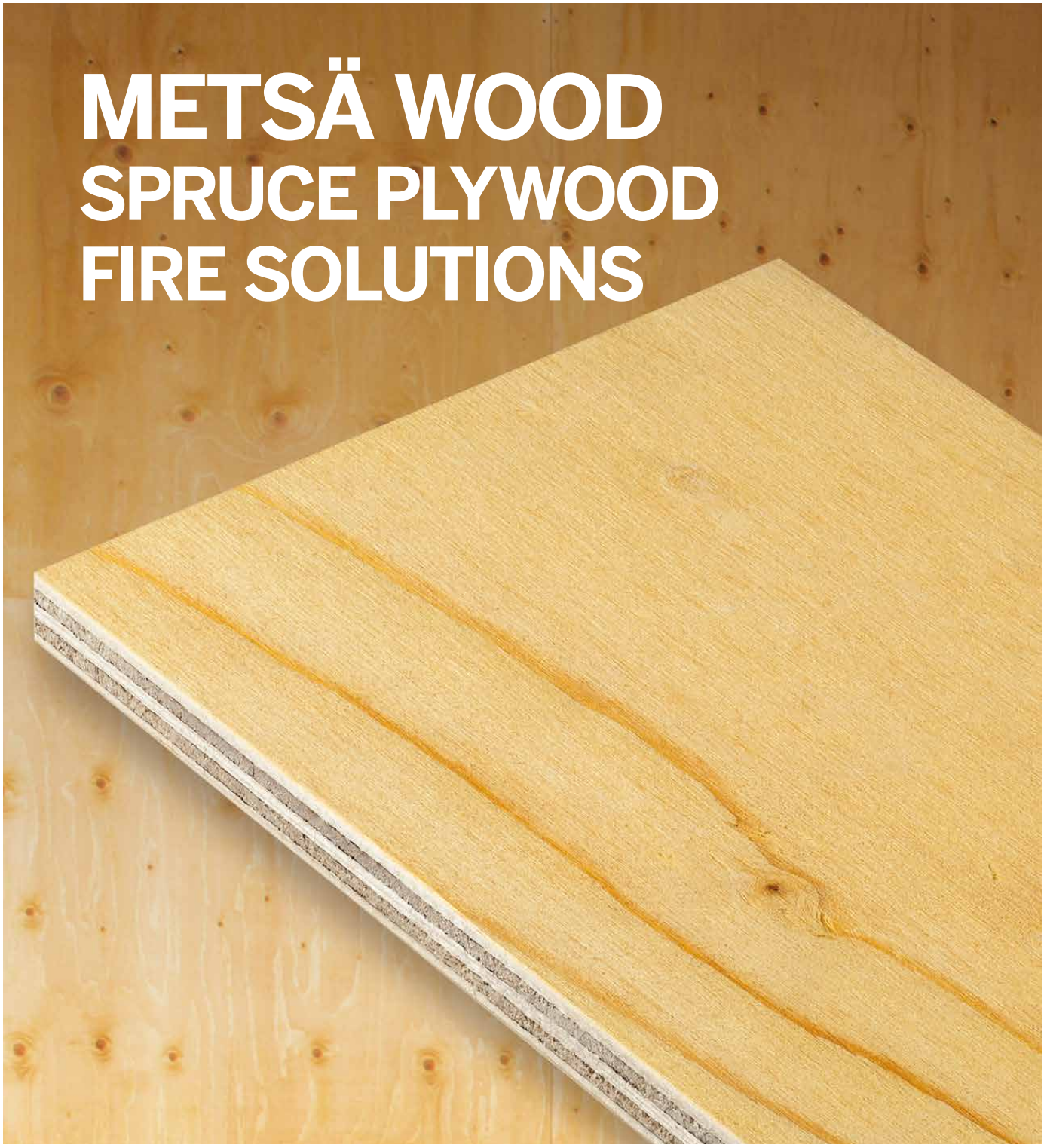
Spruce Ply

EASY ON SITE



Metsä

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.

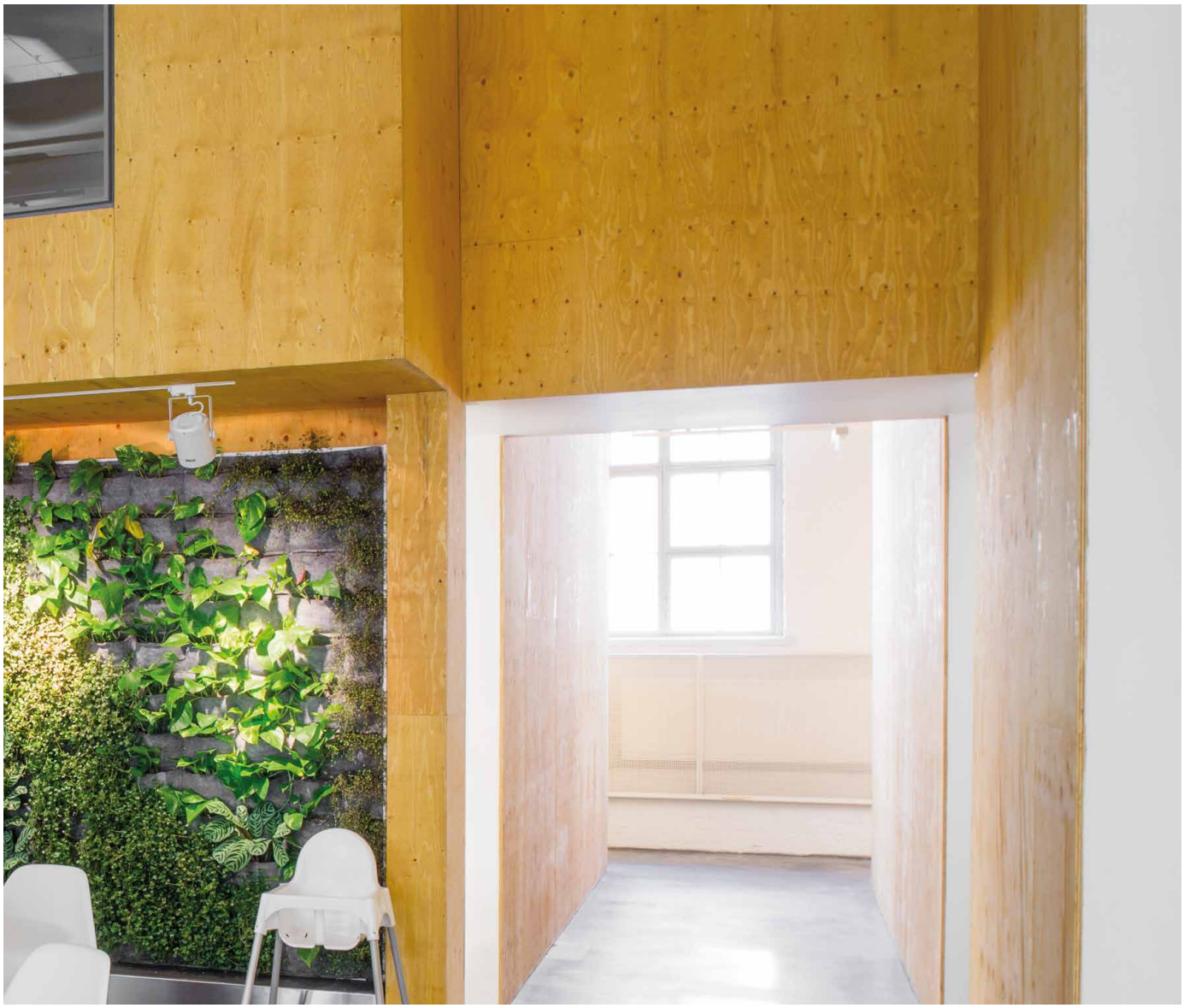
THE MAIN APPLICATIONS ARE:

- 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

PRODUCT	THICKNESS [mm]	MAX SIZES [mm]	REACTION TO FIRE CLASS*	FIRE PROTECTION ABILITY OF A COVERING (K-CLASS)**	END USE CONDITIONS (STRUCTURAL USE)
FireResist	15 – 21	2500 × 1250	B-s1, d0 B_{fl}-s1	$K_2$10 and $K_1$10	Dry (interior)
FireResist	24 – 30	2500 × 1250	B-s1, d0 B_{fl}-s1	$K_2$30	Dry (interior)

* 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 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 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

Spruce FireResist is painted and used in combination with gypsum board to enhance the impact resistance of the wall

Metsä Wood 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).

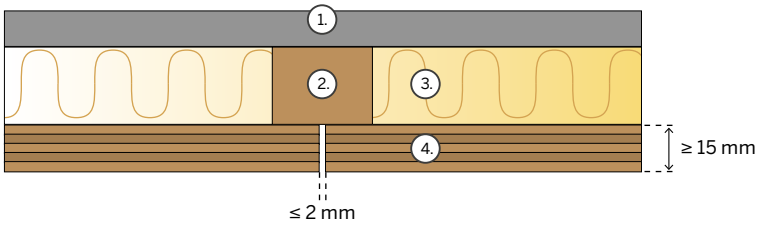
Spruce FireResist does not contain heavy metals, boron or halogenated compounds. The product contains nothing classified as hazardous waste and the product is classified as biofuel. Additional coatings are not recommended for Metsä Wood Spruce FireResist as coatings might affect the fire performance 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 wood-working 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)

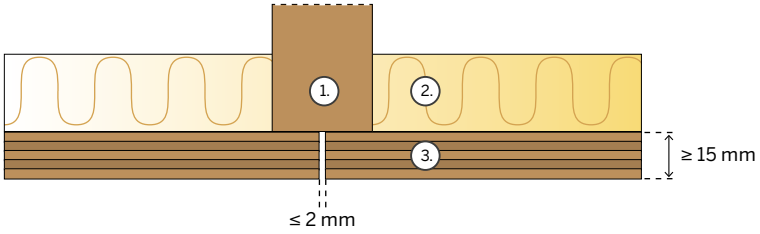
FIELD OF APPLICATION OF THE SPRUCE FIRERESIST EUROPEAN REACTION TO FIRE CLASSIFICATION B-s1, d0 (EXCLUDING FLOORINGS):

- 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



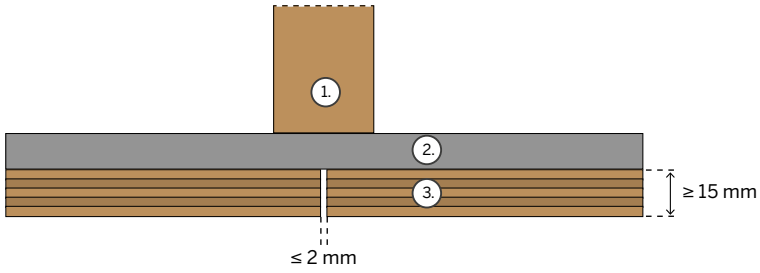
1. Substrate, no demands, e.g. plywood, concrete
2. Wood frame (or optionally metal frame)
3. Insulation at least class A2-s1, d0 ≥ 30 kg/m³, e.g. glass wool or stone wool
4. Spruce FireResist

Figure. Wall or ceiling structure with thermal insulation



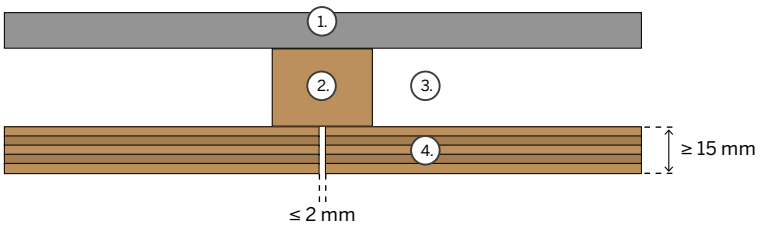
1. Wood frame (or optionally metal frame)
2. Insulation at least class A2-s1, d0 ≥ 30 kg/m³, e.g. glass wool or stone wool
3. Spruce FireResist

Figure. Ceiling structure with thermal insulation



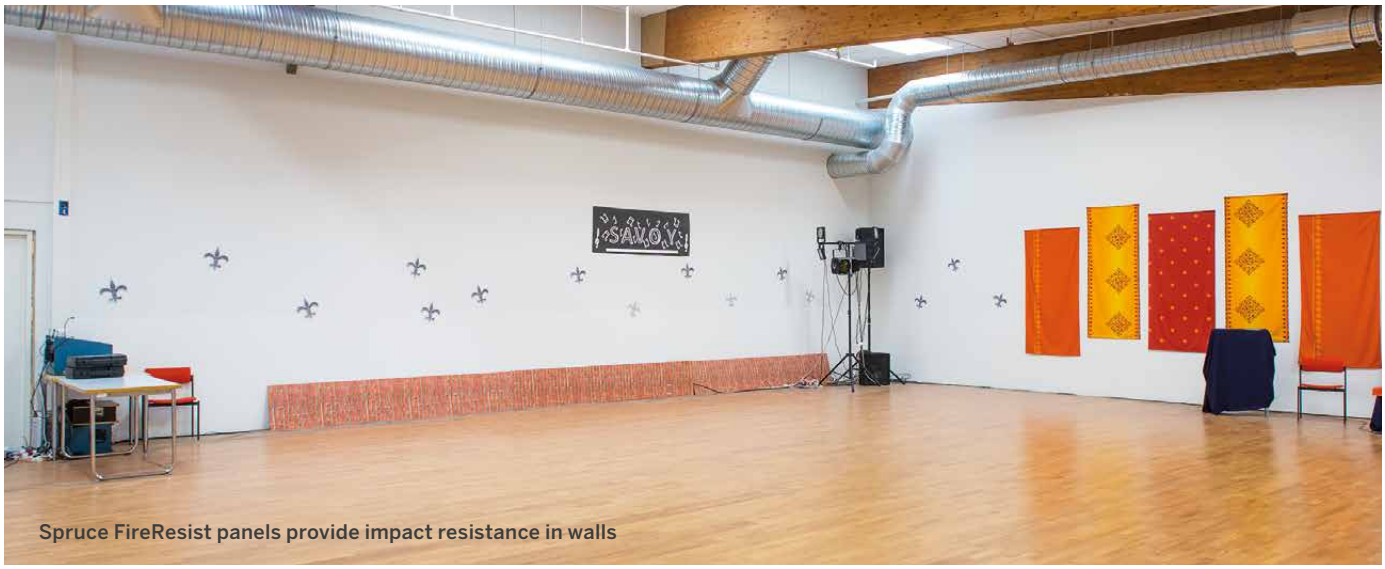
1. Wood frame (or optionally metal frame)
2. Substrate at least class A2-s1, d0 ≥ 30 kg/m³, e.g. concrete, in walls gypsum board
3. Spruce FireResist

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



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

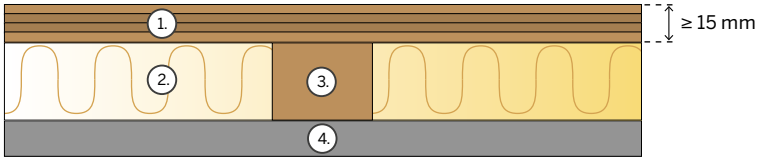
Figure. Wall or ceiling structure with air gap



Spruce FireResist panels provide impact resistance in walls

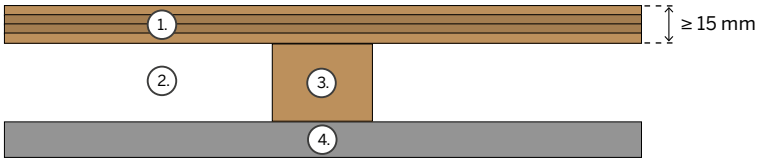
FIELD OF APPLICATION OF THE SPRUCE FIRERESIST EUROPEAN REACTION TO FIRE CLASSIFICATION B_{fl}-s1 FOR FLOORINGS:

- 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)



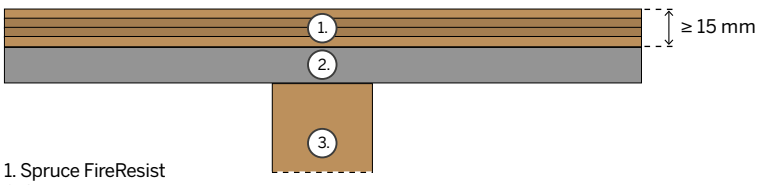
1. Spruce FireResist
2. Insulation, Class A1 or A2-s1, d0 ≥ 23 kg/m³, e.g. glass wool or stone wool
3. Battens
4. Wood based substrate, ≥ 470 kg/m³, e.g. wood based panel

Figure. Floor structure with thermal insulation



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 air gap



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

Figure. Floor structure with Spruce FireResist fixed to the substrate

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

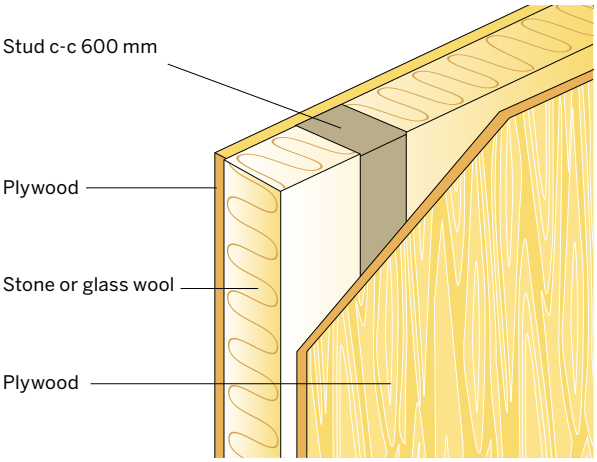
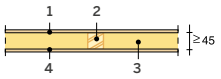
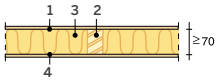
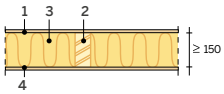


Figure. Example of a fire rated structure for a compartment wall

NON-LOAD-BEARING FIRE COMPARTMENT WALLS

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.

WALL STRUCTURE	STUDS (mm)	MAX. WALL HEIGHT (mm)	FIRE RATING	MATERIAL LAYERS
	45 × 45	3000	EI 15	1. Spruce plywood, min. 15 mm 2. Kerto LVL studs 3. Cavity 4. Spruce plywood, min. 15 mm
	45 × 70	3000	EI 30	1. Spruce FireResist plywood, min. 15 mm 2. Kerto LVL studs 3. Stone wool, min. 70 mm and 30 kg/m³ 4. Spruce FireResist plywood, min. 15 mm
	45 × 150	3000	EI 60	1. Spruce FireResist plywood, min. 18 mm 2. Kerto LVL studs 3. Stone wool, min. 150 mm and 30 kg/m³ 4. Spruce FireResist plywood, min. 18 mm

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

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

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.

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

ONE-DIMENSIONAL CHARRING RATE AND FAILURE TIME OF METSÄ WOOD SPRUCE PLYWOOD PRODUCTS

NOMINAL THICKNESS [mm]	CHARRING RATE β_0 [mm/min]		FAILURE TIME t_f (EN 1995-1-2) [min]	
	WITHOUT MINERAL WOOL IN THE CAVITY BEHIND THE PANEL	WITH MINERAL WOOL IN THE CAVITY BEHIND THE PANEL	WITHOUT MINERAL WOOL IN THE CAVITY BEHIND THE PANEL	WITH MINERAL WOOL IN THE CAVITY BEHIND THE PANEL
9	0,74	1,26	7,5	2,7
12	0,72	1,23	12,0	5,3
15	0,71	1,16	16,4	8,5
18	0,70	1,12	21,0	11,6
21	0,69	1,07	25,7	15,2
24	0,68	1,02	30,6	19,0
27	0,67	0,97	35,6	23,3
30	0,66	0,94	40,7	27,4

Table. European reaction to fire classification

REACTION TO FIRE OF METSÄ WOOD SPRUCE

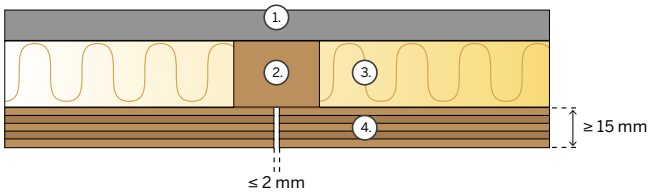
END USE CONDITION	MINIMUM THICKNESS (mm)	CLASS (EXCLUDING FLOORING)	CLASS (FLOORINGS)
Without an air gap behind the panel - mounted directly against class A1 or A2-s1,d0 products with minimum density of 10 kg/m³ or at least class D-s2,d2 products with minimum density of 400 kg/m³ - a substrate of cellulose insulation material of at least class E may be included if mounted directly against the wood-based panel, but not for floorings - 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	9	D-s2, d0	D_{fl}-s1
With a closed or an open air gap of not more than 22 mm behind the panel - 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	9	D-s2, d2	-
With a closed air gap - 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	15	D-s2, d1	D_{fl}-s1
With an open air gap - 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	18	D-s2, d0	D_{fl}-s1

REACTION TO FIRE OF METSÄ WOOD SPRUCE FIRERESIST

END USE CONDITION	MINIMUM THICKNESS (mm)	CLASS (EXCLUDING FLOORING)	CLASS (FLOORINGS)
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	15	B-s1, d0	-
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)	15	-	B_{fl}-s1

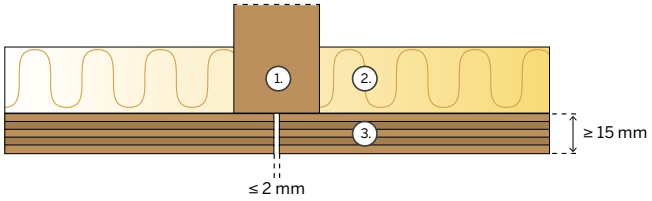
B-s1, d0

WALL OR CEILING STRUCTURE WITH THERMAL INSULATION



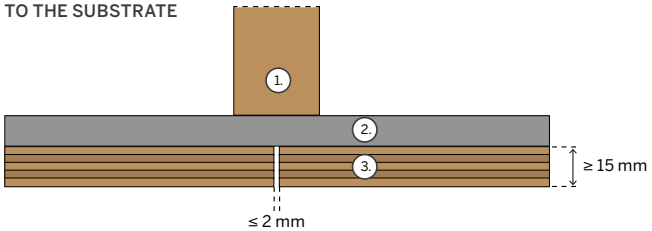
1. Substrate, no demands, e.g. plywood, concrete
2. Wood frame (or optionally metal frame)
3. Insulation at least class A2-s1, d0 ≥ 30 kg/m³, e.g. glass wool or stone wool
4. Spruce FireResist

CEILING STRUCTURE WITH THERMAL INSULATION



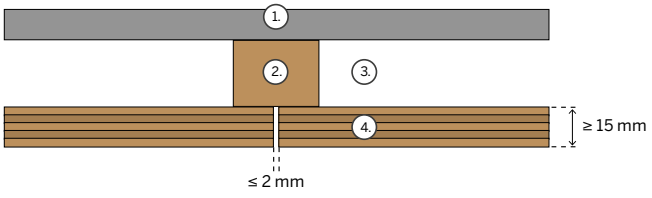
1. Wood frame (or optionally metal frame)
2. Insulation at least class A2-s1, d0 ≥ 30 kg/m³, e.g. glass wool or stone wool
3. Spruce FireResist

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

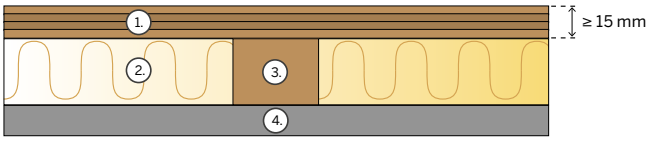
WALL OR CEILING STRUCTURE WITH AIR GAP



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

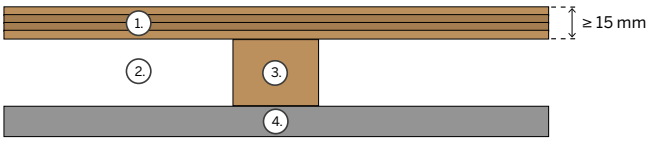
B_{fl}-s1

FLOOR STRUCTURE WITH THERMAL INSULATION



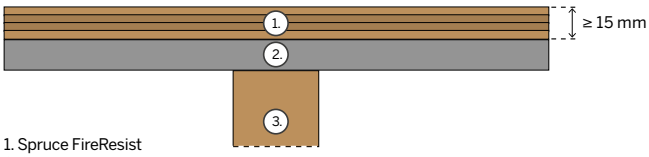
1. Spruce FireResist
2. Insulation, Class A1 ≥ 23 kg/m³, e.g. rock wool
3. Battens
4. Wood based substrate, ≥ 470 kg/m³, e.g. wood based panel

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

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

Metsä

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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.

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