construction products in Euroclass A1 can be classed as non-combustible, with those in A2 classed as limited combustibility. All wood and wood-based materials are rated as Euroclass B or lower and therefore classed as Combustible albeit to different degrees.

CASE STUDY IN CLADDING

One Tower Bridge is a prestigious development offering luxury five-star living by the banks of the Thames in London. The site, completed in 2017, consists of luxury apartments, a theatre, gymnasium, swimming pool, and commercial and retail sites, along with breath-taking views of some of London's most famous sites.

London-based specialist contractor The Outdoor Deck Company supplied and installed decking, contemporary screens, fencing and seating steps and specified LIGNIA for the high-quality cladding (sidings) and screens seen in this top-floor apartment.

LIGNIA was specified due to the inherent qualities that are derived from its modification process which offers all the advantages of wood as

a construction material, with none of the age-old drawbacks such as rot and fungal decay (LIGNIA is supplied with a 50-year warranty against rot and decay in above-ground applications). LIGNIA's wood is classified as a small movement timber and when combined with its durability and natural beauty was a natural choice in this prestigious development.







LIGNIA Wood Company Limited

Tŷ Coed
Unit 10
Atlantic Trading Estate
Barry
Vale of Glamorgan
CF63 3RF
United Kingdom

t +44 (0) 1446 507077

e info@lignia.com

w lignia.com

