PUUINFO

QUALITY FROM FINLAND – WOODPRODUCTS.FI

A BUYER'S GUIDE TO WOOD PRODUCTS

SKILFUL FINLAND

Finland is known for its top-level expertise, excellent educational system and forests. Finland is a pioneer of the forest-based bioeconomy, and it produces a diverse range of sustainable solutions from wood. Finnish people are renowned as responsible and reliable partners who honour the contracts that they make. It's easy to do business with Finns.

FINNISH WOOD PRODUCTS

The Finnish wood industry manufactures and markets high-quality wood products for the global market. The manufacture of wood products has long traditions. The choice of products is extensive, from sawn timber to engineered products, interior design products, and furniture from top-class designers.

Common to all manufacturers are extensive knowledge of wood as a material, the utilisation of modern technology and high-quality raw material, which is obtained from sustainably managed forests. The products are tailored to the requirements of the customer.

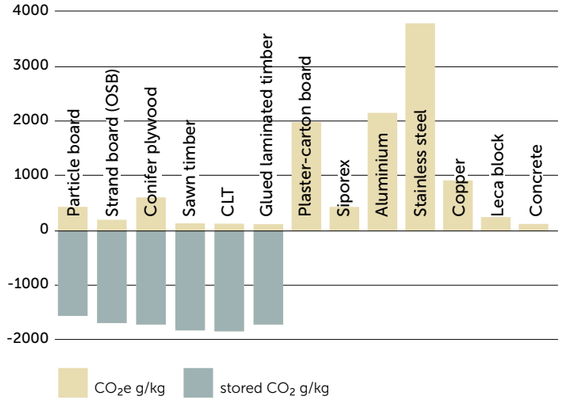
AN ECOLOGICALLY SUSTAINABLE CHOICE

Wood is a renewable material. Finland's sustainably managed forests produce considerably more good-quality wood than is used. Annual forest growth is roughly 109,9 million cubic metres, about half of which is used. The limit for sustainable felling is about 70 million cubic metres. When you buy Finnish wood products, you can be sure of the sustainability of your choice. Finnish forest industry companies only use legally acquired wood in their production. The companies know the origin of the wood. Knowing the origin of the raw material is a prerequisite for the sustainable use of forests.

The conservation rate of Finnish forests is unsurpassed in Europe. Finland strictly protects 2,7 million hectares of forest, equivalent to 12 % of its total area of forests. The forest industry supports the use of impartial and widely approved international certification systems. Forest certification can ensure that the fundamentals for sustainable forest use are in place, and that international comparability is preserved.

Of Finland's commercial forests, more than 95 % is subject to third-party forest certification. Correspondingly, less than 10 % of forests in the rest of the world are certified.

THE CARBON FOOTPRINT OF BUILDING PRODUCTS



Source: VTT Technical Research Centre of Finland, €CO_2 project

THE USE OF WOOD MITIGATES CLIMATE CHANGE

- The use of wood precipitates forest renewal. Growing forests bind more carbon dioxide than a fully grown forest.
- The consumption of energy and natural resources and CO_2 emissions caused by the manufacture of wood products are less than manufacturing using other materials. In fact, in the production of sawn and planed products, more energy is created than consumed.
- Wood is a carbon store as it sequesters CO_2 from the air as it grows. One cubic metre of wood absorbs about one tonne of carbon dioxide. In long-lasting wood products, carbon is stored in the wood for a long period of time.
- Wood can be used to replace materials whose manufacture is harmful to the environment.
- At the end of their life cycle, wood products can be used to produce renewable energy and so replace fossil fuels. The amount of CO_2 released when burning wood is equal to the amount that it has sequestered during its growth.
- Neither wood nor the products produced from its elements generate hazardous waste.

STRONG WOOD FROM THE NORTHERN CONIFEROUS FOREST BELT

IN THE COLD, WOOD GROWS SLOWLY

Finland is one of the best areas in the world for tree growth. It belongs to the cold climatic belt in which sub-zero winters alternate with warm summers. The summer season lasts only 100 days, during which the trees grow. The short growing season means slow growth, which may take 60-120 years.

THE RESULT – STRAIGHT-GRAINED, TOUGH TIMBER WITH FEW KNOTS

This slow growth provides the best possible timber: there are few knots, and they are small. Growth is symmetrical and the trunks are straight and round. Growth rings are thin and tightly-packed. The proportion of juvenile wood is small and that of heartwood great. The result is a hard, tough and straight-grained timber with low tension and few internal cracks. Low-resin, evenly patterned Finnish wood is first-class material for many applications.

TECHNICAL PROPERTIES OF A NORDIC CONIFER COMPARED TO NORTH AMERICAN AND JAPANESE SPECIES OF TREE

SPECIES	COMPRESSION STRENGTH		TENSIONAL STRENGTH	BENDING STRENGTH	MODULUS OF ELASTICITY	BREAKING STRENGTH	DENSITY
Commercial/scientific name	along the grain N/mm²	against the grain N/mm²	along the grain N/mm²	N/mm²	N/mm²	N/mm²	kg/m³
FINNISH							
Spruce / Picea abies	39	5,3	116	87	10.000	6,8	470
Pine / Pinus sylvestris	50	7,0	95	91	10.900	9,1	540
NORTH AMERICA							
Douglas Fir / Pseudotsuga menziesii	43	5,9	95	66	11.300	7,2	520
Coast Redwood / Sequoia sempervirens	30	4,1	70	50	6.800	6,8	430
Western hemlock / Tsuga heterophylla	44	5,2	69	79	10.500	8,2	480
Longleaf pine / Pinus palustris	59	6,9	105	78	10.900	9,8	680
European larch / Larix decidua	50	6,5	97	90	12.500	8,2	470
JAPANESE							
Japanese cedar / Cryptomeria japonica	35		90	65	7.500	6,0	380
Japanese cypress / Chamaecyparis obtusa	40		120	75	9.000	7,5	440
Japanese red pine / Pinus densiflora	45		140	90	11.500	9,5	520
Japanese black pine / Pinus thunbergii	45		140	85	10.500	9,0	540
Japanese white pine / Pinus parviflora	35		80	70	7.000	8,0	450

The values for strength and elasticity are averages and based on measurements of flawless test pieces in 12 % humidity.
They are not intended to be used as design values, for which values given in national standards must be used.

GRADES, NAMES AND DIMENSIONS OF SAWN TIMBER

Pine (commercially known as redwood) and spruce (commercially known as whitewood) are sawn, dried and sorted according to technical standards, moisture content and dimensions.

MAIN GRADES

- The main grades are US, V, VI and VII.
- US is the highest production grade, and it is subdivided into sub-grades US I to US IV, of which US I is the highest.
- Production grades V and VI have no sub-grades.
- Grade VII has no numerical values. All wood properties are allowed, but the sawn timber piece must remain in one piece. The saw blade must touch the majority of the timber piece's surfaces, but a piece where one third of its length is untouched by the blade is still acceptable.

DIMENSIONED SAWN TIMBER means sawn timber, which is rough-planed to a precise measurement. Sawn timber is dimensioned by planing about 1 mm from all sides at a rapid feeding speed. The result of the planning is rough and the product might exhibit unplaned areas and ridges. Dimensioned sawn timber is typically available in lengths between 2.7 and 5.4 m, at 300 mm intervals.

PLANED SAWN TIMBER means all-round planed sawn timber in the shape of a rectangle. In the planing of sawn timber, at least 2 mm is planed from all sides. The surface should be smooth and there should be no sawing roughness or ridges. Planed sawn timber is typically available in lengths between 2.7 and 5.4 m, at 300 mm intervals.

STANDARD SIZES:

THICKNESSES, WIDTHS AND LENGTHS
Dimensions mean nominal sizes when the moisture content of the sawn timber is 20 %.

The most common lengths vary between 2.7 m and 6.0 m in steps of 300 mm. Other lengths must be agreed separately. Thickness and width dimensions mean the nominal sizes of the timber at a moisture content of 20 %.

The standard measurements of sawn, dimensioned and all-round planed timber are shown in the following tables:

SAWN TIMBER GRADES						
US				V	VI	VII
US I	US II	US III	US IV			

COMMON CROSS-SECTIONAL DIMENSIONS

Sawn timber

Thickness (mm)	Width (mm)								
	50	75	100	125	150	175	200	225	250
19 [1]									
22 [2]	JH	JH							
25 [1]									
32									
38									
44 [2]									
50		JH							
63									
75		JH							
100									
125									
150									

[1] usually pine
[2] usually spruce
JH = usually done by splitting afterwards, whereby the width is 2 mm less that the nominal size
= standard size = rarely produced size

Dimensioned sawn timber

Thickness (mm)	Width (mm)											
	48	66	73	95	98	120	123	145	148	173	198	223	248
20 [1]													
42													
48													

[1] finely-sawn surface
= standard size = rarely produced size

All-round planed sawn timber

Thickness (mm)	Width (mm)										
	15	21	28	33	45	70	95	120	145	170	195
8											
12											
15 [1]											
18 [2]											
21 [1]											
28											
33											
45											
70											

[1] usually pine
[2] usually spruce
= standard size = rarely produced size

SPRUCE, US

SPRUCE, V

SPRUCE, VI

SPRUCE, VII

PINE, US

PINE, V

PINE, VI

PINE, VII

PERMITTED DIMENSIONAL DEVIATIONS

The maximum permitted dimensional deviations from nominal sizes for sawn timber are shown in the following tables:

Sawn-surface sawn timber

Dimension	Dimensional deviation
Thickness and width ≤ 100 mm	- 1,0 ... + 3,0 mm
Thickness and width > 100 mm	- 2,0 ... + 4,0 mm
Length 1800...6000 mm	- 0 ... + 50 mm
Length when cut to the specified size	± 2,0 mm

Dimensioned sawn timber

Dimension	Dimensional deviation
Thickness and width ≤ 100 mm	± 1,0 mm
Thickness and width > 100 mm	± 1,5 mm
Length 1800...6000 mm	- 25 ... + 50 mm
Length when cut to the specified size	± 2,0 mm

All-round planed sawn timber

Dimension	Dimensional deviation
Thickness ≤ 20 mm	± 0,5 mm
Thickness > 20 mm [1]	± 1,0 mm
Length ≤ 100 mm	± 1,0 mm
Length > 100 mm	± 1,5 mm
Length when sorted according to length	- 25 ... + 50 mm
Length when cut to the specified size	± 2,0 mm

[1] The maximum permitted dimensional deviation for thickness in floorboards is always ± 0.5 mm

The average values for the actual thickness and width of pieces belonging to a batch of sawn timber cannot, however, be less that the nominal size. In grade VII, greater dimensional deviations than given above are permitted.

FINGER-JOINTED SAWN GOODS

Sawn timber is extended using finger joints when there is a need for pieces of timber that are longer than normal or certain properties are required from the timber. By using finger joints, it is possible to produce, for example, pieces of sawn timber that are completely made of heartwood, completely knotfree and very straight. Such special products are usually used in the furniture and window industries.

Finger-jointed sawn timber is available with a sawn surface, dimensioned and planed, so the most common cross-sectional dimensions are in accordance with the tables shown previously. The maximum length varies between different manufacturers, but is usually 12 - 14 metres.

The manufacture of finger-jointed sawn timber meant for use in construction is subject to permit, and such timber must bear to a stamp indicate that finger-jointing has been done in accordance with the product standard.

PACKAGING

Sawn timber is delivered pre-packaged.
Truck package
Dimensions roughly 1 m x 1 m x 1.8 - 6.0 m (height x width x length). A truck package can include any variety of lengths.
Length package
Dimensions roughly 1 m x 0.5 m x 1.8 - 6.0 m. A length package typically only contains one length.
Consumer package, a.k.a foil-packed timber. Typically contains small amounts of one length wrapped in foil.

DRYING

Sawn timber is usually artificially dried at least to a level acceptable for shipping. In that case, at least 97 % of the pieces in a batch of sawn timber have a moisture content of no more than 24 %. Usually the moisture content is 18 - 20 %. Moisture content requirements that deviate from this must be specially mentioned in the contract/order confirmation. By agreement, sawn timber can be dried to levels of moisture content required for different purposes.

SORTING SAWN TIMBER IN TERMS OF STRENGTH

Most sawn timber is sorted using modern, highly developed, mechanical strength-sorting methods, such as computer-vision measurement, measurement of specific frequency, X-ray measurement and ultrasound measurement. The traditional mechanical strength-sorting methods to bend the pieces of sawn timber, based on which the modulus of elasticity can be determined thereby establishing the strength class of the piece of timber. Sawn timber can also be visually sorted according to strength, whereby such parameters as the numbers of knots, location and quality of a piece of timber can be checked visually, as well as cracks, warping, distortion and other faults. The thickness of the timber's growth rings can also be checked.

ACCORDING TO STANDARD EN 338, sawn conifer timber is strength-sorted into strength classes as shown in the following table. Strength classes C14 - C30 can be sorted either visually or mechanically, and strength classes C35 - C50 only mechanically.

INSTA 142 is a pan-Nordic standard, according to which sawn conifer timber is visually strength-sorted into strength classes as shown in the following table. The INSTA 142 strength classes have been approved to correspond to the C strength classes in accordance with the EN 338 standard.

STAMPING SAWN TIMBER IN TERMS OF STRENGTH

Sawn timber sorted according to strength is stamped either on each package or so that each piece of sorted timber bears a stamp. The information required on the stamp is often printed as continuous text on the face of the piece of timber. Alternatively, an individual stamp can be used that shows the necessary information. The manufacturer of the sawn timber can also put its own markings on the pieces of timber.

CE	*A 'CE' mark in accordance with Directive 93/68/EEC*
01234	*ID code of certification body in question*
AnyCo Ltd	*Manufacturer's name or ID code NOTE: The manufacturer's registered address can also be added to the marking.*
11	*The last two digits of the year in which the marking was granted.*
M / Kuivana lajiteltu AnyCo No. 789/2010	*Information describing the construction timber, including its ID code.*
C24	*Mandated essential properties.*

PEFC FSC

Of Finland's commercial forests, more than 95 % is subject to third-party forest certification.

Strength classes in accordance with EN 338

All strenght classes	C14	C16	C18	C20	C22	C24	C27	C30	C35	C40	C45	C50
Common strenght classes in Finland			X			X		X	X	X		

Strength classes in accordance with INSTA 142

All strenght classes	T0	T1	T2	T3
Correspondance with EN 338	C14	C18	C24	C30

MOST COMMON USES FOR QUALITY CLASSES

USE	US I	US II	US III	US IV	V	VI	VII
Carpentry products Products with high requirements in terms of appearance	■	■	■	■	■		
Window- and door frames that require painting			■	■	■		
Furniture, glue boards				■	■	■	
Frame structures, roof trusses, load-bearing structures				■	■	■	
Exterior cladding					■		
Interior panels			■	■	■		
Batten strips	■	■					
Slating					■	■	
Floors			■	■	■		
Underfloor structures					■	■	■
Rough-tongue-and-groove boards (surface boards)						■	
Fences, wind fairings and snow covers					■	■	
Concrete moulds						■	■
Euro- and Finnpallets						■	
Disposable packaging pallets						■	■
Packaging						■	■
Boat building	■	■	■				
Handicraft, ornaments	■	■					
Sauna panels	■	■					

SPRUCE

BIOLOGICAL PROPERTY OF WOOD	BENEFITS AVAILABLE
The trunk has a long sound-knotted part.	Most planks and boards are also sound-knotted.
The colour of sound knots does not differ from the surrounding timber.	The surface of sound-knotted sawn spruce is uniformly pale.
The dry-knotted section of the trunk is short and the dry knots are small.	Planks and boards have few arris knots, they are small and easy to plane.
The wood is straight-grained.	The wood grain does not rise up with sanding, planing, cutting or painting.
The wood has few resin pockets, and their length is rarely more than 40 mm.	Glueing and surface treatment properties are good.
The proportion of heartwood is great. The surface wood only lets through a little water.	Moisture penetrates the wood slowly; the wood is durable on façades. Correctly sawn, it will not warp easily.

PINE

BIOLOGICAL PROPERTY OF WOOD	BENEFITS AVAILABLE
The trunk usually has a long knot free part.	Simple surface and side boards with very few knots can be made.
The trunk's dry-knotted part also often contains sound knots.	The inner faces of timber from the central part of the trunk are very often sound-knotted
The growth angle of a branch in relation to the core of the trunk is rightangled. The density of wood in the branch is low.	The wood is easy to plane.
Resin occurs evenly throughout the wood.	Planing smooths out the resin into a silky texture on the surface of the wood. The resin protects the wood in both humid and hot climates.
The density of the wood at the base of the trunk is 100 kg/m^3 higher than at the top. In the same way, the density of the surface wood at the base is higher than in its heartwood.	Boards and side boards from the base of trunks are strong.
The heartwood contains pinosylvins which do not allow water to penetrate.	The heartwood is naturally resistant to decay and can also withstand attacks by insects.
The surface wood is very porous to water.	The surface wood can be easily impregnated and is very suitable for outdoor use.

FAST TRANSPORTATION BY LAND AND SEA

In the manufacture of Nordic sawn timber, the norms of each destination country are taken into account.

The timber is delivered to the customer quickly using the shortest route based on the INCOTERMS for delivery.

FURTHER PROCESSED TIMBER PRODUCTS

THERMALLY MODIFIED TIMBER

In Finland, thermally modified timber is manufactured using the ThermoWood® process. This thermally modified timber falls into two product categories, Thermo-S and Thermo-D, which define the eventual end product's properties and possible uses. Prior to being treated, wood is sorted into quality categories according to the unique quality criteria of the Thermo Wood® process. In other words, the quality of thermally modified timber is not measured with the same criteria as untreated sawn timber.

Thermally modified timber is made from pine, spruce or deciduous timber by means of heat treatment. The treatment process is based on a combination of high temperature and water vapour. No chemicals are used. Compared to wood that has not been subjected to heat treatment, thermally modified timber has superior durability and dimensional stability under moisture. In addition, heat treatment can be used to change the wood's colour to resemble hardwoods. The colour change extends through the entire piece of wood rather than being limited to the surface only.

Thermally modified timber is available in the standard dimensions and profiles used for the most common indoor and outdoor claddings. Manufacturers also have their own profiles for terrace products and cladding grilles. Thicker/wider dimensions can be made by gluing.

IMPREGNATED TIMBER

In Finland, impregnated timber is pine wood impregnated with saturated copper compounds to meet the requirements of classes A and AB. In addition to the traditional green colour, impregnated timber is also available in brown, which is made by adding a coloured pigment to the impregnating agent.

Impregnation is an effective way to improve wood's resistance to rot in damp outdoor conditions. Impregnated timber can withstand outdoor use 3-5 times longer than regular wood. The wood's strength properties are not significantly improved by the treatment, however.

Wood impregnation in Finland complies with common quality standards and standards. Modern copper-based impregnation compounds are safe and effective. The production of impregnated timber is subject to quality control.

The most common cross-sectional dimensions and tolerances of impregnated timber are the same as those of sawn and planed timber. Impregnated timber is typically available in lengths between 1.8 and 5.4 m, at 300 mm intervals.

PLANED PRODUCTS: panels, batten strips, floors

Panels, batten strips and floorboards are wood products that are planed into shape and specially dried. Pine and spruce are mainly used for them, and also birch a certain extent. Rarer types of wood are also available such as aspen, alder and poplar. Products are also available ready surface-treated. There is an endless number of differently shaped profiles, and products are also produced tailored to the customer's needs.

GLUED LAMINATED TIMBER

Glued laminated timber is a structural wooden product comprised of several layers of dimensioned lumber that are bonded together with glue. At least two layers of up to 45 mm thick dimensioned lumber are used, and the direction of the wood grain is longitudinal to the final glued laminated product. Glued laminated timber is mostly used in load bearing structures. The properties of glued laminated timber are defined in accordance with standard SFS-EN 14080. A strength classification on GL30c is recommended for glued laminated timber that meets the above requirements.

Glued laminated timber is typically planed on all surfaces. It is available in a variety of surface treatments and also in pressure-impregnated form. The dimensioned wood layers are typically 45 mm thick in straight supports and 33 mm in curved. In addition to standard cross-sectional dimensions, glued laminated timber is also available in special sizes. The maximum heights and lengths of glued laminated timber are about 2 and 30 meters, respectively (maximum dimensions vary by manufacturer).

LAMINATED VENEER LUMBER (LVL)

Laminated veneer lumber (LVL) is a structural wooden product made by gluing thin layers of wood together. LVL is suitable for all types of construction and refurbishment and also for industrial use. Examples of applications include supporting beams, pillars, trusses and rims, as well as components of the window and door industry.

Finnish LVL is made by gluing 3 mm thick spruce veneers together. Depending on the product, the wood grain can run in the longitudinal direction in every veneer layer or some of the veneers can be glued crosswise.

LVL is typically not delivered sanded or spackled, but the top plies can be sanded as a special order. LVL is available with different surface treatments and also with class AB pressure impregnation. LVL is defined in accordance with the SFS-EN 14374 standard.

The maximum width of LVL is about 2.5 meters, and the manufacturing technology allows for lengths of about 24 to 25 meters. Transport reasons tend to restrict the maximum length to about 25 meters. The thickness of LVL beams varies from 27 to 75 mm. Standard heights vary by manufacturer.

CROSS LAMINATED TIMBER (CLT)

Cross laminated timber (CLT) is formed by cross-gluing several layers of board, typically three, five or more. The resulting construction sheet has very good fire resistance, strength and rigidity, yet is lightweight in relation to its properties.

The raw material is usually spruce or pine. Boards used for CLT are sorted according to strength, and joints are made with finger-jointing. If desired, the visible surfaces of CLT can be of specific types of wood. After gluing, the boards are machined to the right size and shape using a CNC milling cutter. Window openings, doorways and any inlets needed for building technology, fastenings, lifting, etc. are made at the factory. Measurement accuracy is ± 1 mm. Surface treatments and finishings depend on the board's intended usage. Visible surfaces are sanded and finished according to the customer's orders. There are several manufacturing techniques for CLT. Board dimensions and manufacturing techniques vary by manufacturer.

GLUED SAWN TIMBER

Glued sawn timber means a product made by glueing two or more pieces of sawn timber together, but which does not meet the standards glulam. Glued sawn timber is used as a billet, for example, in the manufacture of window and door frames, interior and exterior cladding panels, and logs for houses. Glued wooden boards are used in interior decoration and, for example, in the manufacture of furniture and fittings. Glued sawn timber products are available ready sorted by strength and surface-treated.

FURTHER PROCESSED TIMBER PRODUCTS

PARTICLE BOARD

Particle board is made by compressing wood chips with glue. In flat-pressed particle board, the chips are mainly parallel to the surface. The chips in the surface layer are thinner than those in the middle layer, so the surface of the particle board is denser and more compact than the middle.

In standard particle board, urea formaldehyde is mainly used as the adhesive. The amount of glue in a particle board is 10%, and many coated board products are classified in surface material emissions class M1. In terms of its basic properties, particle board is comparable to wood. The difference is that particle board is homogeneous and has the same degree of strength in different directions. The 'living' of the board in the direction of the plane surface is negligible. The density of particle board varies between 650 and 750 kg/m^3, so it is considerably heavier than sawn conifer timber.

PLYWOOD

Plywood is made by binding thin layers (veneers) of wood together with adhesive. The thickness of a single veneer is 0.2 to 3.2 mm. Adjacent layers typically have wood grains perpendicular to each other. Birch plywood board typically has an odd number (at least three) of veneer layers, which means that the grains of the surface veneers run in the same direction. In contrast, conifer plywood board may have an odd or even number of layers. The glue is typically a weatherproof phenol resin that is visibly darker in colour than the wood.

The basic properties of plywood are comparable to wood. However, the manufacturing method gives plywood several advantages, including strength, tightness, shock resistance and versatility. Some plywood products are categorised as emission class M1 surface materials.

CARPENTRY PRODUCTS FOR CONSTRUCTION

Finnish industry makes high-quality carpentry products for construction, such as roof trusses, windows and doors, fittings and interior decoration products and solutions.

HOUSES AND HOLIDAY HOMES

A wide range of different ready solutions are available for the construction of houses and holiday homes, both for log-framed buildings and those made from other materials. Each manufacturer has a different selection of models, which can be tailored to the wishes of the customer. Houses are delivered to the customer in the degree of completion request.

COMPOSITES

New kinds of products are created when wood is combined with other materials or intelligence. These include composites made of wood and plastic or structures that react to stress. New types of special solutions can be made by defibering or pulping wood. By modifying wood, it is possible to improve its properties, an example of this being thermal wood.

Photographs: Puuinfo Oy, UPM, Kestopuuteollisuus ry, Koskisen Oy, Metsä Wood, Metsäteollisuus ry, Pölkky Oy, Stora Enso

Sustainably produced, high-quality and strong Finnish wood is first-class material for many purposes. Find out more about Finnish wood products at

WOODPRODUCTS.FI WOODARCHITECTURE.FI PUUINFO.FI