SINTEF

2024:01209 - Confidential

Report

Fibo Wall Panel and Vito Fire Panel – Fire- and acoustic technical properties

Assessment of fire- and acoustic technical properties and areas of applications for Fibo Wall Panel and Vito Fire Panel.

Authors
Anne-Marit Haukø
Anders Homb

SINTEF Community
Building physics/Construction technique and fire safety
2024-11-11

SINTEF Community
Post address:
Postboks 4760 Torgarden
7465 Trondheim
Phone: 40005100

info@sintef.no

Organization number:
NO 919 303 808 MVA

Report

Fibo Wall Panel and Vito Fire Panel – Fire- and acoustic technical properties

Assessment of fire- and acoustic technical properties and areas of applications for Fibo Wall Panel and Vito Fire Panel.

KEYWORDS:
Assessment
Fire
Acoustics
Interior wall
Interior cladding
Vapour barrier
Timber

VERSION	DATE
1.0	2024-11-11

AUTHORS
Anne-Marit Haukø
Anders Homb

CLIENT	CLIENT'S REF.
Fibo AS	Kevin Hægeland

PROSJECT NO.	NUMBER OF PAGES:
102021376	16

SUMMARY

Summary of fire safety assessment and soundproofing properties

This report summarizes the fire safety properties of the Fibo Wall Panel (formerly Fibo Bathroom Wall Panel) and Vito Fire Panel in respect of both surface / material classes and fire resistance. A description is provided of areas of application and any limitations in the use of the wall panels based on their fire-resistant properties. A list of pre-calculated wall constructions with fire resistance and sound reduction indices has also been produced. The report will be used to create a product brochure and provide in-house training to Fibo staff, amongst other things. This report is an English translation of SINTEF Report no. 2024:00300 *FIBO Veggpanel og Vito Fire Panel - Brann- og lydtekniske egenskaper*, dated 17.09.2024.

PREPARED BY	SIGNATURE
Anne-Marit Haukø	Anne-Marit Haukø Anne-Marit Haukø (Nov 11, 2024 12:31 GMT+1)
Anders Homb	Anders Homb
CONTROLLED BY	SIGNATURE
Kathinka Leikanger Friquin	Kathinka Leikanger Friquin
APPROVED BY	SIGNATURE
Ola Asphaug	Ola Asphaug Ola Asphaug (Nov 12, 2024 09:23 GMT+1)

REPORT NO.	ISBN	CLASSIFICATION	CLASSIFICATION CURRENT PAGE
2024:01209	-	Confidential	Confidential

History

VERSION	DATE	VERSION DESCRIPTION
1.0	2024-11-11	English translation of SINTEF Report no. 2024:00300 *FIBO Veggpanel og Vito Fire Panel - Brann- og lydtekniske egenskaper*, dated 17.09.2024. The translation was done by Jan Ove Hennøy (Språkverkstaden) and Anne-Marit Haukø (SINTEF).

Table of contents

1 Background and scope 4

2 Baseline documents 4

3 Properties 4

3.1 Fibo Wall Panel 4

3.2 Vito Fire Panel 5

4 Requirements to fire- and acoustic properties 5

5 Areas of application 5

5.1 Fibo Wall Panel 5

5.2 Vito Fire Panel 7

6 Fire resistance and sound reduction for walls 7

6.1 The effect of raised panel 7

6.2 Methods for determining fire resistance and sound reduction 8

6.2.1 Fire Resistance 8

6.2.2 Sound reduction 9

6.3 Fire resistance and sound reduction indices for walls with Fibo Wall Panel 9

6.3.1 Walls with continuous timber studs – One or two board layers 9

6.3.2 Walls with double solid timber studs – One or two board layers 11

7 Summary/conclusion 15

8 References 16

1 Background and scope

Fibo AS has asked SINTEF to help assess the fire- and acoustic technical properties of the Fibo Wall Panel (formerly known as the Fibo Bathroom Wall Panel) and the Vito Fire Panel. This report is based on text and evaluations from the earlier report *Fibo Baderomspanel – Brann og lydtekniske egenskaper* v. 3.0 dated 30.04.2020.

The assessment is based on the prevailing Regulations on technical requirements for construction works ("Byggteknisk forskrift – TEK17") [1] with guidance notes.

The project does not involve planning, design and testing. The previous report included calculations to determine whether the Fibo panel, when fitted on an EI 30 or EI 60 wall, causes reduced overall fire resistance performance. This report also incorporates calculations where the Fibo Wall Panel extends to floor level, thus contributing to the fire resistance. The project only addresses properties related to fire and acoustics, and SINTEF takes reservations that other properties may imply other limitations on use than those described in this report.

2 Baseline documents

The fire safety assessment is based on documentation supplied by Fibo, which includes the following:

- Fibo brann- og lyddokument (brochure produced by Fibo, used at the early stages of the project in 2019 – the document has since expired), undated
- Classification report from testing of Fibo-Trespo Bathroom Panel, SINTEF NBL AS, report no. 102010.02/12.042 dated 04.07.2012 (classification according to EN 13501-1, core made from plywood with density 780 kg/m^3)
- Classification of reaction to fire in accordance with EN 13501-1, RISE Research Institutes of Sweden AB, report no. O100352-164145-1 dated 04.05.2022 (classification of Vito Fire Panel)
- Classification of reaction to fire in accordance with EN 13501-1, RISE Research Institutes of Sweden AB, report no. O100609-197758-2 dated 04.05.2022 (classification of Fibo Wall Panel, core made from plywood with densities 490 and 630 kg/m^3)

3 Properties

3.1 Fibo Wall Panel

Fibo Wall Panel is a watertight cladding system based on plywood boards coated with a high-pressure laminate at the front and barrier laminate at the back. The boards have a density of approx. 10 mm, and the density of the core is approx. 490, 630 and 780 kg/m^3, respectively.

Fibo Wall Panel in combination with Fibo Seal applied in all joints and a core with density 780 kg/m^3 has a fire classification of **D-s1,d0** [2], in accordance with EN 13501-1 [3], when used on a wooden substrate with a minimum thickness of 12 mm and a minimum density of 630 kg/m^3, or on other substrates with a fire classification of at least A1 or A2-s1,d0 with a minimum density of 14.4 kg/m^3. The classification thus applies to substrates such as timber stud walls insulated with mineral wool, to wood fibre-based boards or to gypsum boards. The boards may be fitted with a cavity between the board and the substrate.

Fibo Wall Panel with a core with densities of 490 and 630 kg/m^3 has a fire classification of **D-s1,d0** [4], in accordance with EN 13501-1 [3], when used on a substrate of gypsum boards or on other substrates with a fire classification of at least A1 or A2-s1,d0 with a minimum thickness of 12 mm and minimum density of 525 kg/m^3. Or on a substrate with a fire classification of at least A1 or A2-s1,d0 with a minimum thickness

of 20 mm and minimum density of 38 kg/m^3. Alternatively, the boards may be fitted using wooden battens or steel battens creating a cavity of at least 36 mm between the board and the substrate. Behind the cavity there may be a wooden substrate with a minimum thickness of 10 mm or other substrate with a fire classification of at least A1 or A2-s1,d0 and a minimum thickness of 6 mm and minimum density of 510 kg/m^3. The cavity may be filled with mineral wool. The classification thus applies to substrates such as timber stud walls insulated with mineral wool, or gypsum boards.

3.2 Vito Fire Panel

Vito Fire Panel is a wall panel made from compact laminate in accordance with EN 438-7 [5] for use in dry areas. The panel has a nominal thickness of 6.4 mm and a density of approx. 1350 kg/m^3.

The Vito Fire Panel has a fire rating of **B-s1,d0** [6], in accordance with EN 13501-1 [3], when used on a substrate of gypsum boards or on other substrates with a fire classification of at least A1 or A2-s1,d0 with a minimum thickness of 12 mm and minimum density of 525 kg/m^3. Or on a substrate with a fire classification of at least A1 or A2-s1,d0 with a minimum thickness of 20 mm and minimum density of 38 kg/m^3. Alternatively, the boards may be fitted using wooden battens or steel battens creating a cavity of at least 36 mm between the board and the substrate. Behind the cavity there may be a wooden substrate with a minimum thickness of 8 mm or other substrate with a fire classification of at least A1 or A2-s1,d0 and a minimum thickness of 6 mm and minimum density of 338 kg/m^3. The cavity may be filled with mineral wool. The classification thus applies to substrates such as timber stud walls insulated with mineral wool, or gypsum boards.

Compact laminate is not a standard timber-based board which can be included in calculations of fire resistance in accordance with EN 1995-1-2 [7] or *Brandsäkra trähus* version 3 [8].

4 Requirements to fire- and acoustic properties

TEK17 describes the requirements for fire safety and acoustic insulation in buildings. The guidance notes to TEK17 set out pre-accepted performance levels for fire resistance and sound reduction indices for building products and building components. The requirements and pre-accepted performance levels vary depending on the activities taking place in the building and the building's size. When deciding which wall construction to use, you must therefore identify the requirements and pre-accepted performance levels for the building in question and consequently which properties the wall needs to have.

5 Areas of application

5.1 Fibo Wall Panel

According to the TEK17 guidance notes, the Fibo Wall Panel may be used as surface in **fire compartments with a floor area of less than 200 m^2** in buildings in **hazard classes 1–5** in **fire classes 1–3** in accordance with Table 1 below. For **fire compartments with a floor area greater than 200 m^2**, its use is restricted to **hazard classes 1–5** in **fire class 1**.

Table 1 Areas of application in buildings in hazard classes 1–5

	Brannklasse		
Overflater og kledninger	1	2	3
Overflater i brannceller som ikke er rømningsvei			
Overflater på vegger og i himling/tak i branncelle inntil 200 m^2	D-s2,d0 [In 2]	D-s2,d0 [In 2]	D-s2,d0 [In 2]
Overflater på vegger og i himling/tak i branncelle over 200 m^2	D-s2,d0 [In 2]	B-s1,d0 [In 1]	B-s1,d0 [In 1]

Examples of buildings in hazard classes 1–5 could be:

- Class 1: Site cabins, aircraft hangars, cold storage facilities, sawmills
- Class 2: Agricultural buildings, industrial buildings, offices, storage facilities
- Class 3: Kindergartens, schools
- Class 4: Apartments, housing barracs, children's homes, cabins, student accommodation
- Class 5: Assembly rooms, sports halls, churches, museums, retail outlets, shopping centres

The product may not be used in escape routes or in buildings in hazard class 6 where the pre-accepted performance level of surfaces is B-s1,d0 (regardless of the size of the fire compartment) without additional safety assessments, according to the TEK17 guidance notes. The use of the Fibo Wall Panel would then be a deviation from the guidance notes, and the responsible designer for fire safety in the building in question must document fire safety by performing a fire safety analysis. Typical buildings in hazard class 6 would be:

- Hospitals and nursing homes
- Sheltered housing
- Hotels and other guest accommodation
- School camps
- Reception centres for asylum seekers
- Prisons

If a $K_2$10 cladding is needed to protect the underlying construction, the use of Fibo Wall Panels must be evaluated by a fire safety consultant on a case-by-case basis.

5.2 Vito Fire Panel

Vito Fire Panel can be used as surface in all **fire compartments** in buildings in **hazard classes 1–6** in **fire classes 1, 2 and 3** in accordance with Table 2 below.

Table 2 Areas of application in buildings in hazard class 6

	Brannklasse		
Overflater og kledninger	1	2	3
Overflater i brannceller som ikke er rømningsvei			
Overflater på vegger og i himling/tak, og i sjakter og hulrom	B-s1,d0 [In 1]	B-s1,d0 [In 1]	B-s1,d0 [In 1]

If a $K_2 10$ cladding is needed to protect the underlying construction, the use of Vito Fire Panel must be evaluated by a fire safety consultant on a case-by-case basis.

6 Fire resistance and sound reduction for walls

6.1 The effect of raised panel

It is common to raise Fibo Wall Panels some 6–8 cm off the floor and replace it with either vinyl or skirting tiles, as shown below:

Figure 1 Fibo Wall Panels raised 6–8 cm off the floor and replaced with vinyl or skirting tiles

Fire: When raising the panels off the floor, the panels' contribution to fire resistance performance can no longer be included in the calculations. To maintain the desired fire rating, e.g. EI 30 or EI 60, fire resistance must be provided entirely by the underlying wall. The outer layer of Fibo Wall Panels will then not be included in the calculation.

Sound insulation: On walls were Fibo panels are fitted on top of existing cladding, it will be of no material significance if the bottom of the panels is replaced with skirting tiles or vinyl coving. Sound insulation will be slightly improved due to the higher surface density of the wall, see also section 7.2.2.

6.2 Methods for determining fire resistance and sound reduction

6.2.1 Fire Resistance

SINTEF Community has performed fire resistance calculations for a selection of wall constructions, which are reported in an internal document. The calculations have been carried out in accordance with EN 1995-1-2 *Eurocode 5: Design of timber structures – Part 1-2: Structural fire design* and the methods described in the handbook *Brandsäkra trähus* version 3, 2012. The fire resistance is calculated on the basis of generic values for cladding panels and insulation and is not based on testing of specific products. Testing of wall constructions with specific products could yield somewhat better results than calculations. The calculated walls are symmetrical, have identical cladding on both sides, and have been calculated without Fibo Wall Panel or Vito Fire Panel.

Calculated fire resistance is given in *Table 3*, *Table 4*, *Table 5* and *Table 6* in chapters 6.3.1 and 6.3.2. The following criteria have been applied to the table values:

- The fire resistance only covers products specified in this document.
- Wooden cladding behind the Fibo Wall Panel could be:
  - plywood boards in accordance with NS-EN 636, characteristic density at least 400 kg/m^3, thickness at least 9 mm
  - chipboard in accordance with NS-EN 312, characteristic density at least 500 kg/m^3, thickness at least 9 mm
  - OSB in accordance with NS-EN 300, characteristic density at least 550 kg/m^3, thickness at least 9 mm
- Gypsum 13 means 13 mm gypsum board type A (standard), in accordance with NS-EN 520
- Gypsum 15 means 15 mm gypsum board type F (fire resistant gypsum board), in accordance with NS-EN 520
- Stone wool in accordance with NS-EN 13162, minimum density 26 kg/m^3
- Glass wool in accordance with NS-EN 13162, minimum density 15 kg/m^3
- Load-bearing studs are at least strength class C18 in accordance with NS-EN 338
- Max. wall height 2.4 m with max. 2.4 m buckling length
- Constructions made from solid timber studs
- Fire resistance applies to fire exposure from one side, symmetrical fire-resistant internal wall

According to the calculation methods, it is the outer board layer that makes the greatest contribution to the fire resistance, and the subsequent layers of insulation and boards will gradually make a lesser contribution to the overall fire resistance. When a raised Fibo panel is fitted on the outside of an EI 30 wall, for instance, the wall may therefore be less fire-resistant since the outermost plywood layer is less fire-resistant than a gypsum board. For that reason, SINTEF has performed calculations to determine the effects thereof:

- The fire resistance of a 48x98 mm stud wall with 100 mm of stone wool and one layer of type A gypsum board on both sides was calculated to be around 2 minutes longer with Fibo panels as the outermost layer.
- The fire resistance of a 48x123 mm stud wall with 120 mm of stone wool and two layers of type A gypsum board on both sides was calculated to be around 3 minutes longer with Fibo panels as the outermost layer.

The calculations thus showed that a raised Fibo panel fitted on the outside of an EI 30 or EI 60 wall covered with gypsum board will not compromise the overall fire resistance of the wall. Based on the calculations, fitting Fibo Wall Panels would not reduce the fire resistance of a wall with wood fibre-based cladding either.

The fire resistance of wall constructions with steel studs cannot be determined using the same methodology as for walls with timber studs. To calculate the fire resistance of walls with steel studs, one would first need to conduct full-scale fire testing in a fire laboratory, or alternatively look for other calculation methods.

6.2.2 Sound reduction

The soundproofing properties of partitions can be determined by calculations or measurements. Since a number of wall constructions have been measured in a laboratory and frequently also in completed buildings, stated values (e.g. in the Byggforsk series) are often based on measured values, see reference 524.325 [9]. Calculations are used as a supplement when looking to determine sound reduction indices for a variant that has yet to be measured. The most important factors would then be the surface density of the wall, the bending stiffness of the boards, connections between the two sides of the wall, and cavity resonance. Increased surface density on either side, increased cavity distance and reduced contact/connections between the boards on either side (e.g. when using independent studwork) improves sound insulation. Increased bending stiffness of the board impairs sound insulation since it results in more unfavorable sound radiation in the audible frequency range. The sound reduction values stated in *Table 3*, *Table 4*, *Table 5* and *Table 6* are based on the values provided in the aforementioned reference, but in the case of certain variants, the values have been adjusted due to increased surface density caused by the Fibo panels being fitted on the outside of other board cladding. Other variants can be calculated, but that was not within the scope of this project.

6.3 Fire resistance and sound reduction indices for walls with Fibo Wall Panel

6.3.1 Walls with continuous timber studs – One or two board layers

These walls are primarily used as fire resistant walls where there are no, or less stringent, soundproofing requirements (see sound classification standard NS 8175 [10]). The values in *Table 3* apply when the Fibo Wall Panel is fitted on the outside of a chosen wall construction (raised design), while *Table 4* is applicable when the Fibo Wall Panel runs from floor level to ceiling and is incorporated into the wall's fire resistance. Internal fire resistant walls must have a fire resistance rating of at least 30 minutes. Walls with a fire resistance rating of 15 minutes are therefore not included in the table.

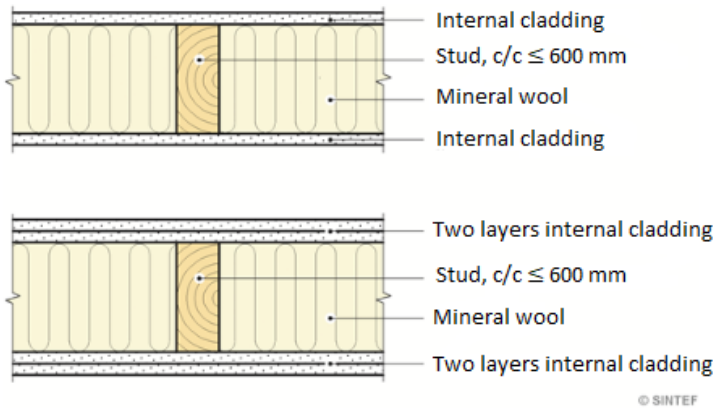

Figure 2 Principal design of internal wall with single-stud timber studwork and one or two board layers on each side of the wall

Table 3 states the calculated fire resistance of symmetrical internal walls with single-stud timber studwork, one-sided fire exposure, obtained from the Byggforsk series [11]. The table describes the construction with

cladding type, studwork dimensions, insulation thickness and fire resistance for walls with glass wool and stone wool. The values in the glass wool and stone wool columns refer to the fire resistance of the respective wall with the chosen insulation type. The first value is the period of fire resistance, while the value in parentheses is the design load capacity during fire given as kN/m after 30 and 60 minutes respectively. When both values are 0, the wall construction in question does not achieve fire rating REI 30 or REI 60. *Table 4* describes equivalent fire resistance, but specifically for cladding with 10 mm Fibo Wall Panel (alone or in combination with wooden cladding behind) from floor to ceiling. *Table 3* and *Table 4* also state the expected sound reduction index in the completed building, R'_w (dB), based on empirical figures from Byggdetaljer 524.325 [9].

Table 3 Fire resistance and sound reduction for symmetrical internal walls with single-stud timber studwork. One-sided fire exposure. Fibo Wall Panel is fitted on the outside of the construction.

Cladding	Studwork	Insulation	Fire resistance (Design load capacity during fire[1] kN/m)				Sound Expected value in completed building R'_w (dB)
			Glass wool		Stone wool		
	mm x mm	mm	30 min	60 min	30 min	60 min	
Wooden cladding [4) 5)]	48 × 98	100	0 (0)	0 (0)	REI 30 (9)	0 (0)	36-38
Wooden cladding [5)]	36 × 123	125	0 (0)	0 (0)	REI 30 (19)	0 (0)	-
Wooden cladding [5)]	48 × 123	125	[3)]	[3)]	REI 30 (34)	0 (0)	-
Gypsum 13	36 × 73	75	0 (0)	0 (0)	0 (0)	0 (0)	36-38
Gypsum 13	48 × 98	100	0 (0)	0 (0)	REI 30 (16)	0 (0)	39-42
Gypsum 13	48 × 123	125	0 (0)	0 (0)	REI 30 (50)	0 (0)	-
2 × Wooden cladding [5)]	48 × 123	125	0 (0)	0 (0)	REI 30 (36)	0 (0)	-
2 × Gypsum 13	48 × 123	125	REI 30 (Full)	0 (0)	REI 30 (Full)	REI 60 (2,0)	-
Gypsum 15 + Gypsum 13	48 × 123	125	REI 30 (Full)	REI 60 (83)[2)]	REI 30 (Full)	REI 60 (83)[2)]	-

1) Where the load capacity in the event of fire is stated as "Full", the load-bearing system will not char because the board cladding protects the underlying construction for the full duration of the fire resistance period. The ultimate limit state or serviceability limit state will then determine the load-bearing capacity of the wall.
2) The cladding provides protection as long as charring only occurs on the side of the stud facing the fireroom. The fire resistance is therefore the same as for walls with glass wool and stone wool.
3) No calculations have been performed for this internal wall.
4) For sound insulation purposes, wooden-based cladding with beneficial sound radiation properties must be used, see Byggdetaljer 524.325.
5) Applies to Fibo Wall Panel with a density of at least 780 kg/m^3.

Table 4 Fire resistance and sound reduction for symmetrical internal walls with single-stud timber studwork and Fibo Wall Panel. One-sided fire exposure. Fibo Wall Panel fitted from floor to ceiling.

Cladding[3)]	Studwork mm x mm	Insulation mm	Fire resistance (Design load capacity during fire[1)] kN/m)				Sound Expected value in completed building R'_w (dB)
			Glass wool		Stone wool		
			30 min	60 min	30 min	60 min	
10 mm Fibo Wall Panel	48 × 98	100	0 (0)	0 (0)	REI 30 (9)	0 (0)	39-42
10 mm Fibo Wall Panel	36 × 123	125	0 (0)	0 (0)	REI 30 (20)	0 (0)	-
10 mm Fibo Wall Panel	48 × 123	125	0 (0)	0 (0)	REI 30 (34)	0 (0)	-
10 mm Fibo Wall Panel [4)] + Wooden cladding	48 × 123	125	0 (0)	0 (0)	REI 30 (39)	0 (0)	-

1) Where the load capacity in the event of fire is stated as "Full", the load-bearing system will not char because the board cladding protects the underlying construction for the full duration of the fire resistance period. The ultimate limit state or serviceability limit state will then determine the load-bearing capacity of the wall.
2) No calculations have been performed for this internal wall.
3) If the back of the wall does not have a cladding with Fibo Wall Panel, it can have a cladding with at least 10 mm plywood with a density of at least 490 kg/m^3 or more (as the outermost layer).
4) Applies to Fibo Wall Panel with a density of at least 780 kg/m^3.

6.3.2 Walls with double solid timber studs – One or two board layers

These walls are primarily used as partition walls between apartments. The values stated in *Table 5* apply to walls where Fibo Wall Panel is fitted on the outside of the chosen wall construction (raised design). *Table 6* applies when Fibo Wall Panel is fitted on the entire wall from floor to ceiling and should be incorporated when calculating the wall's fire resistance. Partition walls must have a fire resistance of at least 30 minutes. Walls with a fire resistance of 15 minutes are therefore not included in the table. There are also criteria for the sound reduction index.

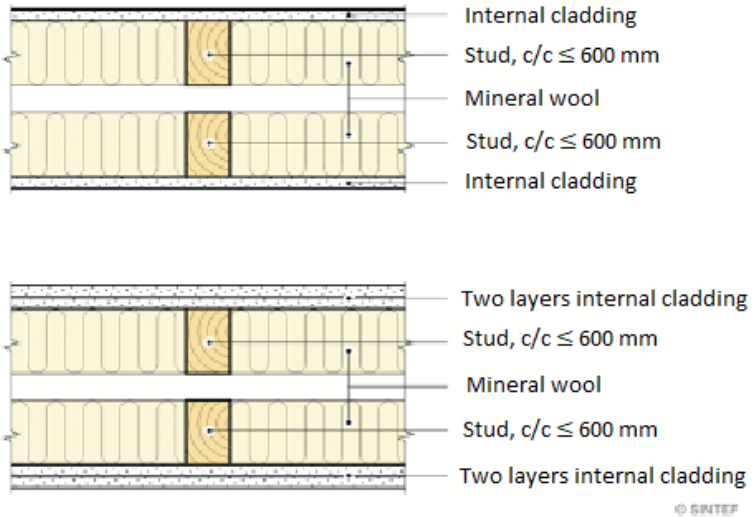

Figure 3 Principal design of internal wall with double-stud timber studwork and one or two board layers on each side of the wall

Table 4 states the calculated fire resistance of internal walls with double-stud timber studwork, one-sided fire exposure, obtained from the Byggforsk series [11]. The table describes the construction with cladding type, studwork dimensions, insulation thickness and fire resistance for walls with glass wool and stone wool. The values in the glass wool and stone wool columns refer to the fire resistance of the respective wall with the chosen insulation type. The first value is the period of fire resistance, while the value in parentheses is the design load capacity during fire given as kN/m after 30 and 60 minutes respectively. When both values are 0, the wall construction in question does not achieve fire rating REI 30 or REI 60. *Table 5* describes equivalent fire resistance, but specifically for cladding with 10 mm Fibo Wall Panel (alone or in combination with wooden cladding behind) from floor to ceiling. *Table 5* and *Table **6*** also state the expected sound reduction index in the completed building, R'_w (dB), based on empirical figures from Byggdetaljer 524.325 [9].

Table 5 Fire resistance and sound reduction for symmetrical internal walls with double-stud timber studwork. One-sided fire exposure. Fibo Wall Panel is fitted on the outside of the construction.

Cladding	Studwork	Insulation	Fire resistance (Design load capacity during a fire[1] kN/m)				Sound Expected value in completed building R'_w (dB) [5]
			Glass wool		Stone wool		
	mm x mm	mm	30 min	60 min	30 min	60 min	
Gypsum 13	2 × 36 × 73	2 × 75	EI 30 (0)	0 (0)	EI 30 (0)	0 (0)	ca. 51
Gypsum 13	2 × 48 × 73	2 × 75	EI 30 (0)	0 (0)	REI 30 (2,3)	0 (0)	ca. 52
Wooden cladding [3) 4)] + Gypsum 13	2 × 36 × 73	2 × 75	EI 30 (0)	0 (0)	REI 30 (1,2)	0 (0)	ca. 54
Gypsum 13 + Wooden cladding [3)]	2 × 36 × 73	2 × 75	EI 30 (0)	0 (0)	REI 30 (1,2)	0 (0)	ca. 54
2 × Wooden cladding [3) 4)]	2 × 48 × 73	2 × 75	0 (0)	0 (0)	0 (0)	0 (0)	ca. 53
2 × Gypsum 13	2 × 48 × 98	2 × 100	REI 30 (Full)	0 (0)	REI 30 (Full)	0 (0)	ca. 57
2 × Gypsum 13	2 × 36 × 73	2 × 75	REI 30 (Full)	0 (0)	REI 30 (Full)	0 (0)	ca. 55
Gypsum 15	2 × 36 × 73	2 × 75	REI 30 (8,0) [2)]	0 (0)	REI 30 (8,0)[2)]	0 (0)	ca. 53
Gypsum 15	2 × 48 × 73	2 × 75	REI 30 (12) [2)]	0 (0)	REI 30 (12)[2)]	0 (0)	ca. 53
Gypsum 15	2 × 48 × 98	2 × 100	REI 30 (41) [2)]	0 (0)	REI 30 (41)[2)]	0 (0)	ca. 55
2 × Gypsum 15	2 × 36 × 73	2 × 75	REI 30 (Full)	REI 60 (8,0)[2)]	REI 30 (Full)	REI 60 (8,0)[2)]	ca. 56
2 × Gypsum 15	2 × 48 × 73	2 × 75	REI 30 (Full)	REI 60 (12)[2)]	REI 30 (Full)	REI 60 (12)[2)]	ca. 56
2 × Gypsum 15	2 × 48 × 98	2 × 100	REI 30 (Full)	REI 60 (41)[2)]	REI 30 (Full)	REI 60 (41)[2)]	ca. 58

1) Where the load capacity in the event of fire is stated as "Full", the load-bearing system will not char because the board cladding protects the underlying construction for the full duration of the fire resistance period. The ultimate limit state or serviceability limit state will then determine the load-bearing capacity of the wall.

2) The cladding provides protection as long as charring only occurs on the side of the stud facing the fireroom. The fire resistance is therefore the same as for walls with glass wool and stone wool.

3) For sound insulation purposes, wooden-based cladding with beneficial sound radiation properties must be used, see Byggdetaljer 524.325.

4) Applies to Fibo Wall Panel with a density of at least 780 kg/m^3.

5) There must be a distance of at least 25–30 mm between independent studs and ground beams.

Table 6 Fire resistance and sound reduction for symmetrical internal walls with double-stud timber studwork and Fibo Wall Panel. One-sided fire exposure. Fibo Wall Panel fitted from floor to ceiling.

Cladding[3]	Studwork	Insulation	Fire resistance (Design load capacity during a fire[1] kN/m)				Sound Expected value in completed building R'_w (dB) [5]
			Glass wool		Stone wool		
	mm x mm	mm	30 min	60 min	30 min	60 min	
10 mm Fibo Wall Panel + Gypsum 13	2 × 36 × 73	2 × 75	0 (0)	0 (0)	REI 30 (1,3)	0 (0)	ca. 54
10 mm Fibo Wall Panel + Gypsum 15	2 × 36 × 73	2 × 75	REI 30 (7,7)	0 (0)	REI 30 (2,2)	0 (0)	ca. 55
10 mm Fibo Wall Panel + Gypsum 13	2 × 48 × 98	2 × 100	REI 30 (5,4)	0 (0)	REI 30 (7,1)	0 (0)	ca. 56
10 mm Fibo Wall Panel [4] + Wooden cladding [2]	2 × 48 × 98	2 × 100	0 (0)	0 (0)	REI 30 (4,1)	0 (0)	ca. 55[6]

1) Where the load capacity in the event of fire is stated as "Full", the load-bearing system will not char because the board cladding protects the underlying construction for the full duration of the fire resistance period. The ultimate limit state or serviceability limit state will then determine the load-bearing capacity of the wall.
2) For sound insulation purposes, wooden-based cladding with beneficial sound radiation properties must be used, see Byggdetaljer 524.325.
3) If the back of the wall does not have a cladding with Fibo Wall Panel, it can have a cladding with at least 10 mm plywood with a density of at least 490 kg/m^3 or more (as the outermost layer).
4) Applies to Fibo Wall Panel with a density of at least 780 kg/m^3.
5) There must be a distance of at least 25–30 mm between independent studs and ground beams.
6) For sound insulation purposes, each of the four board layers must have a surface density of at least 7.5 kg/m^2.

7 Summary/conclusion

The assessments shows that the Fibo Wall Panel can be used as surface cladding in fire compartments (e.g. in apartments) of up to 200 m^2 in buildings in hazard classes 1–5 in fire classes 1, 2 and 3. Its use in larger fire compartments, in escape routes or in hazard class 6 must be assessed on a case-by-case basis by the fire safety consultant on each building project.

The Vito Fire Panel can be used as surface cladding in all fire compartments in buildings in hazard classes 1–6 in fire classes 1, 2 and 3. Its use in escape routes must be assessed on a case-by-case basis by the fire safety consultant on each building project.

SINTEF has calculated that the fire resistance of walls with gypsum board or wooden-based boards is not compromised by fitting raised Fibo Wall Panels on the outside. The fire resistance of selected walls with raised panels is stated in *Table **3*** and *Table 5*. The fire resistance of selected walls with 10 mm Fibo Wall Panel fitted from floor to ceiling is given in *Table **4*** and *Table **6***. The fire resistance stated in the tables only applies to the wall constructions described in the tables.

Expected values for sound insulation in table 4 show that the sound insulation requirement between residential units of $R'_w \geq 55$ dB can be obtained with a wall fitted with Fibo Wall Panel on the outside of at least one layer of fire-rated gypsum board or 2 layers of standard gypsum board on both sides of the wall provided the cavity between the wall frames is at least 200 mm (separate studs), albeit with the former being within a very tight margin of the threshold value. In the case of cavities down to 150 mm (still with separate studs), at least 2 layers of standard gypsum board or 2 layers of fire-rated gypsum board + Fibo panels are required to achieve the same expected value in the completed building. With standard gypsum board, the margin to the threshold value is very tight.

8 References

[1] The Norwegian Building Authority, 'Byggteknisk forskrift TEK17'. The Norwegian Building Authority, 2017. Accessed: Aug. 09, 2022. [Online]. Available: https://dibk.no/regelverk/byggteknisk-forskrift-tek17/

[2] SINTEF NBL, 'Klassifikasjonsrapport fra prøving av Fibo-Trespo Baderomspanel', Trondheim, Norway, 102010.02/12.042, Jul. 2012.

[3] CEN, *EN 13501-1 Fire classification of construction products and building elements - Part 1: Classification using data from reaction to fire tests*, 2018.

[4] RISE Research Institutes of Sweden AB, 'Classification of reaction to fire in accordance with EN 13501-1', O100609-197758–2, May 2022.

[5] CEN, *EN 438-7:2005 High-pressure decorative laminates (HPL) - Sheets based on thermosetting resins (Usually called Laminates) - Part 7: Compact laminate and HPL composite panels for internal and external wall and ceiling finishes*, 2005.

[6] RISE Research Institutes of Sweden AB, 'Classification of reaction to fire in accordance with EN 13501-1', Sweden, O100352-164145–1, May 2022.

[7] CEN, *EN 1995-1-2:2004+NA:2010 Eurocode 5: Design of timber structures - Part 1-2: General - Structural fire design*, Mar. 01, 2010.

[8] B. Östman, J. König, and B. Schmid, *Brandsäkra trähus version 3*, 3rd ed. SP Trä, 2012.

[9] SINTEF, 'SINTEF Byggforskserien 524.325 Lydisolasjon for innervegger av bindingsverk'. 2020.

[10] Standard Norge, *NS 8175:2019 Lydforhold i bygninger. Lydklasser for ulike bygningstyper*, 2019.

[11] SINTEF, 'SINTEF Byggforskserien 520.322 Brannmotstand for vegger av tre, mur og betong'. 2021.

SINTEF

Technology for a better society