



**FINNFOREST**  
**HEAVY TRANSPORT**  
*Strength in motion*

**finnforest**

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Finnforest plywood goes through a strict quality control from forest to production, sales and distribution. This strict attention to details and quality produces plywood boards with exceptional strength and durability. A vast range of specifications, possibilities in machining and finishing and Finnforest technical support provide flexible and specialized solutions to meet the end use specific requirements. Finnforest know-how is based on long term relationships and cooperation with important parties within the European transport industry and thorough and continuous R&D work.



**TRAILERS**

Finnforest plywood is tough, durable and rigid and built to withstand the daily grind of continual loading, unloading and constant wear on the road. The top-quality thin veneers and the cross bonded structure make Finnforest plywood homogenous and strong. The hard abrasion- and slip-resistant coatings meet the most demanding safety and performance specifications. All products are high quality Finnish birch throughout their construction with a full exterior glue line. Finnforest plywood has a worthy reputation for exceptional strength, light weight and ease of fixing characteristics. Floorings come in a wide range of sizes and overlays, with quick-assembly joints and machining to order.

## FLOORS

Cross bonded thin birch veneers form a homogenous Finnforest Birch plywood with excellent strength and stiffness properties. Birch plywood has high planar shear and bending strength and impact resistance which makes it especially suitable for heavy-duty floor and wall structures. Finnforest Birch plywood panels can be overlaid with various overlays to meet the end use requirements.

### DECK

Mesh patterned multi-purpose Finnforest Deck panel is highly durable. The mesh pattern overlay is on either one or two surfaces and offers high resistance to abrasion and rolling. The phenolic resin coating resists most common chemicals. The overlay weight can be selected to meet the end use requirements.

**Common thicknesses:** from 9 mm to 40 mm with options for special plywood structures on the thicker boards.

### FLOOR

Heavy-duty Finnforest Floor panel is overlaid with a long-lasting tight mesh pattern overlay that produces superb slip resistance in two grades: Floor 500 and Floor 700. The thick multi-layer surface has exceptional abrasive and rolling wear properties and resists common chemicals, dilute acids and alkalis.

**Common thicknesses:** from 9 mm to 30 mm

### TOP and CARAT and FREIGHT

The high abrasion resistance is characteristic for Finnforest Top, Carat and Freight panels. Top panel has a raised circular pattern on the surface whereas Carat panel is supplied with a small diamond pattern and Freight panel has two interlaced raised F's. All surfaces are suitable for water or steam cleaning and are resistant to common chemicals. The overlay weight can be selected according to the end use requirements. The maximum size for Top, Carat and Freight panels is 1500 x 3000 mm.

**Common thicknesses:** from 9 mm to 30 mm

### DURALINE

The exceptional surface wear and abrasion resistance properties of Finnforest Duraline panels are a result of several durable intermediate film layers. Duraline panels are available in Floor, Top, Carat and Freight patterns.

**Common thicknesses:** from 9 mm to 30 mm

### KING-SIZE PLYWOOD

Easy installation, structures with high stiffness and large continuous surfaces are the benefits achieved with Finnforest King-size panels up to 13500 mm x 2600 mm in size. King-size panels are manufactured by scarf-jointing standard size panels. The panels are available uncoated and with Deck and Form overlays.

**Thicknesses:** from 9 mm to 30 mm.

Applications of Finnforest King-Size plywood include bus, truck, trailer, container, refrigerated trailer and van floors and walls.

### CUSTOMIZED PLYWOOD CONSTRUCTIONS

To improve strength and stiffness properties in the main load bearing direction Finnforest birch plywood is available in special constructions.

## WALLS, DOORS AND BULK HEADS

### FORM

Maintenance free Form plywood with a hard, smooth surface is a multipurpose panel for the transport industry. The semi-glossy phenolic resin coating on both sides withstands abrasion and is resistant to commonly used chemicals, dilute acids and alkalis. The surface is easy to clean with water or steam. Optionally Form can be manufactured with a MATT surface.

**Common thicknesses:** from 4 mm to 30 mm

**SP**

Weather proof base paper on high quality birch plywood provides excellent surface for painting for both interior and exterior applications. The painting paper overlay is on either one or two surfaces and offers a ready to use painting surface with excellent adhesion properties preventing the formation of hairline cracks in the paint coat. The following paint types are suitable for finishing: epoxy, polyurethane, alkyd enamel paints and water based exterior paints. Always follow the paint manufacturer's specific instructions.

**Common thicknesses:** from 9 mm to 30 mm

**STANDARD COLOURS**

DECK	Dark Brown	Grey		
FLOOR	Dark Brown	Grey		
TOP/CARAT	Dark Brown	Grey	Black	
FORM	Light Brown	Dark Brown	Green	Black

Other colors are available on request.

**EDGE PROTECTION/SEALING**

Panel edges are protected against moisture absorption with acrylic paint. The standard edge color is dark brown. According to special order it is possible to stain the edges to match the overlay color. Edge sealing slows down moisture absorption but does not eliminate it entirely.

**RESISTANCE TO ABRASION AND ROLLING**

Rolling wear simulates the surface tolerance under a wheel load whereas the taber value indicates the surface tolerance against abrasion.

*Table 1. Abrasion & rolling wear resistance of overlaid plywood*

Abrasion & rolling wear resistance of overlaid plywood			
Product	Overlay weight if optional	Taber revolutions*	Rolling wear**
Form	120	350	3500
Deck	120	350	3500
Deck	220	900	5000
Top and Carat and Freight	440	2100	7000
Floor 500	-	3200	7000
Floor 700	-	4300	9000
Duratop	-	5300	11000

\*) Abrasion resistance is tested according to DIN 53799/EN 438 until overlay is penetrated. Taber value is an approximate number of revolutions before first signs of penetration occur.

\*\*) Resistance to rolling wear is determined by method corresponding to SS 923508. Rolling wear is an average calculated from the random rolling movements with a load of 200 kg before the first signs of breakdown occur.

The values are indicative and are valid for new unused panels.

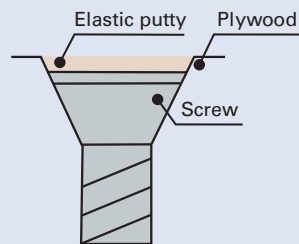
**TRAILER FLOOR INSTALLATION****FIXING AND SEALING**

Galvanized or stainless steel round head screws are most commonly used for plywood, because acetic and formic acids in birch strain the fixings. If screws are used pilot drilling is always recommended with exception of self-tapping screws. The fixing size depends of the used plywood thickness.

**Recommended screw pitches are:**

- Along the edge of the panel 200-300 mm c/c
- In the middle of the panel 300-500 mm c/c
- Distance from edge min. 10 mm

A 1-2 mm/m gap must be left between the plywood panels to allow moisture movements. Gaps and fixing spots should be sealed with elastic mass. The mastic enables the moisture movements of the panel and improves the edge protection.



### INSTALLING THE PANELS

The panels can be installed longitudinal or transversal. Plywood panels must be supported on each four sides. By using a steel profile (fig 2.1) to support the panel edges a 100 % load capacity is achieved when compared to the panel center area. The face grain of standard construction birch plywood is installed parallel to span, i.e. face grain is perpendicular to the supporting beams. By using oriented plywood constructions the thickness of the plywood panel can be reduced. With king-size panels the floor can be made with only one piece. NOTE! Plywood with an oriented special construction must be installed on the beams in the strongest direction.

### INSTALLATION OF FINNFOREST PLYWOOD FLOOR ON TRANSVERSAL BEAMS

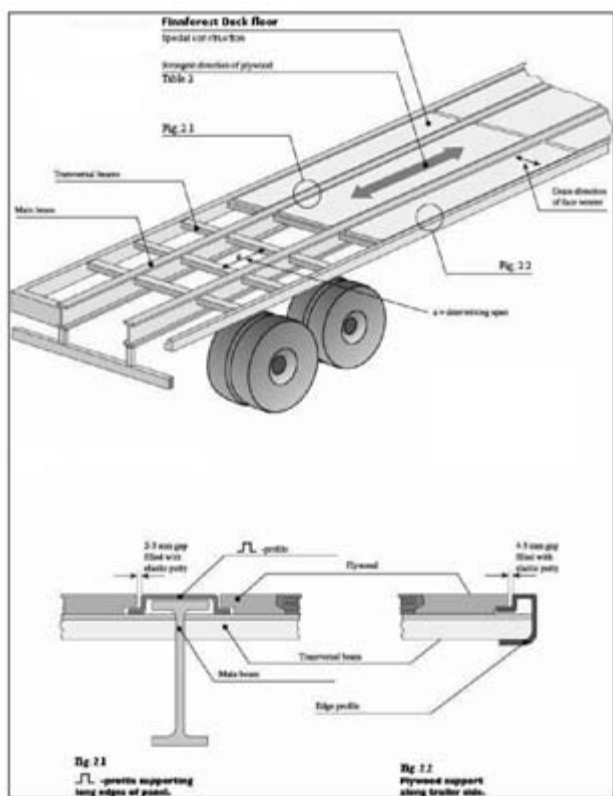


Figure 2. Finnforest Deck floor, transversal beams

### FINNFOREST PLYWOOD FLOOR ON LONGITUDINAL BEAMS

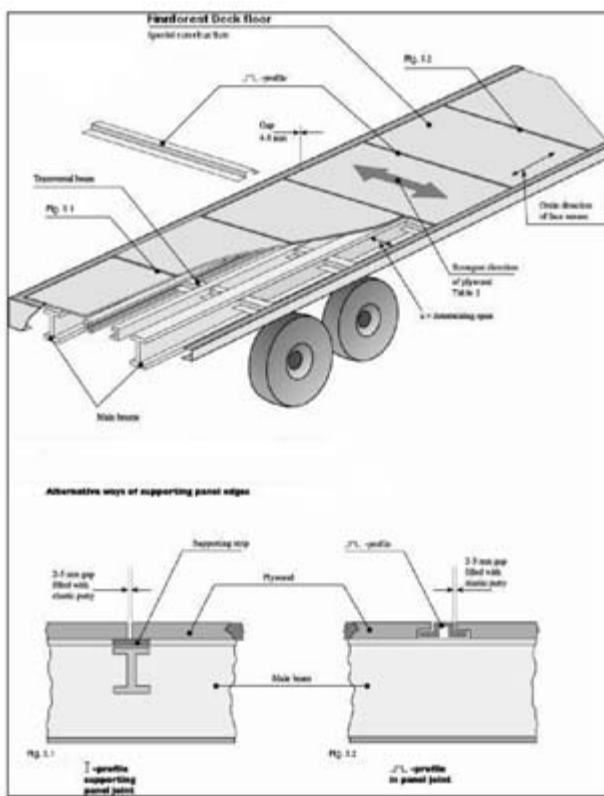


Figure 3. Finnforest Deck floor, longitudinal beams

Values in table 2 are suitable for floor structures in above pictures. The strength of the floor structure is calculated in accordance with ISO 1496 standard for one wheel contact area of 80 mm x 180 mm.

Table 2. Loading table. Maximum wheel load F [kN/wheel] for birch plywood with oriented structure. SURFACE Grain direction parallel to shorter edge of the panel. STRONGEST DIRECTION IN DIRECTION OF THE LONGER PANEL DIMENSION. Chassis construction: a rigid steel frame. Plate side ratio of 2.

Maximum wheel load, special structure birch plywood															
Span mm	Thickness mm / Number of plies														
	12/9		15/11		18/13		21/15		24/17		27/19		27/20		
	F kN	u mm	F kN	u mm	F kN	u mm	F kN	u mm	F kN	u mm	F kN	u mm	F kN	u mm	
300	7	7.7	10	5.9	14	4.9	19	4.2	24	3.6	31	3,2	33	3,0	
400			9	9.7	12	8.0	16	8.8	21	5.9	27	5.2	29	5.0	
500					11	11.7	15	10.1	19	8.6	24	7.6	26	7.3	
600							14	13.6	17	11.8	22	10.4	24	9.9	
800									16	19.2	19	17.0	21	16.1	

Maximum wheel load, special structure birch plywood															
Span mm	Thickness mm / Number of plies														
	30/21		30/22		33/23		35/25		40/29		45/32		50/35		
	F kN	u mm	F kN	u mm	F kN	u mm	F kN	u mm	F kN	u mm	F kN	u mm	F kN	u mm	
300	37	2.9	39	2,7	41	2,4	45	2.1	52	1.5	58	1.3	63	1.1	
400	31	4.7	35	4.5	37	4.2	44	3.9	52	2.9	58	2.4	63	2.0	
500	28	6.8	31	6.5	34	6.2	40	5.7	52	4.7	58	3.9	63	3.3	
600	26	9.3	29	8.9	31	8.4	37	7.7	49	6.5	58	5.7	63	4.8	
800	23	15.2	26	14.5	28	13.7	33	12.6	44	10.7	53	9.6	63	8.7	

F = maximum wheel load [kN]

u = approximate deflection [mm]

Short term loading in Service Class 2

MC 15 %. An increase in moisture content will result in a decrease in strength, modulus of elasticity and shear modulus values.

Wheel contact area 80 mm x 180 mm

**TECHNICAL SERVICE**

Please contact Finnforest specialists in more demanding solutions.





## PASSENGER TRANSPORT

Plywood light weight combined with high strength properties is one reason why plywood is used widely in the floor and wall structures of buses and passenger trains. Special plywood panels have been developed to meet the safety and comfort requirements of passenger transport. Improved insulation of engine or other disturbing noise is achieved with sound insulation panels. Fire safety regulations are met with panels of improved fire resistance. Special treatments and overlays are offered to give protection against decay and to prolong the service life of the products.

### FLOORS AND WALLS

Cross bonded thin birch veneers form a homogenous Finnforest Birch plywood with excellent strength and stiffness properties. Birch plywood has high bending strength, planar shear strength and impact resistance which makes it especially suitable for heavy-duty floor and wall structures. Finnforest Birch plywood panels are available uncoated and with Deck, Form, Top, Carat, Freight or SP overlays (see page 3) to meet the special surface requirements in passenger transport. King-size panels are manufactured by scarf-jointing standard size panels. The panels are available uncoated and with Deck and Form overlays.

**Common thicknesses:** from 9 mm to 30 mm.

#### FINNFOREST SONEX

Compared to standard birch plywood the sound pressure levels can be reduced by as much as half with special Finnforest Sonex structures. Sound absorbing panels are available as Sonex and Sonex Light. The advantage of Sonex Light is its low weight. Finnforest Sonex panels are well suited for the walls and floors of passenger vehicles to insulate the passengers from noise. Sonex panels can be overlaid on request. The standard size of Sonex panels is 1250 x 2500 mm.

**Common thicknesses:** from 11 mm to 22 mm

#### Fire classification

- DIN 5510 Part 2: S3, SR2, ST2 (film-faced Sonex plywood - requirement for railways)
- Directive 95/28/EC (requirement for buses)
- FMVSS 302 (1-10-93 Edition) (requirement for buses)

#### TREATMENT AGAINST ROT

Finnforest Birch plywood can be treated to withstand rot better than standard birch.



## LNG TANKERS

LNG (Liquefied Natural Gas) is transported with specialized tankers.

Finnforest LNG plywood used in the insulation components of LNG tankers is subjected to a very strict quality control. To ensure the safety and functionality of the ship, the product is specified to reach extremely high mechanical strength. Selecting the veneers, bonding and cutting are the critical stages in production. Finnforest plywood is an approved component to a LNG tanker because of its high resistance of cryogenic circumstances.

## PRECUT AND MACHINED PANELS

A vast range of thicknesses and sizes combined with cut-to-size, CNC, edge machining and surface treatments enable ready made components and quick installation. By using cut and machined panels significant savings in production and refurbishment can be achieved. Consult nearest sales office to learn more about machining possibilities and services.

## IMPORTANT TECHNICAL INFORMATION AND FACTS

### STORING AND PROTECTION

Keep plywood panels in their packing during storage. This will protect the boards and help maintain the moisture content. Plywood panels should be stored in dry conditions under cover. The panels should be placed horizontally on flat ground with adequate supports with no direct contact to soil.

### HANDLING AND MOVING PANELS

The panels should be unloaded and handled with care to prevent any damages. If panels are shifted after the original packages have been removed, make sure that the panels are strapped properly together.

## STANDARD THICKNESSES AND SIZES

Finnforest standard birch plywood panel sizes:

1220/1250 x 2440/2500/3000/3050/3660 mm

1500/1525 x 2500/3000/3050/3660 mm

The first measurement indicates the orientation of the surface veneer grain.

Plywood panels can be specially ordered with a longitudinal grain direction.

Other sizes and special constructions available by order.

### Dimensional tolerances of standard size birch plywood panels:

**Length/width standard:** <1000 mm, ±1 mm; 1000-2000 mm, ±2 mm; >2000 mm, ±3 mm

**Length/width King-size:** 1000-2000 mm, ±2 mm; 2000-6000 mm, ±3 mm; >6000, ±5 mm

**Squareness tolerance:** ±0.1% or ± 1 mm/1000 mm

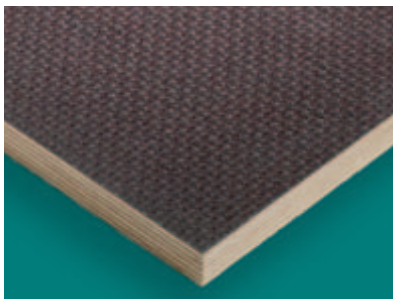
**Edge straightness:** ±0.1% or ± 1 mm/1000 mm

The lengths and widths of the panels are with 95 % probability within the given tolerances, measured according to SFS-EN 324. Cut-to-size panels have higher tolerance requirements.

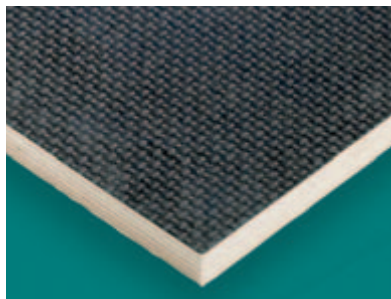
### Thicknesses of Finnforest standard birch plywood:

*Table 3. Thicknesses, number of plies, thickness tolerance and weights per square meter (MC 8-12%) of sanded Finnforest standard plywood.*

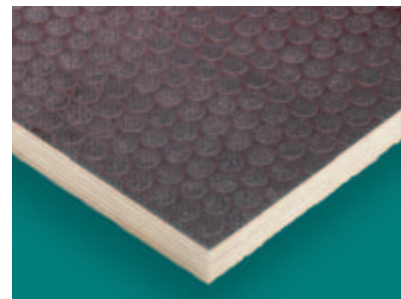
Thickness mm	Number of plies	Thickness tolerance		Birch weight approx. kg/m <sup>2</sup>
		max. mm	min. mm	
6,5	5	6,1	6,9	4,6
9	7	8,8	9,5	6,5
12	9	11,5	12,5	8,4
15	11	14,3	15,3	10,4
18	13	17,1	18,1	12,3
21	15	20,0	20,9	14,3
24	17	22,9	23,7	16,2
27	19	25,2	26,8	18,2
30	21	28,1	29,9	20,3
35	25	33,5	35,5	24,2
40	28/29	38,8	41,2	28,0



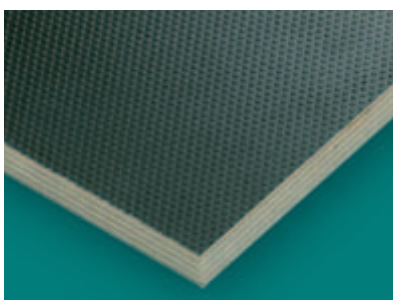
Deck



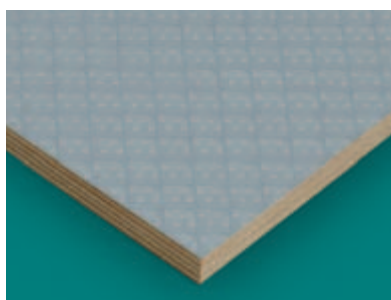
Floor 500



Top



Carat



Freight



Sonex

## OVERLAY PROPERTIES

Overlay color variations are possible between panels and production runs.

In King-size panels the scarf-joint appear as thin, dark brown line on both sides of the panel. The joints run perpendicular to the panel length. King-size panels are made by scarf-jointing standard size panels. Some color variation may occur between the jointed panels.

The color of the phenolic film surface will change over time due to exposure to outdoor conditions and UV radiation. In external conditions the service life of phenolic film overlays is limited.

## BONDING CLASSES

Veneers are bonded with phenolic resin adhesive (WBP, BFU 100, AW, exterior) which is resistant to weather and boiling water and meet the following international bonding standards:

- SFS-EN 314-2 / Class 3
- BS 6566 Part 8 / type WBP (former)
- DIN 68705 / BFU 100

Overlaid and edge protected panels also meet EN 636-3 standard requirements.

## QUALITY CONTROL

In addition to Finnforest's own quality control, the Technical Research Centre of Finland (VTT) oversees production operations and the internal quality control at Finnforest plywood mills. External plywood quality control will continue to be conducted in accordance with CE rules. The EN ISO 9001:2000 Quality Management system is applied.

## THE ENVIRONMENT

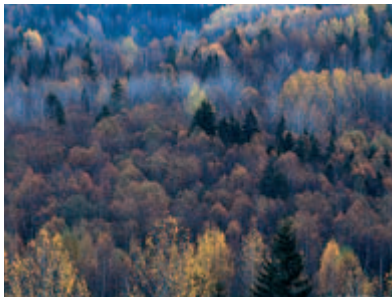
Finnforest plywood is manufactured from wood, which is a renewable natural resource. Finnforest plywood has the right to use the PEFC-logo, which ensures that the raw material is sourced from sustainably managed forests.

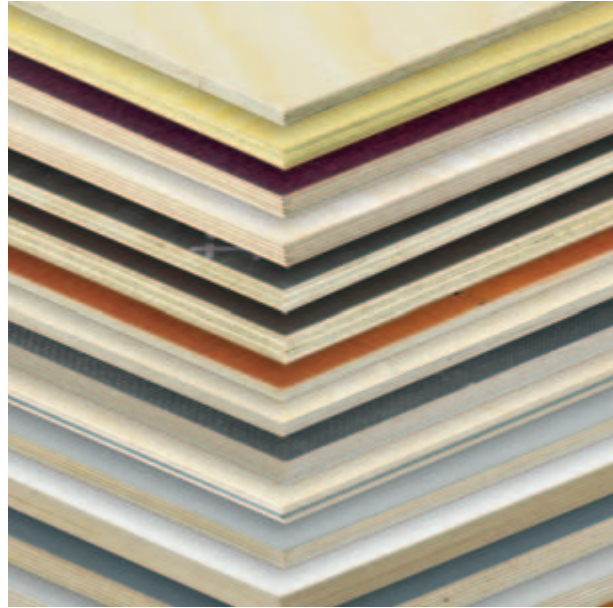
## INSTRUCTIONS FOR USAGE

Finnforest Birch plywood must be properly surfaced, edge sealed, installed and maintained to provide protection against weather. All edges, fixing spots and other unprotected areas must be surface treated properly to prevent moisture penetration.

## MAINTENANCE

The phenolic film overlays can not be easily painted or otherwise repaired and the panels are usually replaced when worn down. The phenolic resin coating can be cleaned with water or steam.





## ORDERING FINNFOREST PLYWOOD

When specifying plywood, the following information should be provided:

1. Type of plywood: birch, spruce
2. Plywood structure: standard or special
3. Face veneer grades: top and reverse side (top grade is marked first)
4. Panel size: length (grain direction of the face veneer) x width
5. Panel thickness and number of plies
6. Overlaid panels: product name, film weight if optional, colours and pattern on the top and reverse side
7. Machining: according to drawings
8. Other special requirements (treatments, structural requirements etc.)

### More information:

Product-specific information sheets

Handbook of Finnish Plywood 2001

[www.finnforest.com](http://www.finnforest.com): country-specific web-sites

## SALES CONTACTS

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Fax +1 586 296 8773  
linda.bouford@finnforest.com  
www.finnforestus.com



Finnforest is a wood products company delivering service-oriented solutions developed in collaboration with its customers, especially in the areas of industrial construction and transportation industry as well as home and lifestyle. Our premium solutions are based on ecological, high quality Nordic wood raw material, and by using them our customers can contribute to better environment and living. Our sales total 1.4 billion euros and we employ 4.500 professionals in 20 countries. We comprise one of the corAe businesses of the Finnish forest industry group Metsäliitto.

# finnforest

### METSÄLIITTO COOPERATIVE

#### Finnforest, Plywood Sales

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fax +358 1046 50490  
www.finnforest.com

For further information please contact Finnforest plywood sales and distribution network [www.finnforest.com](http://www.finnforest.com).  
Finnforest reserves the right to change the range without notice.

