Spruce Ply
EASY ON SITE

METSÄ WOOD
SPRUCE PLYWOOD
FOR CONSTRUCTION
Metsä Wood delivers competitive and eco-efficient wood-based solutions for the needs of the construction industry, other industrial customers and home improvers. Metsä Wood plywood products are manufactured in Finland using high quality Nordic wood raw material.

Metsä Wood has a versatile product range based on high-quality raw materials, an efficient supply chain and outstanding customer service. The aim of the company is to develop understanding of customers’ business to be able to develop solutions to match their increasingly demanding requirements. Metsä Wood spruce plywood products are certified, CE marked and environmentally friendly. They fulfil the strictest requirements set on wood based materials.

Metsä Wood spruce plywood products are excellent construction panels. They are ideal for both interior and exterior construction work and any other application which requires strength, dimensional stability and lightweight versatility.

SCOPE OF THE MANUAL

The purpose of this manual is to present the full Metsä Wood spruce plywood product range and suitable end use applications.

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1. Metsä Wood Spruce
2. Metsä Wood Spruce MouldGuard
3. Metsä Wood Spruce WeatherGuard
4. Metsä Wood Spruce Flex - white
5. Metsä Wood Spruce FireResist
6. Metsä Wood Spruce Flex - grey

RECOMMENDED APPLICATION

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<tr>
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<tr>
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<td>★ ★</td>
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<td>★ ★</td>
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<tr>
<td>WINDBREAK PANEL FOR BASE FLOOR</td>
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<td>FIRE CLASSIFIED INTERIOR LINING</td>
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<tr>
<td>TECHNICAL ROOMS</td>
<td>★</td>
<td>★</td>
<td>★ ★ ★ ★</td>
<td>★</td>
<td>★ ★ ★ ★</td>
</tr>
</tbody>
</table>

★ = product recommended for the application
* = product also suitable for the application
2. FLOORING

Metsä Wood Spruce plywood is a strong, rigid and durable flooring panel, well suited for use as an assembly substrate for different surface materials, both for new constructions and renovation work.

The strong and rigid spruce plywood flooring panels have a good load-bearing capacity. The smooth and uniform surface of the panels is an ideal foundation for parquet floors, carpets and floor tiles. Spruce plywood panels can also be used on their own as ready-made floors in warehouses and other similar applications. In particular, the small deflections of the panels make the use of longer spans possible, which in turn helps save the amount of construction material required.

Floorings can be divided into two different categories: load-bearing floors and non-load-bearing floating floors. With tongue and grooved panels both structures can easily be built. Working with Metsä Wood Spruce is fast and efficient due to the light weight and stable dimensions of the panels. Large floor areas can be mounted quickly and final finishing can be installed directly on top of the deck. A small opening in a floor structure can be built without a supporting frame; larger openings must have a supporting frame system around them.

The base panel is sanded spruce plywood with long edges tongue and grooved (TG2) to make the floor panel installation easy and fast. Four sides tongue and grooved (TG4) spruce plywood panels are an excellent material for building floating floor structures. Typical thicknesses for floor panels are 18, 21 and 24 mm depending on the span of the floor joists. The panel gross sizes measured with the tongue are 2410 × 1210 mm and 2410 × 610 mm. The corresponding panel net sizes are 2400 × 1200 mm and 2400 × 600 mm. Primary surface quality combinations for the flooring panels are II/III or III/III.
KEY ADVANTAGES OF METSÄ WOOD SPRUCE PLYWOOD IN FLOORING APPLICATIONS:

- Excellent strength to weight ratio
- Rigid panel with small deflections
- Easy to handle, joint and fasten
- Available with tongue and grooved profiles
- Available in half-size panels
- Dimensionally stable
- Low emissions
- Provides a safe working surface

PRODUCTS:

- Spruce
- Spruce WeatherGuard
- Spruce MouldGuard
3. ROOFING

Metsä Wood Spruce MouldGuard is an ideal roof decking panel. Plywood panels located in an unheated space with relative humidity temporarily exceeding 75% are recommended to be treated with wood preservative to reduce the risk of mould growth.

Roof structures can be designed in many different ways according to national building regulations and requirements. Strong and rigid spruce plywood is an excellent substrate for different roofing materials. Plywood panels can be also used as horizontal bracing for stabilizing the building. The light and dimensionally stable panels are easy to fit together and they can also be used as a safe working surface during the installation of the roofing.

Metsä Wood Spruce MouldGuard is surface impregnated with a wood preservative at the mill. The spreading of the anti-mould agent is carefully controlled to guarantee an even spread and sufficient amount of the anti-mould agent. MouldGuard production is part of the mill quality control system overseen by a third party certifier.

MouldGuard base panel is unsanded spruce with long edges tongue and grooved (TG2) to make the roof paneling installation easy and fast. Typical thicknesses for roof panels are 15, 18 and 21 mm depending on the span of the rafters and trusses. The panel gross sizes measured with the tongue are 2410 × 1210 mm and 2410 × 610 mm. The corresponding panel net sizes are 2400 × 1200 mm and 2400 × 600 mm. Primary surface quality combination for the roofing panel is III/III.

Tongue and groove joint
KEY ADVANTAGES OF METSÄ WOOD SPRUCE PLYWOOD IN ROOFING APPLICATIONS:

- Mould protection
  - MouldGuard has up to 5 times improved resistance against mould compared to untreated spruce plywood (ref. VTT tests)
- Time saving
  - easy to cover a large area fast with the light-weight tongue and grooved panels
- Material saving
  - Metsä Wood spruce plywood sizes are optimized for support spacings 400/600/800/1200 mm to minimize the material waste
  - fewer fasteners than with grid siding
- On-site safety
  - provides a good slip resistant working platform
- Stable constructions
  - spruce plywood can act simultaneously as a load-bearing structure and stiffening element

PRODUCTS:

- Spruce MouldGuard
- Spruce WeatherGuard
- Spruce

DID YOU KNOW

KERTO® LVL S-BEAM IS AN EXCELLENT MATERIAL CHOICE FOR RAFTERS. DIMENSIONALLY ACCURATE AND STIFF KERTO® LVL S-BEAMS ENABLE LONG SPANS WITH MINIMAL DEFLECTION. FIND OUT MORE ON WWW.METSAWOOD.COM/KERTO
4. CEILINGS

Wood has always inspired architects and designers by creating a natural and unique atmosphere in interior applications.

Metsä Wood Spruce is suitable for ceiling paneling as an assembly substrate for other interior lining materials or as a ready finished surface, giving a light, vivid and warm appearance for the room. Spruce panels can be coated with all standard stains, lacquers and paints suitable for wood products.

Metsä Wood Spruce Flex has a smooth thermoplastic overlay, which is a ready finished surface for interior use. It is suitable for ceiling panels giving a light visual appearance and moisture resistance, especially in warehouses, industrial and agricultural buildings.

Plywood can also act as a part of bracing for buildings and there are spruce plywood products available with enhanced fire classification (see Chapter 8).

Typical panel sizes are 2400 × 1200 mm and 2400 × 600 mm. Most common thicknesses for the ceiling panels are 9, 12 and 15 mm. Primary surface quality combinations for the ceiling panels are II/III or III/III.
KEY ADVANTAGES OF METSÄ WOOD SPRUCE PLYWOOD IN CEILING APPLICATIONS:

- Good capacity for hanging loads
- Ready finished surface with Spruce Flex
- Aesthetics
- Easy handling, jointing and fastening
- Low formaldehyde emissions

PRODUCTS:

- Spruce
- Spruce Flex
- Spruce WeatherGuard
5. INTERIOR WALLS

Metsä Wood Spruce plywood is a versatile wall construction panel, suitable also for bracing structures. In the wall structures spruce plywood acts as a good base for fixings.

Due to excellent strength and stiffness properties spruce plywood is the most commonly used sheet material for bracing wood frame buildings. It is easy to install and fasten to various frame structures. Spruce plywood products with enhanced European reaction to fire classification are available for applications with fire performance requirements (see Chapter 8).

Typical panel sizes are 2400 × 1200 mm and 2400 × 600 mm. Most common thicknesses for the wall panels are 9, 12, 15 and 18 mm. Primary surface quality combinations for the wall panels are II/III or III/III.

Spruce plywood panels can be coated with all standard stains, lacquers and paints suitable for wood products.
KEY ADVANTAGES OF METSÄ WOOD SPRUCE PLYWOOD IN WALL APPLICATIONS:

- Provides a solid fixing base for hangings
- Can act as a bracing panel
- Excellent impact resistance
- Low emissions

PRODUCTS:

- Spruce
- Spruce Flex
- Spruce WeatherGuard
5.1 SPRUCE FLEX FOR WALLS

Metsä Wood Spruce Flex is a spruce plywood panel with a thermoplastic overlay. The technical advantages of spruce plywood combined with the thermoplastic overlay make Spruce Flex an excellent panel for various demanding interior applications. Spruce Flex panels have a smooth and light colour visual appearance, and an excellent impact and crack resistance. Surface is easy to clean with water and normal detergents.

Spruce Flex is suitable for interior applications, such as a wall and ceiling paneling in agricultural buildings, garages and warehouses. Spruce Flex as spruce plywood in general has a good capacity for hanging loads. Spruce Flex can also be used to protect the gypsum board wall and make the wall more impact resistant.

Panel edges are sealed against moisture absorption with a transparent edge sealing paint. Even though the edge sealing hinders the absorption of moisture into the panel, it does not eliminate it completely. If panels are cut to smaller pieces, edges need to be sealed with water-repellent paint.
Plywood panel as a fixing base

Spruce Flex is used to protect gypsum board wall

- Light colour
- Easy to clean
- Impact resistant
- Strong
6. MOULD PROTECTION

Metsä Wood Spruce MouldGuard is a surface impregnated softwood plywood panel, significantly reducing the risk of mould growth compared to unprotected softwood plywood panels.

There is always a risk of mould growth on the surface of untreated wood products when they are located in high relative humidity conditions or in an unheated space where the humidity of the air may be high and condensation may occur from time to time. In end use applications, such as a roofing panel, Metsä Wood recommends the use of Metsä Wood Spruce MouldGuard plywood.

Spruce MouldGuard provides a ready to use surface for humid conditions. The panels have a light brown colour and the surface can be further treated with paints, lacquers and varnishes applicable on wood products. The compatibility of the surface treatment is recommended to be confirmed from the supplier.

Spruce MouldGuard has M1 emission class for building materials and formaldehyde emissions are far below the class E1 requirements. The treatment has no influence on the corrosion properties of the fasteners. Direct contact with foodstuffs, animal feed or similar must be avoided.

Spruce MouldGuard is surface impregnated with a wood preservative at the mill. The spreading of the anti-mould agent is carefully controlled to guarantee an even spread and sufficient amount of the anti-mould agent. Spruce MouldGuard production is part of the mill quality control system overseen by a third party certifier.

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>THICKNESS [mm]</th>
<th>MAX SIZE [mm]</th>
<th>APPROVAL</th>
<th>QUALITY CONTROL</th>
<th>RANGE OF USE</th>
</tr>
</thead>
<tbody>
<tr>
<td>MouldGuard</td>
<td>12 – 30</td>
<td>2500 × 1250</td>
<td>CE-marked</td>
<td>VTT Expert Services Ltd</td>
<td>Weather protected areas</td>
</tr>
</tbody>
</table>
KEY ADVANTAGES OF METSÄ WOOD SPRUCE MOULDGUARD PLYWOOD:

- MouldGuard treatment provides up to 5 times improved resistance to mould and blue stain compared to untreated panels
- Ready to use surface saves time at construction site
- Off-cuts are classified as biofuel and they can be disposed by burning.
  - due to preservative treatment the correct combustion conditions and suitable waste burning plants should be checked locally

TESTED PERFORMANCE

Spruce MouldGuard is a general purpose construction panel for conditions where the air relative humidity may exceed 75%. Spruce MouldGuard can be used in the same way as standard Spruce plywood panels, but it should be protected from direct rain and UV radiation.

A field test performed by VTT clearly shows that mould and blue stain grow much slower on untreated spruce than on untreated pine. The mould and blue stain resistance of the Metsä Wood Spruce can be significantly further enhanced with MouldGuard treatment.

There is always a risk of mould growth if there is organic material on the panel surface, for example, dust and dirt can cause mould growth even if the product itself is protected.

![Field test results](image)

Figure. Results of the outdoor field test by VTT (VTT-R-10360-10), mould index describes the occurrence of mould growth on the panel surface
Metsä Wood Spruce WeatherGuard is a spruce plywood panel with a hydrophobic surface. The surface rejects rain-water and therefore reduces the amount of water absorbed by the panel during construction work. At the same time the surface allows the panel to breathe and water vapour to move freely.

During construction, it is common for building materials to get wet because of rain, and reasonable amounts of wetness can be expected during a typical construction. It is essential to allow wood-based components to dry before the components are fitted into the final structure. Otherwise moisture can lead to mould growth. Good construction site planning takes protection from the rain into account, and protects all moisture-sensitive building materials.

The colour of WeatherGuard treatment is transparent. The surface can be further treated with paints, lacquers, varnishes and protection treatments applicable on wood products. The compatibility of the surface treatment is recommended to be confirmed from the supplier. Also carpets, linoleum, tiles etc. can be glued to the surface.

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>THICKNESS (mm)</th>
<th>MAX SIZE (mm)</th>
<th>APPROVAL</th>
<th>RANGE OF USE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spruce Weather-Guard</td>
<td>12 – 30</td>
<td>2500 × 1250</td>
<td>CE-marked</td>
<td>On-site construction</td>
</tr>
</tbody>
</table>
KEY ADVANTAGES OF METSÄ WOOD SPRUCE WEATHERGUARD PLYWOOD:

- Reduced moisture intake and swelling
  - up to 60 % reduction of water intake in rain
  - better dimensional stability results in enhanced assembly tolerances
  - shorter drying period before closing structures ⇒ faster building time and energy savings
  - lower risk of damage caused by wet structures
- The hydrophobic surface temporarily protects the product from rain during construction period
- treatment does not block water vapour movements
- WeatherGuard treatment does not affect the strength properties, slip resistance, reaction to fire and corrosion of the fasteners compared to untreated spruce plywood

TESTED PERFORMANCE

During field tests in typical construction site settings, full size panels of Spruce WeatherGuard were placed horizontally to simulate roof and/or floor structures. The 72-hour test demonstrated that Spruce WeatherGuard panels absorbed only half of the amount of water compared to untreated spruce plywood. Due to the lower moisture content of Spruce WeatherGuard also the needed drying period is shorter. In the tests the difference of the drying period duration was 48 hours.

Plywood is a hygroscopic material and the moisture content is dependent on the relative humidity and temperature of the ambient atmosphere. It is recommended that before installation plywood is conditioned to a moisture content corresponding to the conditions of the end-use application.

Figure. Water absorption of Spruce WeatherGuard and untreated spruce plywood measured by Metsä Wood.

Figure. Drying time of Spruce WeatherGuard and untreated spruce plywood measured by Metsä Wood.
8. FIRE SOLUTIONS

Metsä Wood Spruce FireResist is a plywood product with enhanced fire performance. The product has been tested according to EN 13501-1 and it has the highest European reaction to fire classification possible for wood products (Class B).

Spruce FireResist is suitable for use as wall, floor and ceiling panel and it offers a visible wood surface. The product can be painted.

Standard Metsä Wood Spruce reaction to fire classification, fire protection ability of a covering and charring rates are described in the Metsä Wood Spruce Plywood Manual.

THE MAIN APPLICATIONS ARE:

- Wall, ceiling and flooring structures with fire performance requirements (for example public buildings, technical rooms, garages etc.)
- Partition walls
- Suitable also for bearing and stiffening structures

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>THICKNESS [mm]</th>
<th>MAX SIZES [mm]</th>
<th>REACTION TO FIRE CLASS**</th>
<th>FIRE PROTECTION ABILITY OF A COVERING (K-CLASS)***</th>
<th>END USE CONDITIONS (STRUCTURAL USE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FireResist</td>
<td>15 – 21</td>
<td>2500 × 1250</td>
<td>B-s1, d0 or B-s2, d0 B1-s1</td>
<td>K310 and K110 Dry (interior)</td>
<td></td>
</tr>
<tr>
<td>FireResist</td>
<td>24 – 30</td>
<td>2500 × 1250</td>
<td>B-s1, d0 or B-s2, d0 B1-s1</td>
<td>K30 Dry (interior)</td>
<td></td>
</tr>
</tbody>
</table>

* Field of application of the European reaction to fire classes are described in the Metsä Wood Spruce Plywood Manual
** Field of application of the K-classes are described in the Metsä Wood Spruce Plywood Manual
KEY ADVANTAGES OF METSÄ WOOD SPRUCE PLYWOOD WITH ENHANCED FIRE PERFORMANCE:

- Enhanced fire safety
- European reaction to fire class B
  - very limited contribution to fire
  - decreased need for structural protection with gypsum board
  - enables load-bearing panel structures
- CE marked
- Quality controlled manufacturing process
- Strong, rigid and lightweight panel
- Easy to machine and install by using conventional woodworking tools and fasteners
  - panel is impact resistant and does not crumble
  - good base for fasteners
9. PRODUCT INFORMATION

NATURAL STRENGTH AND RIGIDITY

Metsä Wood spruce plywood products are excellent general purpose construction panels. They are ideal for both interior and exterior construction work and any other application which requires strength, dimensional stability and lightweight versatility.

Spruce plywood is manufactured from a long-grained, straight fiber, homogeneous Nordic conifer. The veneer structure gives the versatile softwood plywood panel considerable strength and rigidity. Spruce plywood panels are light, and easy to machine and install using conventional wood-working tools and fasteners. As well as being beautifully light in colour, spruce plywood is also up to 30 % lighter than many alternatives with similar load-carrying capacity and stiffness.

Metsä Wood Spruce is uncoated softwood plywood glued with weather and boil-proof phenolic resin adhesive (WBP, BFU, AW, exterior). The nominal thicknesses of the veneers used in the manufacturing process is 3,0 mm. Spruce plywood is manufactured at Suolahti plywood mill with automatic production lines.

COMPARISON WITH OTHER WOOD-BASED PANELS

Metsä Wood Spruce plywood, radiata pine plywood, OSB/3 and particleboard P5 are all suitable materials, for example, for flooring applications. Metsä Wood Spruce has a good weight-strength ratio. The panel thicknesses required to carry the same load and fulfill the same deflection limitation, and the corresponding panel weights are shown in Table 9.1.

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>PANEL THICKNESS (mm)</th>
<th>CHAR. PANEL WEIGHT (kg / m²)</th>
<th>CHAR. MATERIAL DENSITY (kg / m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MW Spruce plywood</td>
<td>18</td>
<td>7,2</td>
<td>400</td>
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<tr>
<td>Radiata Pine plywood</td>
<td>21</td>
<td>9,5</td>
<td>450</td>
</tr>
<tr>
<td>OSB/3</td>
<td>22</td>
<td>12,1</td>
<td>550</td>
</tr>
<tr>
<td>Particleboard P5</td>
<td>25</td>
<td>13,8</td>
<td>550</td>
</tr>
</tbody>
</table>

Material information for OSB and particleboard taken from standard EN 12369-1 and for radiata pine plywood from Arauco ITT report by DTI
Plywood pallets in a plastic wrapping

### Table 9.2 Comparison design calculations

<table>
<thead>
<tr>
<th>Span (mm)</th>
<th>MW Spruce</th>
<th>Radiata Pine</th>
<th>OSB/3</th>
<th>Particleboard P5</th>
</tr>
</thead>
<tbody>
<tr>
<td>400</td>
<td>12</td>
<td>12</td>
<td>15</td>
<td>18</td>
</tr>
<tr>
<td>600</td>
<td>18</td>
<td>21</td>
<td>22</td>
<td>25</td>
</tr>
</tbody>
</table>

Design calculations according to Eurocode (EN 1990, EN 1991-1-1, EN 1995-1-1), loaded area category A: residential areas, permanent load 0.3 kN/m² includes the weight of the panel, service class 2, medium-term load-duration class, plywood $k_{mod} = 0.8$, plywood $k_{def} = 1.0$, OSB $k_{mod} = 0.55$, plywood $k_{def} = 2.25$, particleboard $k_{mod} = 0.45$, $k_{def} = 3.0$, consequences/reliability class 2 $k_0 = 1.0$, $k_0 = 1.2$ (1.3 for particleboard), $\gamma_M = 1.35$, $\gamma_Q = 1.5$, $\psi_2 = 0.3$, combination of actions (6.10), characteristic combination, multispans, net final deflection $w_{net,fin} \leq L/200$.

The natural durability of wood varies between different wood species. Durability classes for different species are given in EN 350-2 or natural durability can be tested according to EN 350-1. Neither Nordic spruce, Elliotis pine, maritime pine nor radiata pine are classified as durable wood species. Spruce plywood is suitable for end uses in use class 2 (EN 335). Panels are marked in technical class EN 636-2.

Field tests clearly show that mould and blue stain grow much slower on the natural surface of Nordic spruce than on Elliotis pine, maritime pine or radiata pine. Never the less exterior use or high relative humidity conditions (e.g. unheated spaces) may cause mould growth on the plywood surface. Metsä Wood Spruce MouldGuard is recommended for applications in humid conditions (not exposed to direct weathering).

### QUALITY CONTROL, CE-MARKING AND APPROVALS

Metsä Wood spruce plywood products are CE-marked and classified as structural panels. In addition to internal quality control, VTT Expert Services Ltd oversees production operations and the internal quality control at Metsä Wood plywood mills. External plywood quality control is conducted according to standard EN 13986 and its CE-marking rules in cooperation with VTT, which is the Notified Production Control and Certification Body (No. 0809) for the CE-marking system. Assessment and verification of constancy of performance (AVCP) system is 2+ for plywood. CE-marking is printed on the packages and on the reverse side of the uncoated panels. Metsä Wood Declaration of Performance (DoP) documents can be found from the website www.metsawood.com/dop. Spruce plywood products meet also the requirements of the plywood specification standard EN 636.

EN ISO 9001 Quality Management System and EN ISO 14001 Environmental Management System are certified by Bureau Veritas.
PANEL DIMENSIONS

METSA WOOD SPRUCE IS AVAILABLE IN SIZES:

- 2400 / 2440 / 2500 mm × 1200 / 1220 / 1250 mm
- 2400 / 2440 mm × 600 / 610 mm

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

Other sizes are available on request.

Metä Wood spruce plywood products can be delivered with square edges or tongue and groove edge profile either on two sides (TG2) or on four sides (TG4). Tongue and groove machining decreases the net panel size by 10 mm.

Spruce plywood panels are available sanded and unsanded. Tongue and grooved panels and Spruce FireResist panels are always sanded.

Spruce plywood panels can also be machined according to customer specification on special request.

Table 9.3 Thickness tolerances, lay-up and weight of Metä Wood spruce plywood

<table>
<thead>
<tr>
<th>NOMINAL THICKNESS (mm)</th>
<th>TOLERANCE THICKNESS MIN. (mm)</th>
<th>TOLERANCE THICKNESS MAX. (mm)</th>
<th>NUMBER OF VENEERS</th>
<th>LAY-UP</th>
<th>APPROX. WEIGHT (kg/m²)</th>
<th>PANELS PER PACKAGE PCS.</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>8.8</td>
<td>9.5</td>
<td>3</td>
<td>–</td>
<td>–</td>
<td>4.1</td>
</tr>
<tr>
<td>12</td>
<td>11.5</td>
<td>12.5</td>
<td>4</td>
<td>–</td>
<td>–</td>
<td>5.5</td>
</tr>
<tr>
<td>15</td>
<td>14.3</td>
<td>15.3</td>
<td>5</td>
<td>–</td>
<td>–</td>
<td>6.9</td>
</tr>
<tr>
<td>18</td>
<td>17.1</td>
<td>18.1</td>
<td>6</td>
<td>–</td>
<td>–</td>
<td>8.3</td>
</tr>
<tr>
<td>21</td>
<td>20.0</td>
<td>20.9</td>
<td>7</td>
<td>–</td>
<td>–</td>
<td>9.7</td>
</tr>
<tr>
<td>24</td>
<td>22.9</td>
<td>23.7</td>
<td>8</td>
<td>–</td>
<td>–</td>
<td>11.0</td>
</tr>
<tr>
<td>27</td>
<td>25.2</td>
<td>26.8</td>
<td>9</td>
<td>–</td>
<td>–</td>
<td>12.4</td>
</tr>
<tr>
<td>30</td>
<td>28.1</td>
<td>29.9</td>
<td>10</td>
<td>–</td>
<td>–</td>
<td>13.8</td>
</tr>
</tbody>
</table>

The nominal veneer thickness is 3.0 mm.
Figure. Spruce plywood panel dimension of tongue and grooved panels

**SURFACE VENEER GRADES**

Table 9.4 Description of surface veneer grades

<table>
<thead>
<tr>
<th>SPRUCE PLYWOOD SURFACES</th>
<th>TYPICAL PROPERTIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>II</td>
<td>Sound surface, might be repaired with filler. Unrepaired defects with a ø max. 5 mm are permitted.</td>
</tr>
<tr>
<td>III+</td>
<td>Open defects repaired with filler</td>
</tr>
<tr>
<td>III</td>
<td>Standard quality, with open defects such as knot holes and veneer checks</td>
</tr>
</tbody>
</table>

Primary grade combinations are II/III, +III/III and III/III.

Classification of the Metsä Wood Spruce surface grade meets the EN 635 requirements.
10. SUSTAINABILITY

Wood raw material for premium-quality Metsä Wood plywood is sourced from PEFC-certified forests belonging to Metsä Group’s Finnish forest owner members, ensuring that the origin of the material conforms to the principles of sustainable forestry.

AN ECO-EFFICIENT BUILDING MATERIAL

Wood products are based on fully renewable raw materials and, especially when they are sourced from sustainably managed forests, they offer an excellent opportunity for ecological construction with fewer emissions. Wood is a highly eco-efficient building material throughout its entire life cycle. Production consumes less energy and results in fewer emissions than other building materials. The products are lightweight, which means that transportation has a small environmental impact.

The manufacture of wood products is mainly based on renewable energy. Moreover, the energy and material efficiency of the wood’s production process is constantly being improved. Compared with competing materials, wood products have by far the smallest carbon footprint. Wood not only binds atmospheric carbon during its growth phase, but it also continues to act as carbon storage in the completed building. When used to replace other building materials, wood indirectly reduces the consumption of fossil fuels.

Metsä Wood is a leading supplier of eco-efficient wood-based solutions, and by using Metsä Wood products, customers can promote the quality of their built environment.
Carbon dioxide (CO₂) emissions are the main cause of the greenhouse effect and global warming. Carbon footprint shows carbon dioxide emissions of the process behind the product. Carbon footprint shows the magnitude of the environmental effect caused by a certain activity. Forests and forestry are involved in the natural circulation of carbon. Sustainably managed forests can act as carbon sinks. The climate change mitigation effect can also be reached by using forest residuals and by-products in energy production.

Carbon footprint of Metsä Wood spruce plywood (cradle to gate):

<table>
<thead>
<tr>
<th>CARBON EMISSION AS kg CO₂ / m³ OF PRODUCT</th>
<th>BIOGENIC CARBON STORAGE AS kg CO₂ / m³ OF PRODUCT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Raw material supply</td>
<td>Carbon stored in the product</td>
</tr>
<tr>
<td>-686</td>
<td>754</td>
</tr>
<tr>
<td>Transport ¹</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td></td>
</tr>
<tr>
<td>Manufacturing ²</td>
<td></td>
</tr>
<tr>
<td>32</td>
<td></td>
</tr>
</tbody>
</table>

The greenhouse effect of carbon stored in the product depends on the life time of the product and selected calculation time period.

Total emission -633

Transportation from the mill to (additional)
- Brussels, Belgium: 34
- Frankfurt am Main, Germany: 31
- London, UK: 36
- Stockholm, Sweden: 12

¹ Including transports to the mill
² Including energy, fuels, packaging materials and waste handling
11. INSTRUCTIONS

INSTRUCTIONS FOR USING PLYWOOD

STORAGE

• Plywood products should be stored under cover, in dry conditions
• Protect the panels from contact with water and direct sunlight, which might cause the panels to twist and/or cup
• Avoid very dry and hot storage areas
• Store the panels in packages, avoid loose panels
• Packages and loose panels should always be stored flat, above ground. The base under the panel stack must be level and durable, with adequate support

When temporarily stored outside or in a humid area:
• Cover plywood packages with a waterproof covering
• If the package has strappings, please remove them to prevent damage caused by swelling

HANDLING

• Use protective gloves when handling spruce plywood
• Plastic wrapping in packages can easily be opened with a knife - all Metsä Wood packaging materials are recyclable
• You can also remove only a few plywood panels from the plastic wrapping. Please close the package top again after removing the panels.
• Avoid handling open packages with a forklift

PROCESSING

Plywood panels can easily be cut, shaped, drilled and fastened with nails, screws, staples by using standard woodworking tools

PAINTING

Painting visible plywood parts is recommended when better visual performance is required or better durability in humid conditions is required. A single topcoat is adequate over the primer, but a second topcoat will extend the lifetime of the panel. For a good visual and durable surface two topcoats are required.

Plywood surface should be treated with a colourless acrylic primer for a transparent finish, and the final finishing should be done twice with tinted transparent paint.

For an opaque finish, plywood should be primed with an acrylic or oil-base primer. For primers, use acrylic latex or alkyd oil and follow the recommendations of paint manufacturers. Acrylic paints and alkyd paints intended for outside use are recommended as topcoats.

The compatibility of the paint and primer with plywood is recommended to be confirmed from the supplier. Test coating is always recommended to confirm the adhesion.
INSTRUCTIONS FOR DISPOSAL

Spruce plywood products can be disposed in several ways. It should be noted that the instructions for disposal may vary by country depending on the current legislation.

Recycling of spruce plywood products by utilizing them in other applications is always preferred.

**METSÄ WOOD SPRUCE, SPRUCE WEATHER-\ GUARD AND SPRUCE FLEX**

Spruce plywood can be safely burnt when the combustion temperature is at least 850°C and correct combustion conditions are maintained (combustion air and gases are well mixed, the retention time of the combustion gases in the furnace is over 2 seconds, and the residual oxygen content of the flue gases over 6%). The flue gases are identical to the gases produced in burning untreated wood.

Spruce plywood can also be composted but the panels have to be chipped and the long duration of the composting process has to be taken into consideration. In addition, the products can be taken to a refuse dump, although plywood products will degrade very slowly.

Spruce plywood contains nothing classified as hazardous waste.

**METSÄ WOOD SPRUCE MOULDGUARD**

Spruce MouldGuard plywood can be considered as biofuel (EN 14961-1) and it can be safely burnt when the combustion temperature is at least 850°C and correct combustion conditions are maintained (combustion air and gases are well mixed, the retention time of the combustion gases in the furnace is over 2 seconds, and the residual oxygen content of the flue gases over 6%). Due to preservative treatment the correct combustion conditions and suitable waste burning plants should be checked locally.

Preservative treatment of Spruce MouldGuard contains following materials, which should be taken into account when choosing the suitable combustion plant: Nitrogen < 0.007 %, Chlorine < 0.01%, Iodine < 0.007% calculated as percentage of weight.

**METSÄ WOOD SPRUCE FIRERESIST**

Spruce FireResist plywood can be considered as biofuel (EN 14961-1) and it can be safely burnt when the combustion temperature is at least 850°C and correct combustion conditions are maintained (combustion air and gases are well mixed, the retention time of the combustion gases in the furnace is over 2 seconds, and the residual oxygen content of the flue gases over 6%). Due to fire retardant character of the product, panels are recommended to be chipped and mixed with easily combustible material to confirm favorable combustion. The flue gases are identical to the gases produced in burning untreated wood.

Spruce FireResist plywood can also be composted but the panels have to be chipped and the long duration of the composting process has to be taken into consideration.

Spruce FireResist plywood does not contain heavy metals, boron or halogenated compounds, or anything else classified as hazardous waste.