DANAK
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File No.: *PG10934*
Serial No.: *8463*
Re.: *AB/NA/ab*
Encl.: *20*

Test Report

Non-loadbearing wall

Fermacell Skandinavien
Selma Lagerløfs Allé 52
DK-2860 Søborg
Denmark

Danish Institute of Fire and Security Technology

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1 Name of Sponsor

Fermacell Skandinavien
Selma Lagerløfs Allé 52
DK-2860 Søborg
Denmark

2 Date of Test

2002-02-19

3 Standard

EN 1364-1:1999 Fire resistance tests for non-loadbearing elements-Part 1: Walls.

4 Drawings and description of the Test Specimen

Details of the construction are shown in the enclosed drawings designated:

1 S 15, drawing No. 1.1
1 S 15, drawing No. 1.2
ER 70, drawing No. P-623

The drawings are carried out by the sponsor and supplied with the Danish Institute of Fire and Security Technology (DIFT) stamp.

See also DIFT drawings Nos. 1.1 and 1.2.

Materials and components for the test specimen were taken out and mounted by the sponsor.

Test specimen:

External dimensions: Height 3000 mm Width 3000 mm Thickness 95 mm

The test specimen was mounted around a system of steel profiles.

The test specimen consisted of the following components, which were controlled by DIFT during and after the mounting.

Profiles:

Guide rails along the top and the bottom: U-profile Gyproc SKP 70, 0.56 x 30 x 70 x 30 galv. steel.
The U-profiles were fixed to the mounting frame with 6 pcs. 6 x 50 mm nail-plugs evenly distributed along the U-profile.
Between the mounting frame and the U-profiles a strip of 12 x 165 mm Rockwool perimeter insulation strip was mounted.

Post, fixed edge:	C-profile Gyproc Ergonomic ER70, 0.56 x 35 x 70 x 37.5 galv. steel. The C-profile was fixed to the mounting frame with 5 pcs. 6 x 50 mm nail-plugs evenly distributed along the U-profile. Between the mounting frame and the C-profile a strip of 12 x 165 mm Rockwool perimeter insulation strip was mounted.
Post, free edge:	C-profile Gyproc Ergonomic ER70, 0.56 x 35 x 70 x 37.5 galv. steel. The C-profile was not fixed to the mounting frame. Between the mounting frame and the C-profile a strip of 12 x 165 mm Rockwool perimeter insulation strip was mounted.
Posts:	C-profile Gyproc Ergonomic ER70, 0.56 x 35 x 70 x 37.5 galv. steel, length 2985 mm. The posts were mounted per 600 mm. During the mounting the vertical position of the posts was adjusted allowing approx. 7.5 mm expansion in both ends. The posts were not fixed to the U-profiles along the top and the bottom edge.

Surface:

One layer of gypsum boards was mounted on each side of the posts.

Gypsum boards:	12.5 mm FERMACELL gypsum fibre board GF 12.5, 1190 kg/m^3 (K 2103 DIN 4102 A2 ÜPA III-4.62-9.1 434) The test specimen was constructed with one layer of gypsum boards with the dimensions: 1200/600 x 2400 mm as well as 1200/1800 x 600 mm (width x length) on each side. The joints between the gypsum boards were butt joints.
Attachment of the gypsum boards:	The gypsum boards were fixed to the steel posts per 250 mm with 3.9 x 30 mm gypsum board screws, FERMACELL cross-slot screw. Along the fixed edge and the top edge of the wall FERMACELL joint filler was applied on the exposed side as well as on the unexposed side along the edges of the gypsum boards.

Measured by DIFT:

FERMACELL gypsum fibre board

Density:	1178 kg/m^3 [1+2)]
Mass per unit of area:	14.7 kg/m^2 [1+2)]
Moisture content:	0.6 % [1+2)]
Thickness:	12.5 mm

[1)] Samples taken from extra material.
[2)] Dried up at 55 °C.

6 Test Conditions and Testing Procedures

Conditioning

Materials for the test specimen were delivered to DIFT laboratory 8 days before the fire test.

Mounting

The test specimen was mounted in a 200 mm thick concrete frame with a clear opening of 3000 x 3000 mm.

Fire test

The complete test specimen was placed as front of the DIFT vertical furnace.

DIFT drawing No. 1.1.shows the position of the 13 thermocouples mounted on the unexposed surface of the test specimen.

DIFT drawing No. 1.1.also shows the position for measuring the deflection on the unexposed surface of the test specimen.

The pressure in the furnace was kept equal to the pressure in the laboratory at a point located approximately 500 mm above the notional floor level.

7 Test Results

The duration of the test was 35 ½ minutes.

Measurements:

The enclosed graphs and tables show:

Enclosure No. 2.0 and 2.1:	The actual minimum-, average- and maximum furnace temperature in relation to the standard temperature. Table 2 also shows the area under the actual time-temperature curve as well as the area under the standard time-temperature curve.
Enclosure No. 3.0 and 3.1:	The average temperature rise measured with 5 thermocouples on the unexposed surface of the test specimen.
Enclosure No. 4.0 and 4.1:	The maximum temperature rise measured with 8 thermocouples on the unexposed surface of the test specimen.
Enclosure No. 5.0 and 5.1:	The ambient temperature measured in the laboratory during the test.

Enclosure No. 6.0 and 6.1: The horizontal deformation of the test specimen during the test, measured on the unexposed surface of the test specimen.

Enclosure No. 7.0 and 7.1: The pressure in the furnace during the test, measured 1160 mm above the notional floor level.

Observations

Observations were made during the test on the general behaviour of the test specimen.

Time Minutes		**Visual observations:** U = Unexposed side E = Exposed side
0		Test commences.
0 – 18		Nothing to observe..
18 ½	E	The gypsum boards have started to crack vertically.
19 ½	E	The gypsum boards have started to crack horizontally.
20	E	Large vertical cracks in the gypsum boards along the posts.
24 ¼	E	Approx. 600 mm wide gypsum board strip, located between two posts behind thermocouples Nos. 1 and 2, is falling down.
25	U	A little steam development along the joint near thermocouple No. 6..
27 ½	U	Discoloration of the gypsum boards along the horizontal joint from thermocouple No. 6 to below No. 3. The roving thermocouple is positioned at the joint near thermocouple No. 6, it shows 85 °C.
28	U	Incipient discoloration between two screws positioned above thermocouple No. 2.
30	U	Steam development along the horizontal joint between the left hand edge and thermocouple No. 8.
31	U	Glowing post visible along the vertical joint between two screws positioned above thermocouple No. 2. The roving thermocouple is positioned at the same location and it shows 98 °C.
32	U	Discoloration in places along the vertical joint with thermocouple No. 2.
	E	More gypsum board is falling down in places.

Time Minutes		Visual observations:	U = Unexposed side E = Exposed side
34	U	Increasing discoloration in places along the central half of the vertical joint with thermocouple No. 2.	
	E	More gypsum board is falling down at the central part of the wall.	
34 ½	U	The ø 6mm gap-gauge is applied along the horizontal joint on the left hand side of thermocouple No. 6. The gap-gauge can not pass through.	
35 ¼	U	A cotton wool pad is applied along the vertical joint above thermocouple No. 2. Ignition occurs.	
		Discoloration of the central gypsum board between the central and the left hand post.	
35 ½		Test stopped.	

The attached photographs Nos. 1 - 6 show:

1. The exposed face of the test specimen before the test.
2. The unexposed face of the test specimen at the start of the test.
3. The unexposed face of the test specimen after 15 ½ minutes testing time.
4. The unexposed face of the test specimen after approx. 30 ¼ minutes testing time.
5. The unexposed face of the test specimen after the test.
6. The exposed face of the test specimen after the test.

8 Conclusion

A non-load bearing wall constructed as described in this report and fire tested in accordance with EN 1364-1, showed failure according to the performance criteria stated in the test method at the times stated below:

Integrity failure (E): 35 minutes

- The cotton wool pad ignited after 35 ¼ minutes testing time.

Insulation failure (I): 35 minutes

- Is assumed to have occurred due to integrity failure.

9 Remark

"This report details the construction of the test specimen, the test conditions and the test results obtained by testing this specific construction according to the test procedures described in EN 1364-1. Any significant deviation with respect to size, constructional details, loads, stresses, edge or end conditions other than those allowed under the field of direct application in the relevant test method is not covered by this report."

"Because of the nature of fire resistance testing and the consequent difficulty in quantifying the uncertainty of measurement of fire resistance, it is not possible to provide a stated degree of accuracy of the result".

[redacted]

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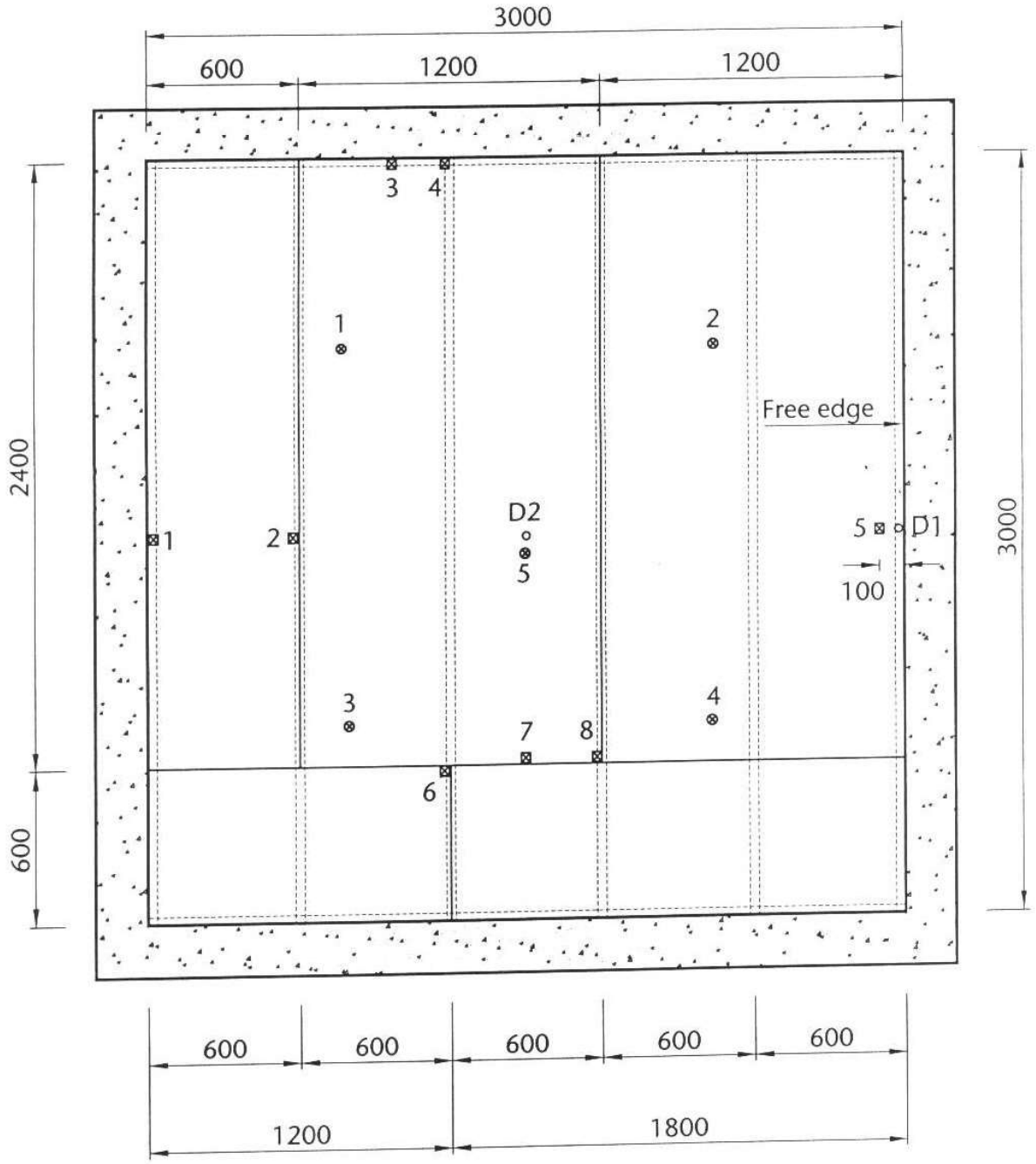
Enclosures:

DIFT drawings:	2
DIFT graphs and tables:	12
Photo montages:	3
Sponsors drawings:	3



— Joints in the gypsum board layer

o Horizontal deflection measured on the unexposed surface

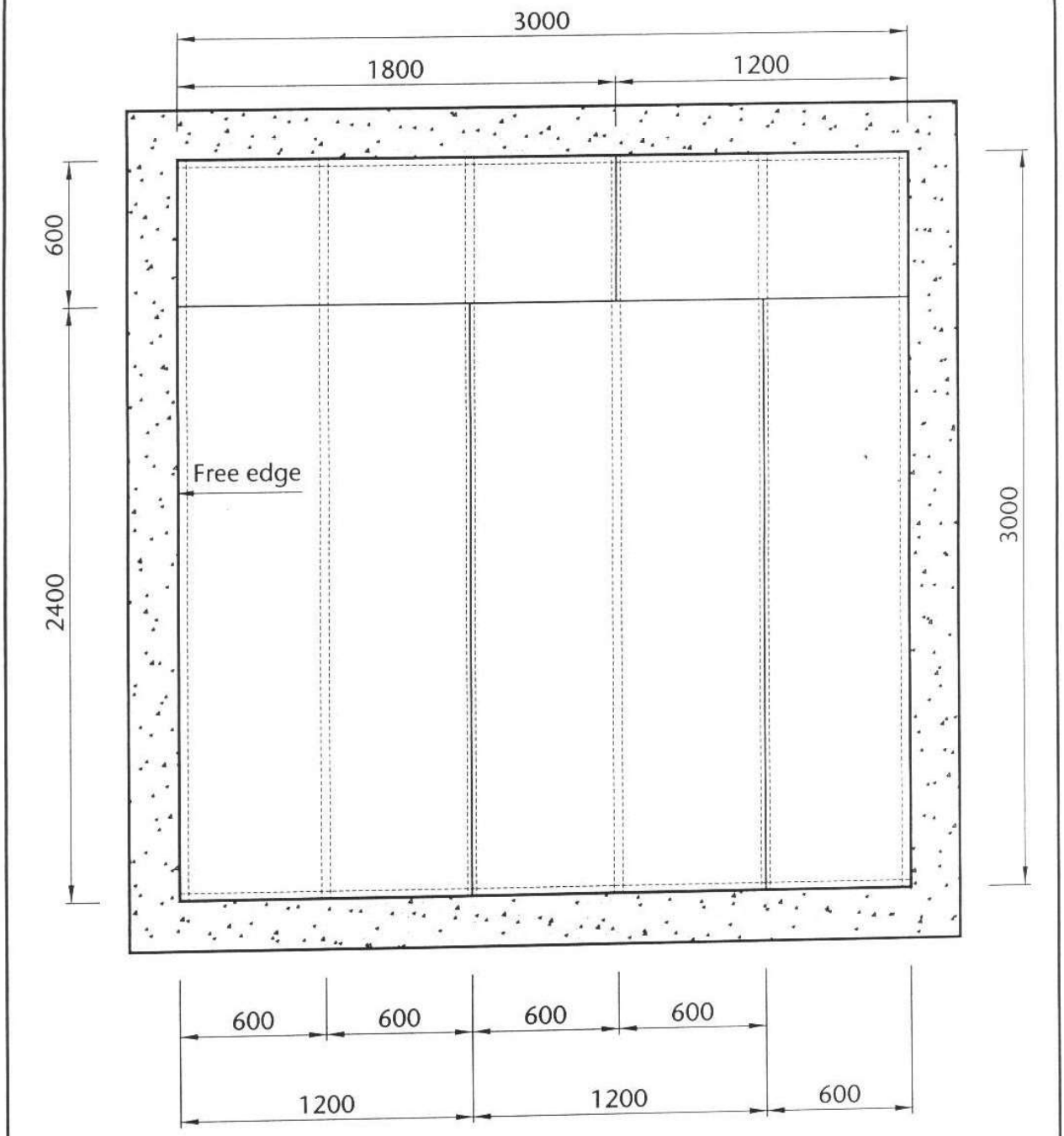
⊠ Position of surface thermocouples (Average)

⊗ Position of surface thermocouples (Maximum)

Test specimen seen from the unexposed side

All dimensions are in mm

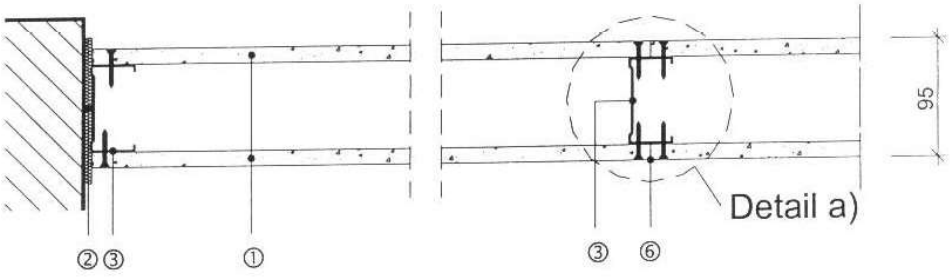
DIFT	Danish Institute of Fire and Security Technology	JERNHOLMEN 12 DK-2650 HVIDOVRE TLF.: +45 36349000 FAX: +45 36349005
	Subject: Non-load-bearing wall	Appendix to file no.: PG 10934
Date: 2002-02-19	Ordered by: Fermacell Skandinavien	Drawing no.: 1.1



Test specimen seen from the exposed side

All dimensions are in mm

DIFT	Danish Institute of Fire and Security Technology	JERNHOLMEN 12 DK-2650 HVIDOVRE TLF.: +45 36349000 FAX: +45 36349005
	Subject: Non-load-bearing wall	Appendix to file no.: PG 10934
Date: 2002-02-19	Ordered by: Fermacell Skandinavien	Drawing no.: 1.2



SECTION B - B

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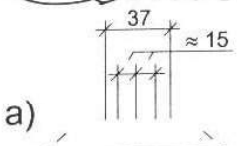
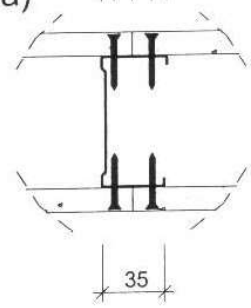
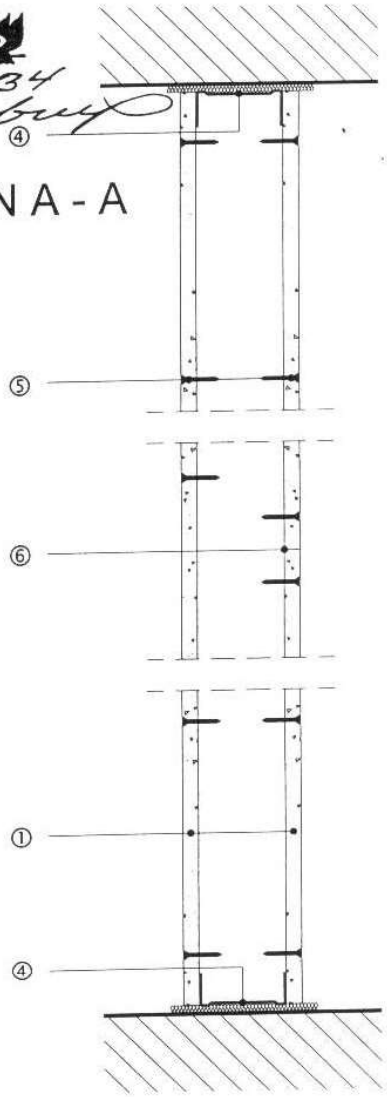
File no. PG 10934



Detail a)



SECTION A - A



① FERMACELL gypsum fiber boards
K 2103 DIN 4102 A2 Ü PA III-4.6 Z 9.1-434
12,5 x 1200 x 2400 mm
~ 1190 kg/m³

② ROCKWOOL RST perimeter insulation strip
12 mm

③ c-stud (Gyproc Ergonomic ER 70)
0,56 x 70 x 35 x 37,5 mm

④ u-channel (Gyproc SKP 70)
0,56 x 70 x 30 x 30 mm

⑤ FERMACELL cross-slot screws
3,9 x 30 mm
a ≤ 250 mm

⑥ FERMACELL but joint

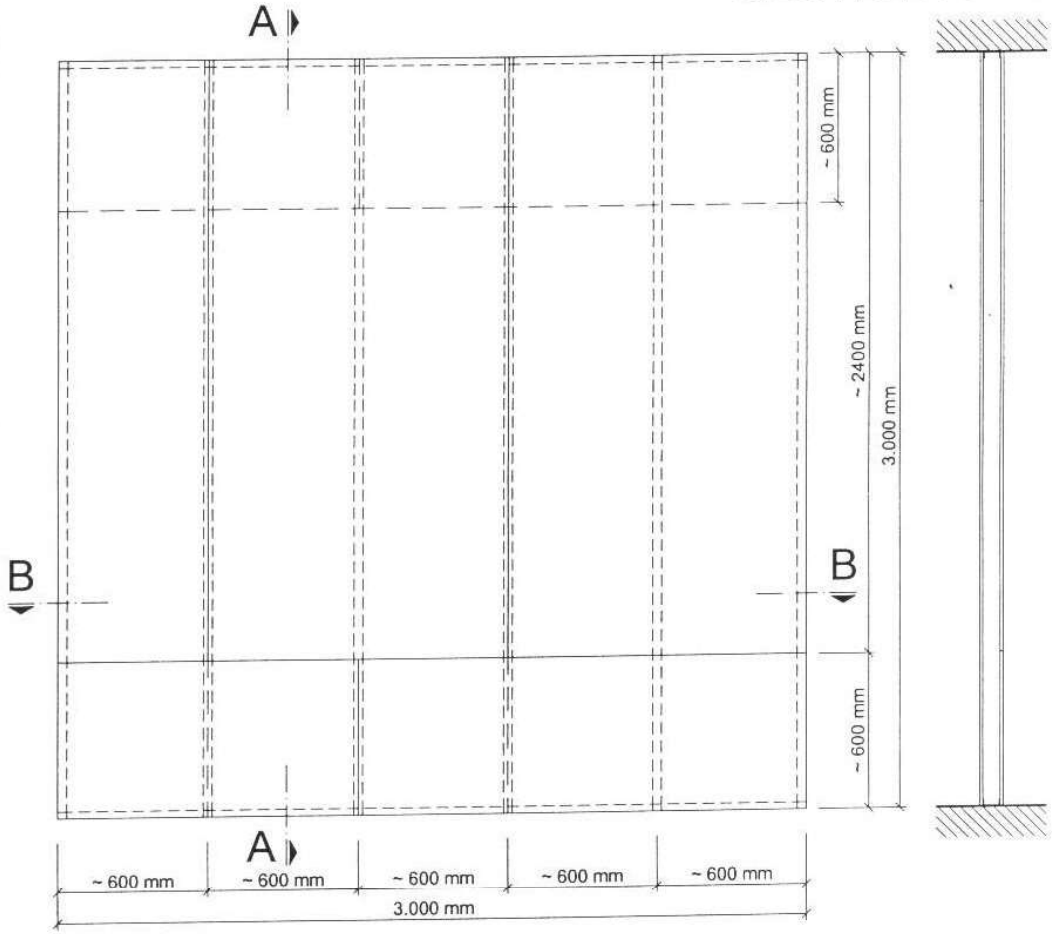
edges filled with FERMACELL joint filler

fermacell fibergips

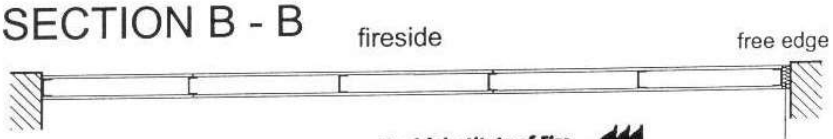
1 S 15

drawing nr.:
1.1

SECTION A - A



SECTION B - B



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30 x 200 mm
ROCKWOOL Floor Rock 32/30

[redacted]

fermacell fibergips

1 S 15

drawing nr.:

1.2