Spruce Ply
EASY ON SITE

METSÄ WOOD
SPRUCE PLYWOOD
FIRE SOLUTIONS
9. 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. Additional coatings are not recommended for Metsä Wood Spruce FireResist as coatings might affect the fire performance of the plywood. The compatibility of the surface treatment should be confirmed from the paint or varnish supplier.

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

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, B1; s1</td>
<td>K_{30} and K_{10}</td>
<td>Dry (interior)</td>
</tr>
<tr>
<td>FireResist</td>
<td>24 – 30</td>
<td>2500 × 1250</td>
<td>B-s1, d0, B1; s1</td>
<td>K_{30}</td>
<td>Dry (interior)</td>
</tr>
</tbody>
</table>

* Field of application of the European reaction to fire classes are described in the following chapters

** Field of application of the K-classes are described in the end of this document
KEY ADVANTAGES OF METSÅ 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 light-weight 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
Spruce FireResist is a surface impregnated softwood plywood panel with enhanced fire performance. Spruce FireResist remains visually and physically stable in interior applications where wetting does not occur. Suitable applications for the product are interior applications in service class 1 (EN 1995-1-1).

Spruce FireResist does not contain heavy metals, boron or halogenated compounds. The product contains nothing classified as hazardous waste and the product is classified as biofuel. Additional coatings are not recommended for Metsä Wood Spruce FireResist as coatings might affect the fire performance of the plywood. The compatibility of the surface treatment should be confirmed from the paint or varnish supplier.

**KEY ADVANTAGES OF METSÄ WOOD SPRUCE FIRERESIST PLYWOOD:**

- Surface impregnated softwood plywood panel with enhanced fire performance (B-s1, d0)
- Enables visible wood surface
- Strong, rigid and light-weight 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
- Does not contain heavy metals, boron or halogenated compounds
- Classified as biofuel (EN 14961-1)
FIELD OF APPLICATION OF THE SPRUCE FIRESOLUTIONS
EUROPEAN REACTION TO FIRE CLASSIFICATION
B-s1, d0 (EXCLUDING FLOORINGS):

- Minimum panel thickness is 15 mm
- With substrates of at least class A2-s1,d0 with a density of at least 30 kg/m³ (e.g. insulation)
- With or without an air gap between the product and the substrate of at least class A2-s1,d0 and density of at least 525 kg/m³ (e.g. gypsum board)
- Maximum of 2 mm gap between the panels with frame support under the joints
- Fixed mechanically to wooden or metallic frames

Figure. Wall or ceiling structure with thermal insulation

1. Substrate, no demands, e.g. plywood, concrete
2. Wood frame (or optionally metal frame)
3. Insulation at least class A2-s1, d0 ≥ 30 kg/m³, e.g. glass wool or stone wool
4. Spruce FireResist

Figure. Ceiling structure with thermal insulation

1. Wood frame (or optionally metal frame)
2. Insulation at least class A2-s1, d0 ≥ 30 kg/m³, e.g. glass wool or stone wool
3. Spruce FireResist

Figure. Wall or ceiling structure with Spruce FireResist fixed to the substrate

1. Wood frame (or optionally metal frame)
2. Substrate at least class A2-s1, d0 ≥ 30 kg/m³, e.g. concrete, in walls gypsum board
3. Spruce FireResist

Figure. Wall or ceiling structure with air gap

1. Substrate at least class A2-s1, d0 ≥ 525 kg/m³, e.g. gypsum board, concrete
2. Wood frame (or optionally metal frame)
3. Air gap
4. Spruce FireResist
FIELD OF APPLICATION OF THE SPRUCE 
FIRE RESIST EUROPEAN REACTION TO FIRE 
CLASSIFICATION Bfl-s1 FOR FLOORINGS:

- Minimum panel thickness is 15 mm
- With or without an air gap between the product and
  - wood based substrate with density of at least 470 kg/m³
  - class A1 or A2-s1, d0 substrate with density of at least 470 kg/m³
- Without an air gap between the product and plywood 
  substrate with density of at least 400 kg/m³
- With thermal insulation of class A1 or A2-s1, d0 and 
  density of at least 23 kg/m³ and wood based substrate 
  with density of at least 470 kg/m³
- Panels may have joints (tongue and groove joints or 
  square edged panels with frame support under the joints)

Figure. Floor structure with thermal insulation

1. Spruce FireResist
2. Insulation, Class A1 or A2-s1, d0 ≥ 23 kg/m³, e.g. glass wool or stone wool
3. Battens
4. Wood based substrate, ≥ 470 kg/m³, e.g. wood based panel

Figure. Floor structure with air gap

1. Spruce FireResist
2. Air gap
3. Battens
4. Substrate
   - wood based substrate ≥ 470 kg/m³, e.g. wood based panel or
   - class A1 or A2-s1,d0 substrate ≥ 470 kg/m³, e.g. gypsum board, concrete

Figure. Floor structure with Spruce FireResist fixed to the substrate

1. Spruce FireResist
2. Substrate
   - plywood substrate ≥ 400 kg/m³ or
   - wood based substrate ≥ 470 kg/m³, e.g. wood based panel or
   - class A1 or A2-s1,d0 substrate ≥ 470 kg/m³, e.g. gypsum board, concrete
3. Battens
FIRE COMPARTMENT WALLS

Fire compartment structures divide a building into smaller sections in order to delay the spread of fire through the whole building. Fire compartment walls can be built of glass or stone wool, Kerto LVL studs and Metsä Wood plywood as paneling material. Suitable products for the paneling are Spruce FireResist and Spruce, and also birch plywood products are possible.

FIRE COMPARTMENTS WALLS ARE RATED WITH THE FOLLOWING SYMBOLS:
• R for load-bearing capacity
• E for integrity
• I for insulation

Non-load-bearing fire compartment walls do not carry any external loads in case of fire. Their function is only to separate the fire compartments.

NON-LOAD-BEARING FIRE COMPARTMENT WALLS

<table>
<thead>
<tr>
<th>WALL STRUCTURE</th>
<th>STUDS (mm)</th>
<th>MAX. WALL HEIGHT (mm)</th>
<th>FIRE RATING</th>
<th>MATERIAL LAYERS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>45 × 45</td>
<td>3000</td>
<td>EI 15</td>
<td>1. Spruce plywood, min. 15 mm</td>
</tr>
<tr>
<td></td>
<td>45 × 70</td>
<td>3000</td>
<td>EI 30</td>
<td>1. Spruce FireResist plywood, min. 15 mm</td>
</tr>
<tr>
<td></td>
<td>45 × 150</td>
<td>3000</td>
<td>EI 60</td>
<td>1. Spruce FireResist plywood, min. 18 mm</td>
</tr>
</tbody>
</table>

• Panel joints supported on studs
• Openings through the panels not allowed
• National limitations for wall height may exist

LOAD-BEARING FIRE COMPARTMENT WALLS

Load-bearing fire compartment walls separate the fire compartments while acting as a load-bearing structure for external loads in case of fire. Load-bearing fire compartment walls should be designed case by case.

Figure. Example of a fire rated structure for a compartment wall

Figure. Fire rated structures for non-load-bearing wood stud wall

Door opening in a compartment wall
PERFORMANCE IN CASE OF FIRE

The values are to be used for structural calculations with EN 1995 (Eurocode 5).

Table. One-dimensional charring rate and failure time

<table>
<thead>
<tr>
<th>NOMINAL THICKNESS [mm]</th>
<th>CHARRING RATE $\beta_0$ [mm/min]</th>
<th>FAILURE TIME $t_f$ (EN 1995-1-2) [min]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>WITHOUT MINERAL WOOL IN THE CAVITY BEHIND THE PANEL</td>
<td>WITH MINERAL WOOL IN THE CAVITY BEHIND THE PANEL</td>
</tr>
<tr>
<td>9</td>
<td>0.74 1.26</td>
<td>7.5 2.7</td>
</tr>
<tr>
<td>12</td>
<td>0.72 1.23</td>
<td>12.0 5.3</td>
</tr>
<tr>
<td>15</td>
<td>0.71 1.16</td>
<td>16.4 8.5</td>
</tr>
<tr>
<td>18</td>
<td>0.70 1.12</td>
<td>21.0 11.6</td>
</tr>
<tr>
<td>21</td>
<td>0.69 1.07</td>
<td>25.7 15.2</td>
</tr>
<tr>
<td>24</td>
<td>0.68 1.02</td>
<td>30.6 19.0</td>
</tr>
<tr>
<td>27</td>
<td>0.67 0.97</td>
<td>35.6 23.3</td>
</tr>
<tr>
<td>30</td>
<td>0.66 0.94</td>
<td>40.7 27.4</td>
</tr>
</tbody>
</table>

Table. European reaction to fire classification

<table>
<thead>
<tr>
<th>END USE CONDITION</th>
<th>MINIMUM THICKNESS (mm)</th>
<th>CLASS (EXCLUDING FLOORING)</th>
<th>CLASS (FLOORINGS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Without an air gap behind the panel</td>
<td>9</td>
<td>D-s2, d0</td>
<td>D-fl-s1</td>
</tr>
<tr>
<td>- mounted directly against class A1 or A2-s1,d0 products with minimum density of 10 kg/m³ or at least class D-s2,d2 products with minimum density of 400 kg/m³</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- a substrate of cellulose insulation material of at least class E may be included if mounted directly against the wood-based panel, but not for floorings</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- a vapour barrier with a thickness up to 0.4 mm and a mass up to 200 g/m² can be mounted in between the wood-based panel and a substrate if there are no air gaps in between</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>With a closed or an open air gap of not more than 22 mm behind the panel</td>
<td>9</td>
<td>D-s2, d2</td>
<td>-</td>
</tr>
<tr>
<td>- mounted with an air gap behind, the reverse face of the cavity shall be at least class A2-s1,d0 products with minimum density of 10 kg/m³</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>With a closed air gap</td>
<td>15</td>
<td>D-s2, d1</td>
<td>D-fl-s1</td>
</tr>
<tr>
<td>- mounted with an air gap behind, the reverse face of the cavity shall be at least class D-s2,d2 products with minimum density of 400 kg/m³</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>With an open air gap</td>
<td>18</td>
<td>D-s2, d0</td>
<td>D-fl-s1</td>
</tr>
<tr>
<td>- mounted with an air gap behind, the reverse face of the cavity shall be at least class D-s2,d2 products with minimum density of 400 kg/m³</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**REACTION TO FIRE OF METSÄ WOOD SPRUCE FIRERESIST**

<table>
<thead>
<tr>
<th>END USE CONDITION</th>
<th>MINIMUM THICKNESS (mm)</th>
<th>CLASS (EXCLUDING FLOORING)</th>
<th>CLASS (FLOORINGS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>With substrates of at least class A2-s1,d0 with a density of at least 30 kg/m³ (e.g. insulation) With or without an air gap between the product and the substrate of at least class A2-s1,d0 and density of at least 525 kg/m³ (e.g. gypsum board) Maximum of 2 mm gap between the panels with frame support under the joints</td>
<td>15</td>
<td>B-s1, d0</td>
<td>-</td>
</tr>
<tr>
<td>Fixed mechanically to wooden or metallic frames With or without an air gap between the product and - wood based substrate with density of at least 470 kg/m³ - class A1 or A2-s1,d0 substrate with density of at least 470 kg/m³ Without an air gap between the product and plywood substrate with density of at least 400 kg/m³ With thermal insulation of class A1 or A2-s1,d0 and density of at least 23 kg/m³ and wood based substrate with density of at least 470 kg/m³ Panels may have joints (tongue and groove joints or square edged panels with frame support under the joints)</td>
<td>15</td>
<td>-</td>
<td>B-s1</td>
</tr>
</tbody>
</table>

**B-s1, d0**

**WALL OR CEILING STRUCTURE WITH THERMAL INSULATION**

<table>
<thead>
<tr>
<th>1. Substrate, no demands, e.g. plywood, concrete</th>
<th>2. Wood frame (or optionally metal frame)</th>
<th>3. Insulation at least class A2-s1,d0 ≥ 30 kg/m³, e.g. glass wool or stone wool</th>
<th>4. Spruce FireResist</th>
</tr>
</thead>
<tbody>
<tr>
<td>➔ 15 mm</td>
<td>➔ 2 mm</td>
<td>➔ 2 mm</td>
<td>➔ 2 mm</td>
</tr>
</tbody>
</table>

**CEILING STRUCTURE WITH THERMAL INSULATION**

<table>
<thead>
<tr>
<th>1. Wood frame (or optionally metal frame)</th>
<th>2. Insulation at least class A2-s1,d0 ≥ 30 kg/m³, e.g. glass wool or stone wool</th>
<th>3. Spruce FireResist</th>
</tr>
</thead>
<tbody>
<tr>
<td>➔ 15 mm</td>
<td>➔ 2 mm</td>
<td>➔ 15 mm</td>
</tr>
</tbody>
</table>

**WALL OR CEILING STRUCTURE WITH SPRUCE FIRERESIST FIXED TO THE SUBSTRATE**

<table>
<thead>
<tr>
<th>1. Wood frame (or optionally metal frame)</th>
<th>2. Substrate at least class A2-s1,d0 ≥ 30 kg/m³, e.g. concrete, in walls gypsum board</th>
<th>3. Spruce FireResist</th>
</tr>
</thead>
<tbody>
<tr>
<td>➔ 15 mm</td>
<td>➔ 2 mm</td>
<td>➔ 2 mm</td>
</tr>
</tbody>
</table>

**WALL OR CEILING STRUCTURE WITH AIR GAP**

<table>
<thead>
<tr>
<th>1. Substrate at least class A2-s1,d0 ≥ 525 kg/m³, e.g. gypsum board, concrete</th>
<th>2. Wood frame (or optionally metal frame)</th>
<th>3. Air gap</th>
<th>4. Spruce FireResist</th>
</tr>
</thead>
<tbody>
<tr>
<td>➔ 15 mm</td>
<td>➔ 2 mm</td>
<td>➔ 2 mm</td>
<td>➔ 2 mm</td>
</tr>
</tbody>
</table>

**Bn-s1**

**FLOOR STRUCTURE WITH THERMAL INSULATION**

<table>
<thead>
<tr>
<th>1. Spruce FireResist</th>
<th>2. Insulation, Class A1 ≥ 23 kg/m³, e.g. rock wool</th>
<th>3. Battens</th>
<th>4. Wood based substrate, ≥ 470 kg/m³, e.g. wood based panel</th>
</tr>
</thead>
<tbody>
<tr>
<td>➔ 15 mm</td>
<td>➔ 2 mm</td>
<td>➔ 15 mm</td>
<td>➔ 2 mm</td>
</tr>
</tbody>
</table>

**FLOOR STRUCTURE WITH AIR GAP**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>➔ 15 mm</td>
<td>➔ 2 mm</td>
<td>➔ 2 mm</td>
</tr>
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</table>

**FLOOR STRUCTURE WITH SPRUCE FIRERESIST FIXED TO THE SUBSTRATE**

<table>
<thead>
<tr>
<th>1. Spruce FireResist</th>
<th>2. Substrate - plywood substrate ≥ 400 kg/m³ or - wood based substrate ≥ 470 kg/m³, e.g. wood based panel or - class A1 or A2-s1,d0 substrate ≥ 470 kg/m³, e.g. gypsum board, concrete</th>
<th>3. Battens</th>
</tr>
</thead>
<tbody>
<tr>
<td>➔ 15 mm</td>
<td>➔ 2 mm</td>
<td>➔ 2 mm</td>
</tr>
</tbody>
</table>
Metsä Wood provides competitive and environmentally friendly wood products for construction, industry and distributor partners. The products are manufactured from northern wood, a sustainable raw material of premium quality. Metsä Wood is part of Metsä Group.

For further information and sales contact

WWW.METSAWOOD.COM

METSÄ WOOD
P.O.Box 50
02020 Metsä, Finland
Tel. +358 1046 05

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