

TEST REPORT NON-LOADBEARING WALL

Name of sponsor:	Wood:UpHigh		
Product name:	Non-loadbearing wall		
File no.:	PGA12234A	Revision no.:	0
Test date:	2023-01-27	Date:	2023-07-10
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Ref:	JBK / CHB		

Client information

Client: Wood:UpHigh

Address: Jernholmen 12

2650 Hvidovre

Denmark

The test is part of the project Wood:UpHigh. The project is partly sponsored by Uddannelses- og Forskningsstyrelsen through DBI's performance contract, Realdania and Grundejernes Investeringsfond. The project is headed by DBI, except for the construction of test specimens for the fire tests, which is headed by LOGIK&CO.

The results relate only to the items tested. The report should only be reproduced in extenso - in extracts only with a written agreement with this institute.

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1 Date of test

The test was conducted on 27/01/2023.

2 Purpose of test

Examination of the fire-resistance of one symmetrical partition wall with timber frames.

The test specimen has been subjected to a standard fire test in accordance with the following standards:

EN 1363-1:2020 Fire resistance tests – General requirements

in conjunction with

EN 1365-1:2012 Fire resistance tests for loadbearing elements — Part 1: Walls

3 Test specimen

The trade name and sponsors identification mark are stated below:

Trade name: None

Identification mark: None

The components for the test specimen were delivered and mounted by the sponsor.

4 Drawings and description

Details of the construction are shown in the enclosed documentation as stated below:

Type	Drawing No.	Dated	Subject
Drawing	1.1	27-01-2023	Non-loadbearing wall – Unexposed side
Drawing	1.2	27-01-2023	Non-loadbearing wall – Unexposed side – Inner layer
Drawing	1.3	27-01-2023	Non-loadbearing wall – Unexposed side – Wood structure with insulation
Drawing	1.4	27-01-2023	Non-loadbearing wall – exposed side - Wood structure with insulation
Drawing	1.5	27-01-2023	Non-loadbearing wall – exposed side – Inner layer of boards
Drawing	1.6	27-01-2023	Non-loadbearing wall – exposed side – Outer layer of boards

The documentation is supplied by DBI - Danish Institute of Fire and Security Technology

Description

The test specimen consisted of the components described in the following. DBI inspected the components during mounting, the test and after the test.

The sponsor carried out the selection of the products for the test specimen as well as the mounting.

Test specimen


External measures:	Height: 3000 mm	Width: 2950 mm	Thickness: 255 mm
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The test specimen was a double timber frame construction with gypsum boards, particle boards and grass fiber insulation. The test specimen was symmetrical.


Studs: A total of 13 studs were used in the wall construction, all 2910 mm tall. The studs are 45 x 95 mm dry graded C24 construction spruce wood with a nominal density of 450 kg/m³. The studs were spaced c/c 600 mm.



Two timber frames were constructed with 300 mm staggered studs.

See drawing no. 1.1 and 1.2 and photo no. 1.

Top and bottom timber beams: The top and bottom beams are 45 x 95 mm dry graded C24 construction spruce wood with a nominal density of 450 kg/m³. The top and bottom beams are fixed to the studs using two  screws in each end of the studs.

See drawing no. 1.1.

Insulation Two layers of 100 mm thick grass fiber insulation with a nominal density of 45 kg/m³ designated  was cut to size in between the studs. See photo no. 5.

Inner layers chipboard A 15 mm thick chipboard, designated  (nominal density 650 kg/m³, EN 13986:2004 + A1:2015) was mounted on both sides of the wood frames with 5.0 x 50 mm, designated . For each stud behind the board 3 screws were fixed, for the maximum board dimension 12 screws were used. A full size chipboard had the dimensions of 615 x 2500 mm with the tongue and groove.

See drawing no. 1.2 and 1.5 and photo no. 4 and 8.

Fibre gypsum boards One layer of 12.5 mm thick gypsum fibre boards designated [REDACTED] (type EN 15283-2, ETA-03/0050) with a nominal density of 1150 kg/m³ were fixed with designated [REDACTED] at a c/c of 200 mm along the edges and in two rows in each 1/3 section. The staples were fixed 15 mm from the board edges. A full-size board measured 900 x 1200 mm.

See drawing no. 1.1 and 1.6 and photos no. 5 and 9.

Filler Over the board joints filler designated [REDACTED] was used. See photo 6 and 10.

Measured by DBI

Product		Fiber gypsum board	chip board	Grass insulation	Construction timber
Density	kg/m ³	1205	626	49	538
Thickness	mm	12.8	-	9,9	-
Moisture content	%	1,2	7,7	6,4	11,07
Sampling method		Extra material	Extra material	Extra material	Extra material
Drying temperature	°C	55	55	105	105

5 Test conditions

Conditioning

The test specimen was delivered on the 24-01-2023 to the DBI laboratory and stored under room temperature. On the day of the fire testing the condition of the test specimen was similar with respect to its moisture content as the test specimen would be in normal service.

Mounting

The test specimen was mounted in a concrete lined test frame with a clear opening of 3000 x 3000 mm. The construction was deeper than the test frame. The test specimen was installed flush with the exposed side of the frame, which means that the test specimen was protruding 55 mm from the test frame on the unexposed side.

A free edge was established along the left vertical edge of the test specimen as seen from the unexposed side. The free edge was made by 2 x 25 mm stone wool with alu-foil.

Fire test

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

Temperature observations were taken continually during the entire testing time.

The surface temperatures were measured on the unexposed surface of the test specimen as indicated on DBI drawing no. 1.0-1.6.

The furnace temperature was determined by means of plate thermocouples uniformly distributed at a distance of approximately 100 mm from the exposed side of the test specimen. The furnace temperature was continuously controlled so as to follow the standard time temperature curve within the accuracy specified in EN 1363-1:2020.

The thermocouples were constructed according to the description in EN 1363-1:2020.

The furnace pressure was controlled at a level of 20 Pa at the top of the test specimen during the test.

6 Test results

Duration of the test was 68 minutes.

Measurements

The enclosed graphs and tables show:

Enclosures 2.0 and 2.1	Furnace temperatures The actual minimum-, average- and maximum furnace temperature in relation to the standard temperature. The table also shows the area under the actual time-temperature curve as well as the area under the standard time-temperature curve
Enclosures 3.0 and 3.1	Vertical furnace pressure The differential pressure in the furnace during the test, measured 1,16 m above notional floor level
Enclosures 4.0 and 4.1	Ambient temperature The ambient temperature in the laboratory during the test
Enclosures 5.0 and 5.1	Average temperature rise Measured with 5 thermocouples on the unexposed side
Enclosures 6.0 and 6.1	Maximum temperature rise Maximum temperatures on the unexposed side
Enclosures 7.0 and 7.1	Horizontal deformation Negative values indicate movement towards the furnace
Enclosures 8.0 and 8.1	Internal temperature - between chip board and fiber gypsum Unexposed Mid height
Enclosures 9.0 and 9.1	Internal temperature - between studs and chip board Unexposed Mid height, 1 on third stud from right, 2 and 3 on insulation to the left of 1 seen from unexposed side
Enclosures 10.0 and 10.1	Internal temperature - between insulation layers at mid height, 1 and 3 on insulation, 2 on center stud seen from exposed side.
Enclosures 11.0 and 11.1	Internal temperature - between studs and chipboard exposed 1,2 and 4 on second stud at mid height, 3 on center stud at height 2460 mm seen from exposed side
Enclosures 12.0 and 12.1	Internal temperature - Between chipboard and fiber gypsum Exposed placed in 1/4 points between chipboard and fibergypsum
Enclosures 13.0 and 13.1	Maximum temperature between the construction layers Each data serie corresponds to the maximum temperature of all thermocouples in that layer. See drawing 1.7

Visual observations:

Time / Minutes	Visual observations:	U = Unexposed side E = Exposed side
0	Test commences	
15	No changes	U
19	Crack along the edges of the boards	E
20	Smoke from the top corners between frame and construction	U
25	Cracks on the center of boards	E
25	Smoke from bottom left corner	U
27	Gypsum board has fallen down partly	E
29	No critical place to perform cotton pad test	U
30	Particle board is cracked from burning	E
34	Only flames visible	E
36	No changes	U
41	Only flames visible	E
45	No changes	U
48	Wood burning sounds	U
47	Only flames visible	E
54	Only flames visible	E
54	No changes	U
55	Faint smoke from mid height free edge	U
58	No critical place for cotton pad test	U
64	Cotton pad test over construction: Ignition	U
64	Sustained flames at the top mid width of the construction between the frame and the test specimen	U
67	Test stopped	

The photographs on the attached photo sheets show the test specimen during the mounting, testing and after the test. See the description at each photo.

7 Conclusion

Fire resistance testing according to EN 1365-1:2012 of the construction described in this test report showed that failure according to the performance criteria stated in the test method occurred at the following time:

Integrity (E): **64 minutes**

- Sustained flaming occurred after 64 minutes of testing.
- The cotton pad was ignited after 64 minutes of testing.
- No through-going openings in the test specimen were created during the test.

Insulation (I): **64 minutes**

- Failure of insulation occurred after 64 minutes of testing due to failure of integrity.
- The mean temperature rise measured on the unexposed surface of the test specimen did not exceed 140 °C during the test. The mean temperature rise was 43 °C.
- The maximum temperature rise measured on the unexposed surface of the test specimen did not exceed 180 °C during the test. The maximum temperature rise was 98 °C.

8 Remarks

The field of direct application of the test results appears from EN 1365-1:2012, clause 13.


This report details the method of construction, the test conditions and the results obtained when the specific element of construction described herein was tested following the procedure outlined in EN 1363-1:2020, and where appropriate EN 1363-2:1999. 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 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.

This report has only been printed in a pdf-version. DBI has not issued a hard copy version.

All values mentioned in this report are nominal values, production tolerances are not considered.

Danish Institute of Fire and Security Technology


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M.Sc. (Eng)

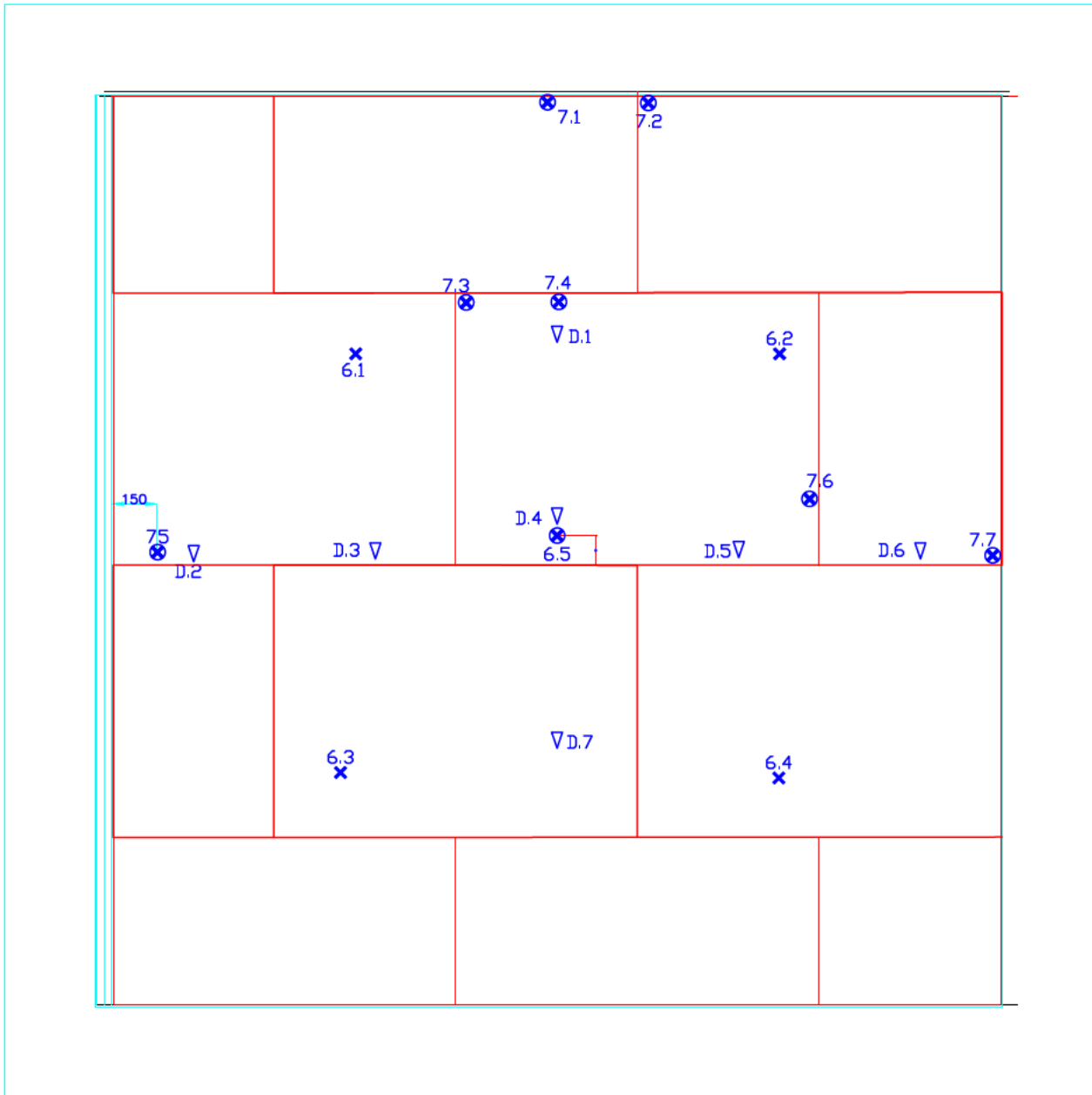

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Enclosures: 41

DBI drawings: 8
DBI graphs and tables: 24
Photo sheets: 9
Sponsors drawings: 0



- ✕ Thermocouple placed on the unexposed surface (average)
- ⊗ Thermocouple placed on the unexposed surface (maximum)
- ∇ Deflection measuring point

All measurements are in mm

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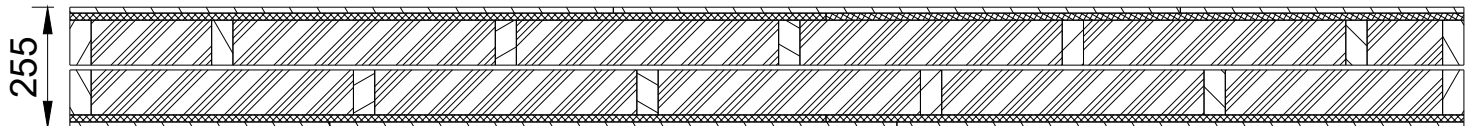
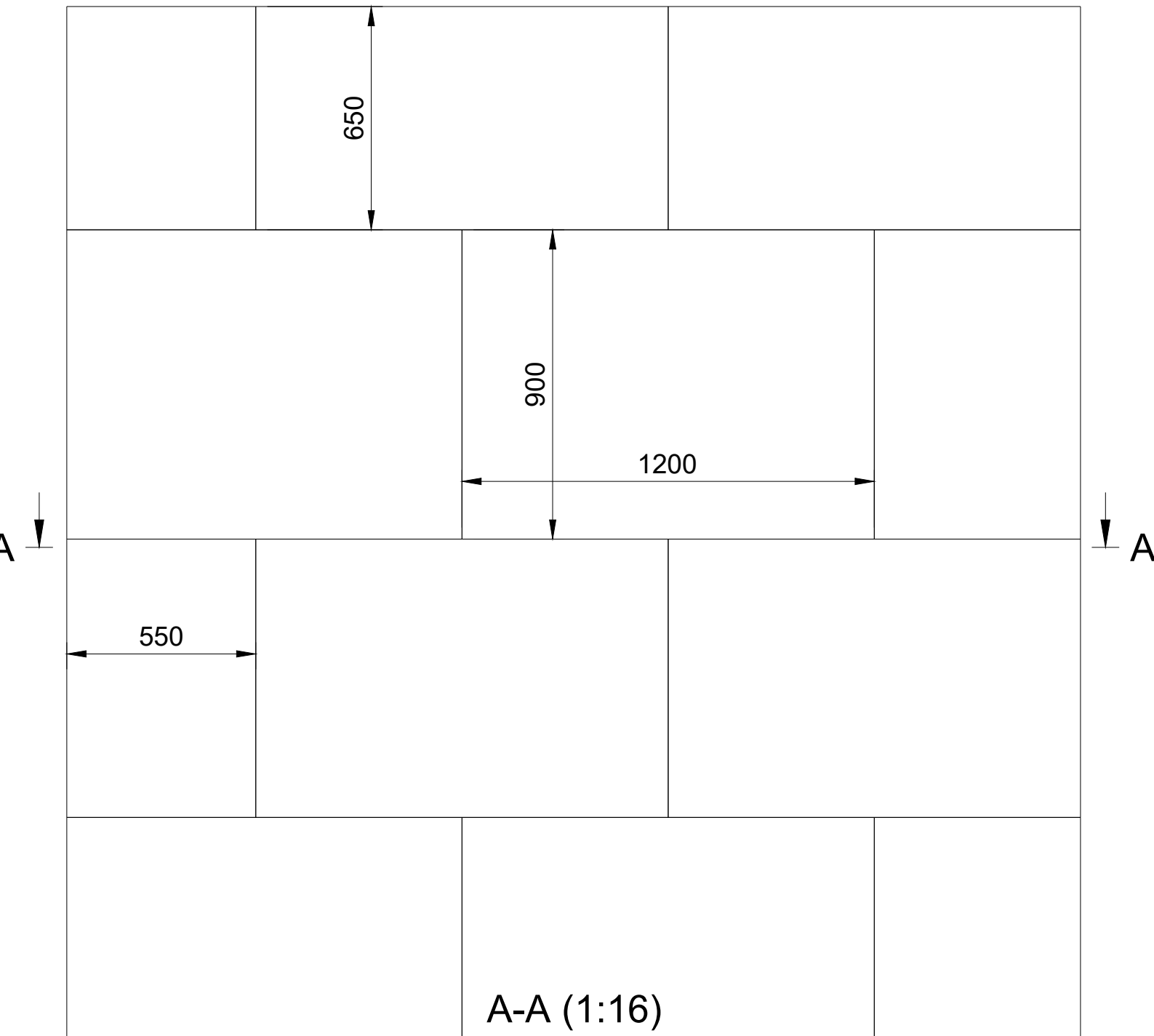
Sponsor: Wood:UpHigh

Subject: Non-loadbearing wall

File No.: PGA12234A

Test date: 27-01-2023

Enclosure: 1.0

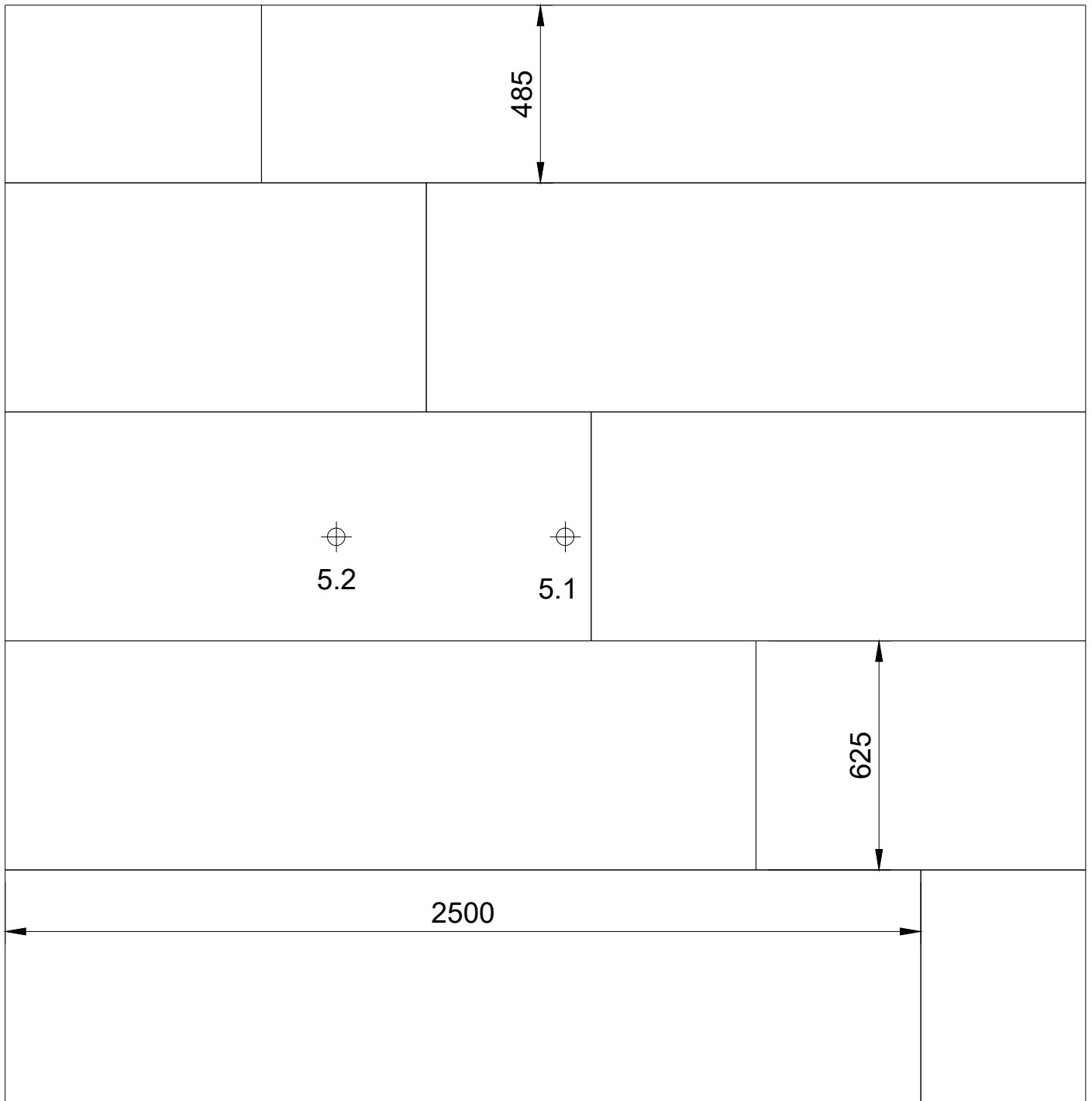


All measurements are in mm



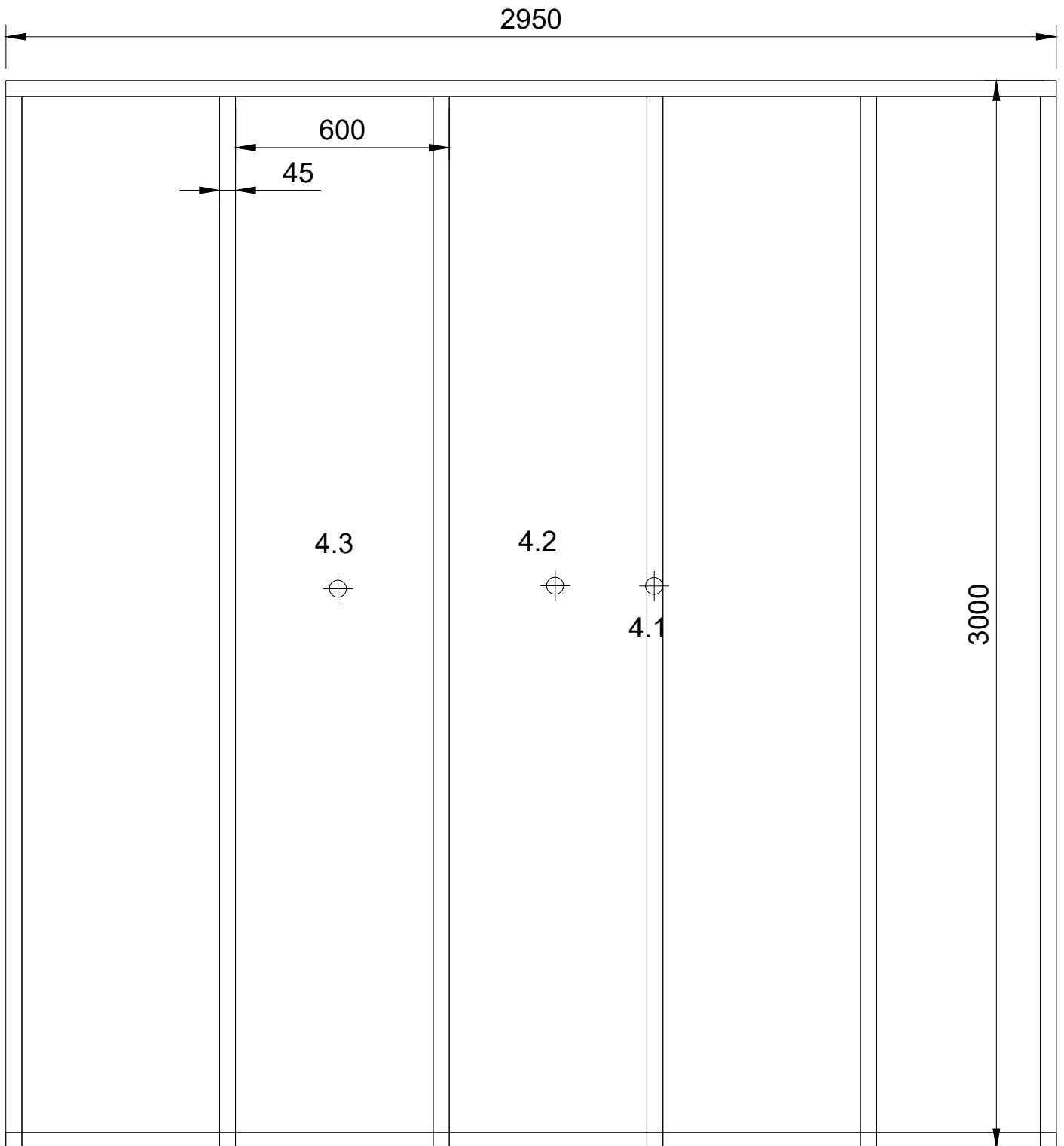
Danish Institute of Fire and Security Technology
 Sponsor: Wood:UpHigh
 Subject: Non-loadbearing wall - Unexposed side

File No.: PGA12234A
Test date: 27-01-2023
Enclosure: 1.1



All measurements are in mm





All measurements are in mm



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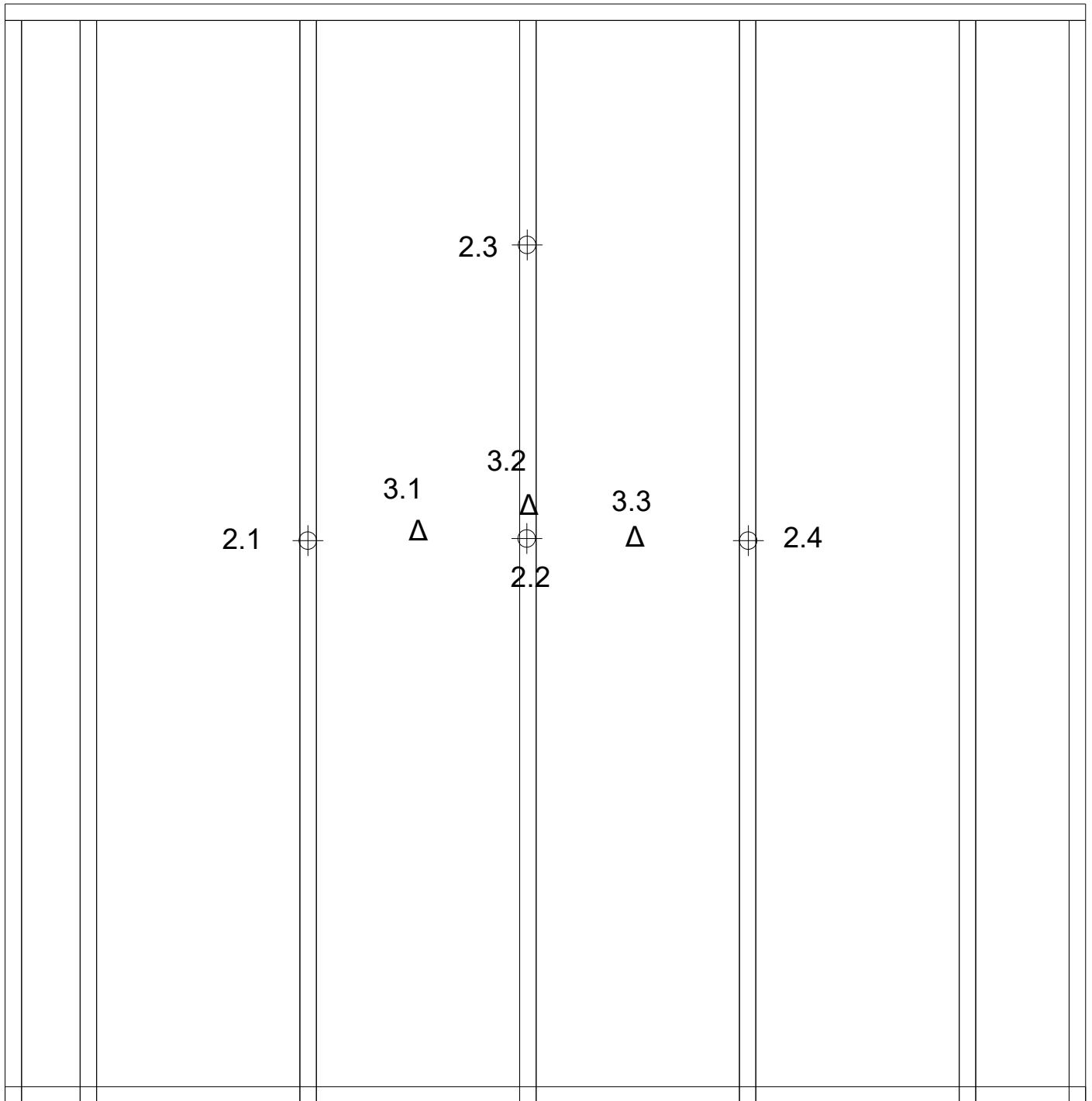
Sponsor: Wood:UpHigh

Subject: Non-loadbearing wall - Unexposed side - wood structure with insulation

File No.: PGA12234A

Test date: 27-01-2023

Enclosure: 1.3



⊕ Thermocouples placed between wood structure and wooden chipboard

Δ Thermocouples in air gap between wood structures

All measurements are in mm



Danish Institute of Fire and Security Technology

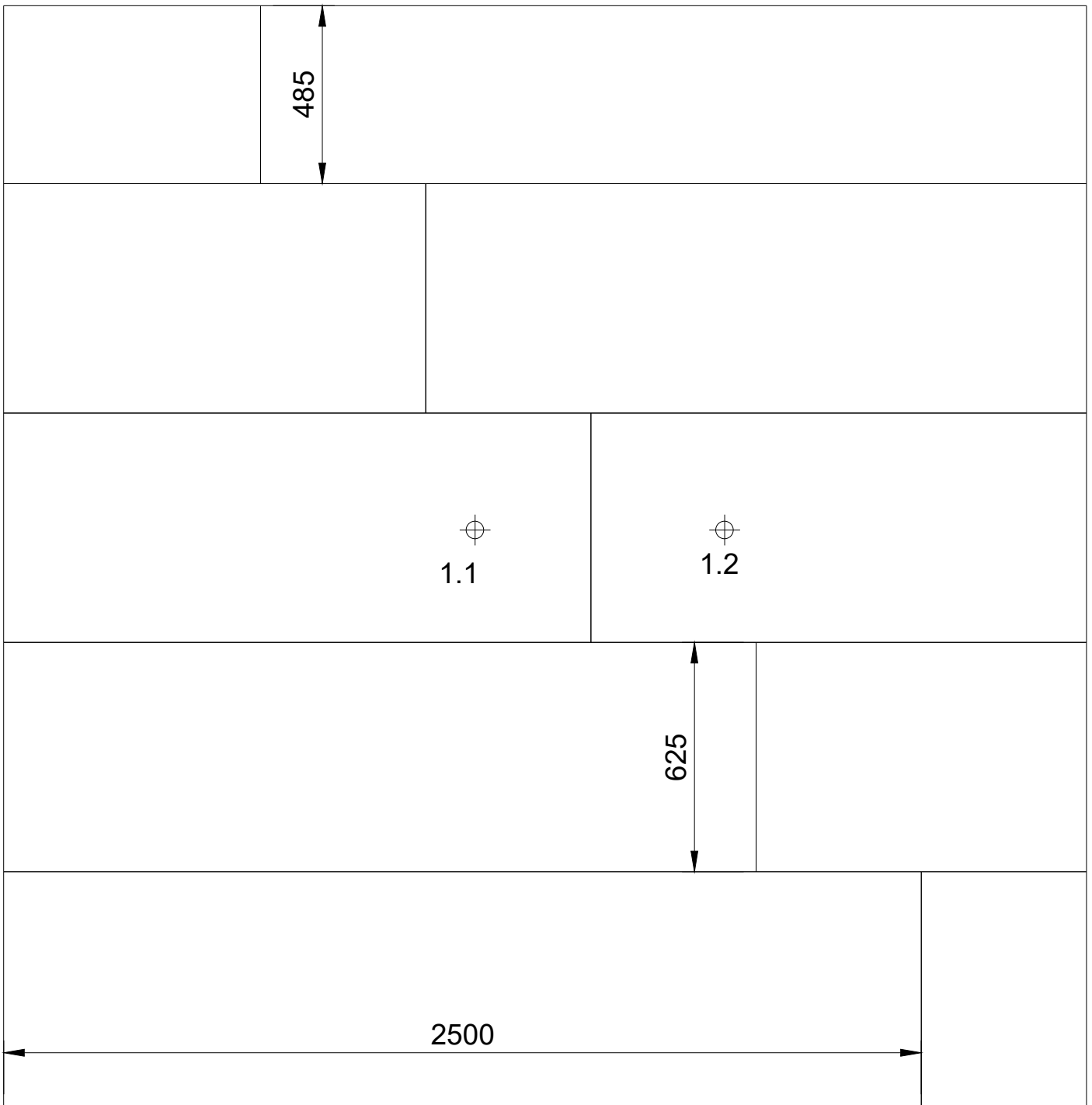
Sponsor: Wood:UpHigh

Subject: Non-loadbearing wall - exposed side - wood structure with insulation

File No.: PGA12234A

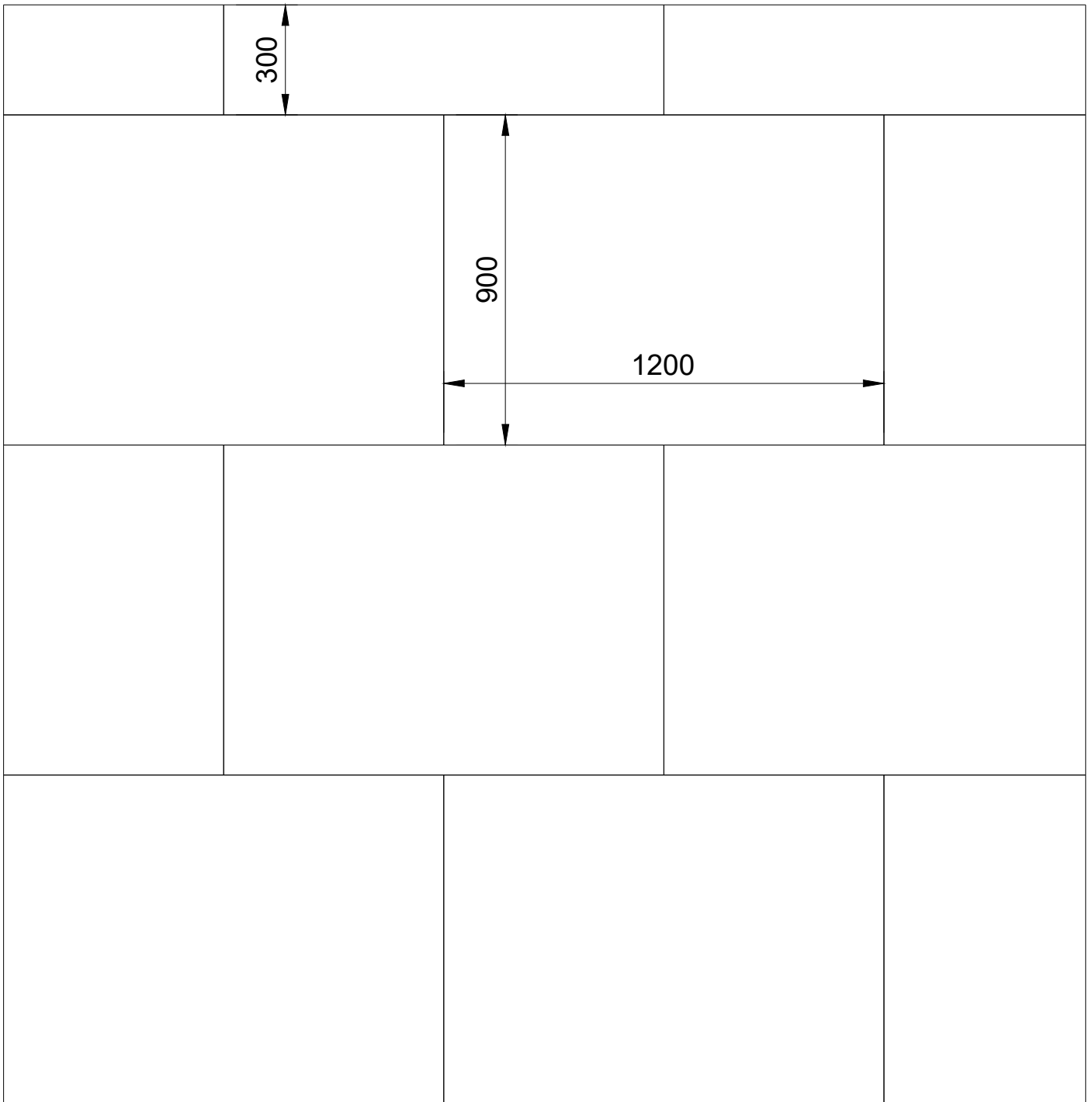
Test date: 27-01-2023

Enclosure: 1.4



All measurements are in mm





All measurements are in mm



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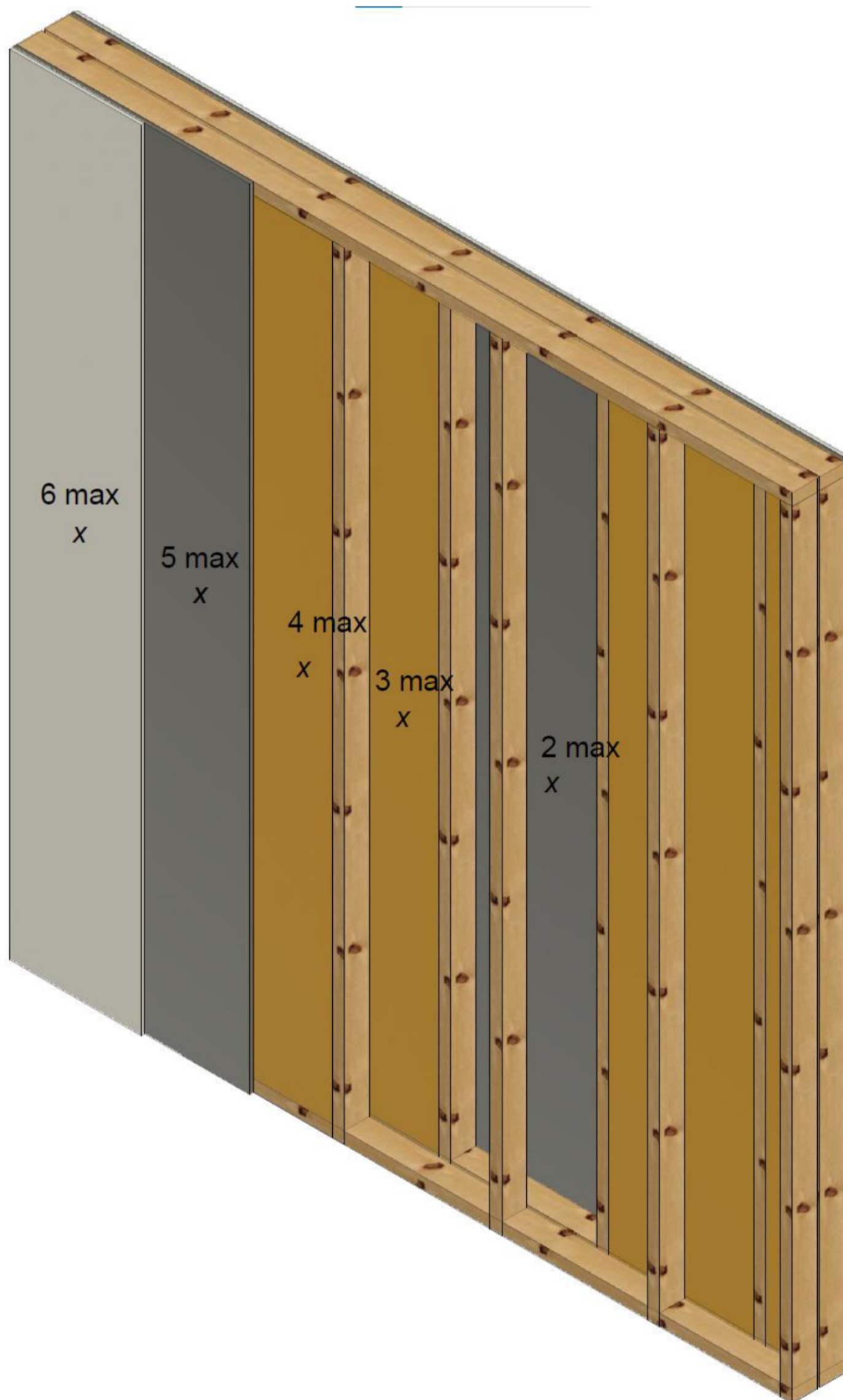
Sponsor: Wood:UpHigh

Subject: Non-loadbearing wall - exposed side - outer layer of boards

File No.: PGA12234A

Test date: 27-01-2023

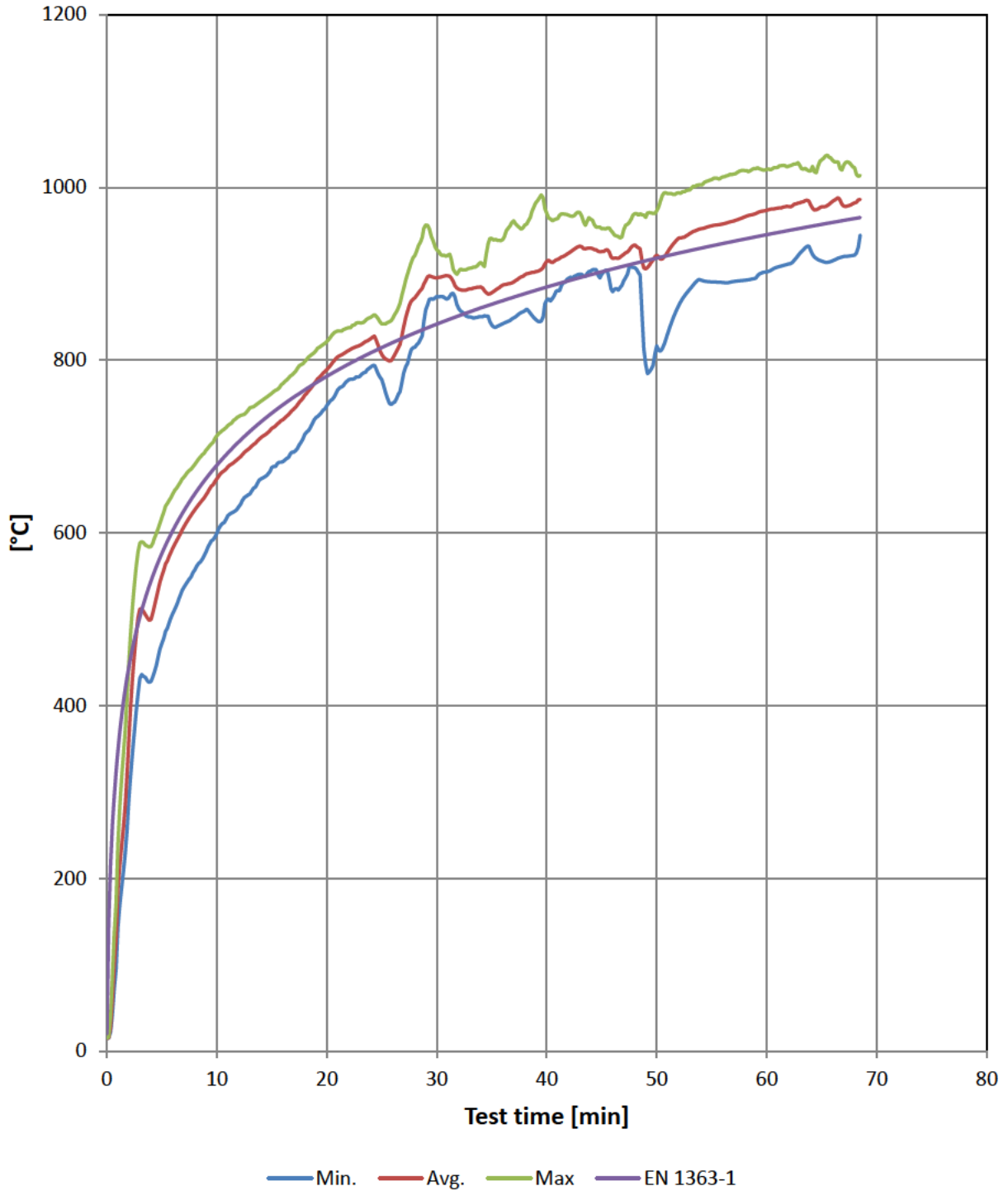
Enclosure: 1.6



Thermocouples measure temperature between layers
0 : fire curve
1 : between fiber gypsum and woodboard
2 : between wood board and wooden studs
3 : between insulation layers
4 : between insulation and wood board
5 : between wood board and fiber gypsum
6 : unexposed side
7 : Unexposed side

Furnace temperature

Furnace temperature



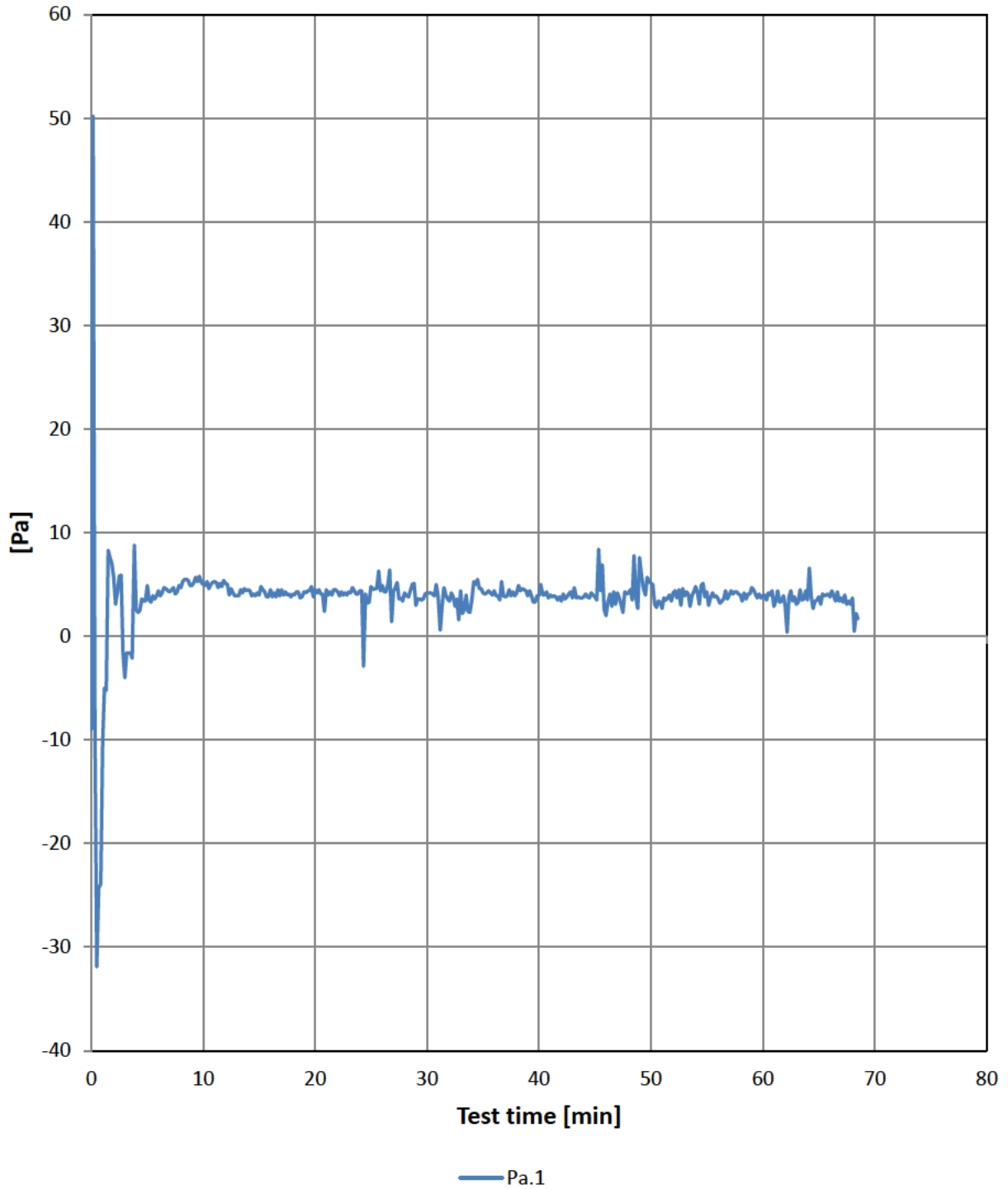
Furnace temperature

Furnace temperature

Time Minutes	Measured			Norm	Area under curve		Dev. [%]	Limit [%]
	Minimum	Average	Maximum	EN 1363-1	Measured	EN 1363-1		
0	15	15	15	20	0	0	0.0	
2	288	361	450	445	338	640	-47.2	
4	428	500	584	544	1294	1639	-21.0	
6	507	583	645	603	2387	2790	-14.5	15
8	557	627	679	645	3599	4041	-10.9	15
10	600	662	712	678	4888	5366	-8.9	15
12	631	686	735	705	6239	6750	-7.6	14
14	663	710	752	728	7636	8185	-6.7	13
15	676	721	761	739	8351	8918	-6.4	13
16	683	731	773	748	9077	9662	-6.0	12
18	714	760	799	766	10565	11176	-5.5	11
20	747	789	822	781	12115	12723	-4.8	10
22	777	811	838	796	13719	14300	-4.1	9
24	792	825	850	809	15355	15904	-3.5	8
26	751	802	849	820	16977	17534	-3.2	7
28	815	872	921	832	18653	19186	-2.8	6
30	874	895	928	842	20431	20859	-2.1	5
32	860	882	903	851	22218	22552	-1.5	5
34	850	885	913	860	23983	24264	-1.2	5
36	842	887	940	869	25745	25994	-1.0	5
38	857	899	957	877	27529	27740	-0.8	4
40	870	914	970	885	29336	29502	-0.6	4
42	895	924	968	892	31171	31279	-0.3	4
44	903	930	963	899	33030	33070	-0.1	4
46	879	918	948	906	34882	34875	0.0	4
48	907	934	970	912	36729	36692	0.1	4
50	817	921	973	918	38564	38522	0.1	3
52	863	941	994	924	40418	40364	0.1	3
54	893	952	1003	930	42311	42218	0.2	3
56	890	958	1012	935	44221	44083	0.3	3
58	893	966	1020	940	46144	45958	0.4	3
60	902	973	1021	945	48084	47844	0.5	3
62	911	978	1025	950	50036	49739	0.6	3
64	927	980	1019	955	52000	51644	0.7	3
66	915	984	1031	960	53955	53559	0.7	3
68	922	982	1023	964	55919	55483	0.8	3

Vertical furnace pressure

The differential pressure in the furnace during the test, measured 1,16 m above notional floor level



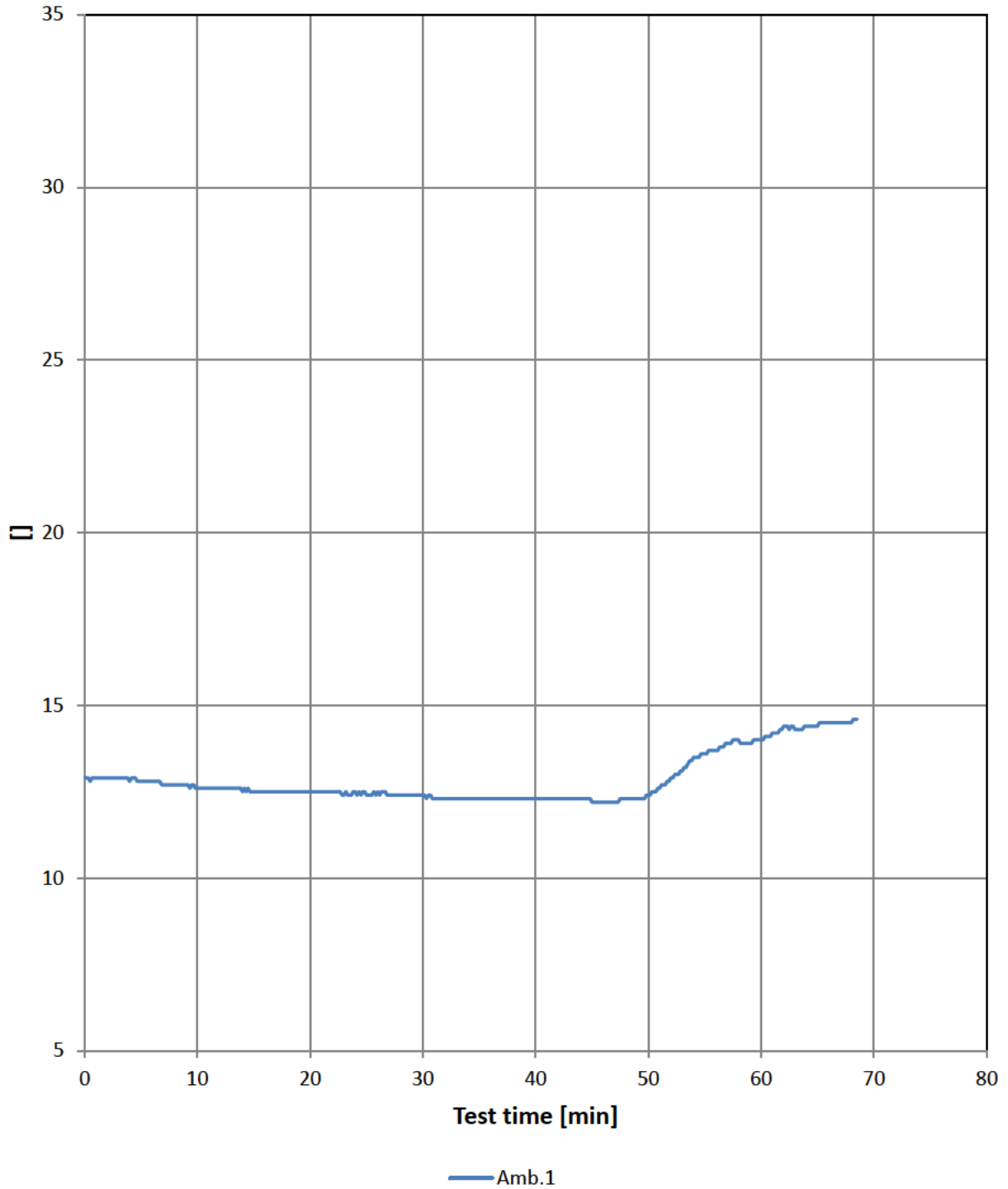
Vertical furnace pressure

The differential pressure in the furnace during the test, measured 1,16 m above notional floor level

Min. / Pa	Pa.1
0	-9.0
2	5.7
4	2.6
6	4.4
8	4.7
10	5.0
12	5.1
14	4.5
15	4.0
16	4.5
18	4.1
20	4.5
22	4.3
24	4.4
26	4.9
28	4.2
30	4.2
32	3.4
34	3.4
36	4.4
38	4.2
40	3.9
42	3.4
44	3.8
46	2.0
48	4.2
50	5.1
52	4.2
54	4.8
56	3.6
58	4.0
60	3.9
62	2.9
64	3.5
66	3.8
68	3.7

Ambient temperature

The ambient temperature in the laboratory during the test



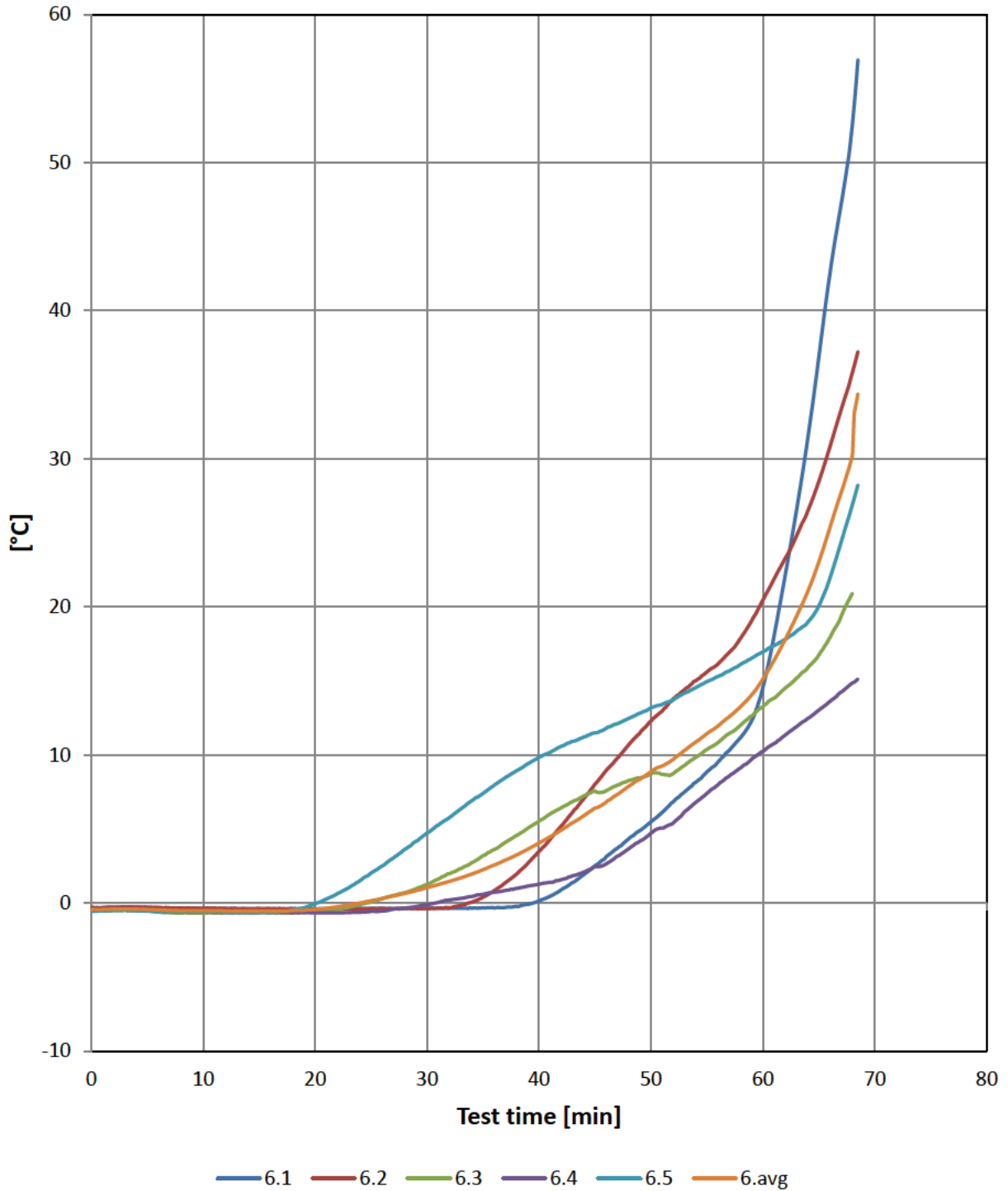
Ambient temperature

The ambient temperature in the laboratory during the test

Min. /	Amb.1
0	12.9
2	12.9
4	12.8
6	12.8
8	12.7
10	12.6
12	12.6
14	12.5
15	12.5
16	12.5
18	12.5
20	12.5
22	12.5
24	12.5
26	12.5
28	12.4
30	12.4
32	12.3
34	12.3
36	12.3
38	12.3
40	12.3
42	12.3
44	12.3
46	12.2
48	12.3
50	12.4
52	12.9
54	13.5
56	13.7
58	14.0
60	14.0
62	14.4
64	14.4
66	14.5
68	14.5

Average temperature rise

Measured with 5 thermocouples on the unexposed side



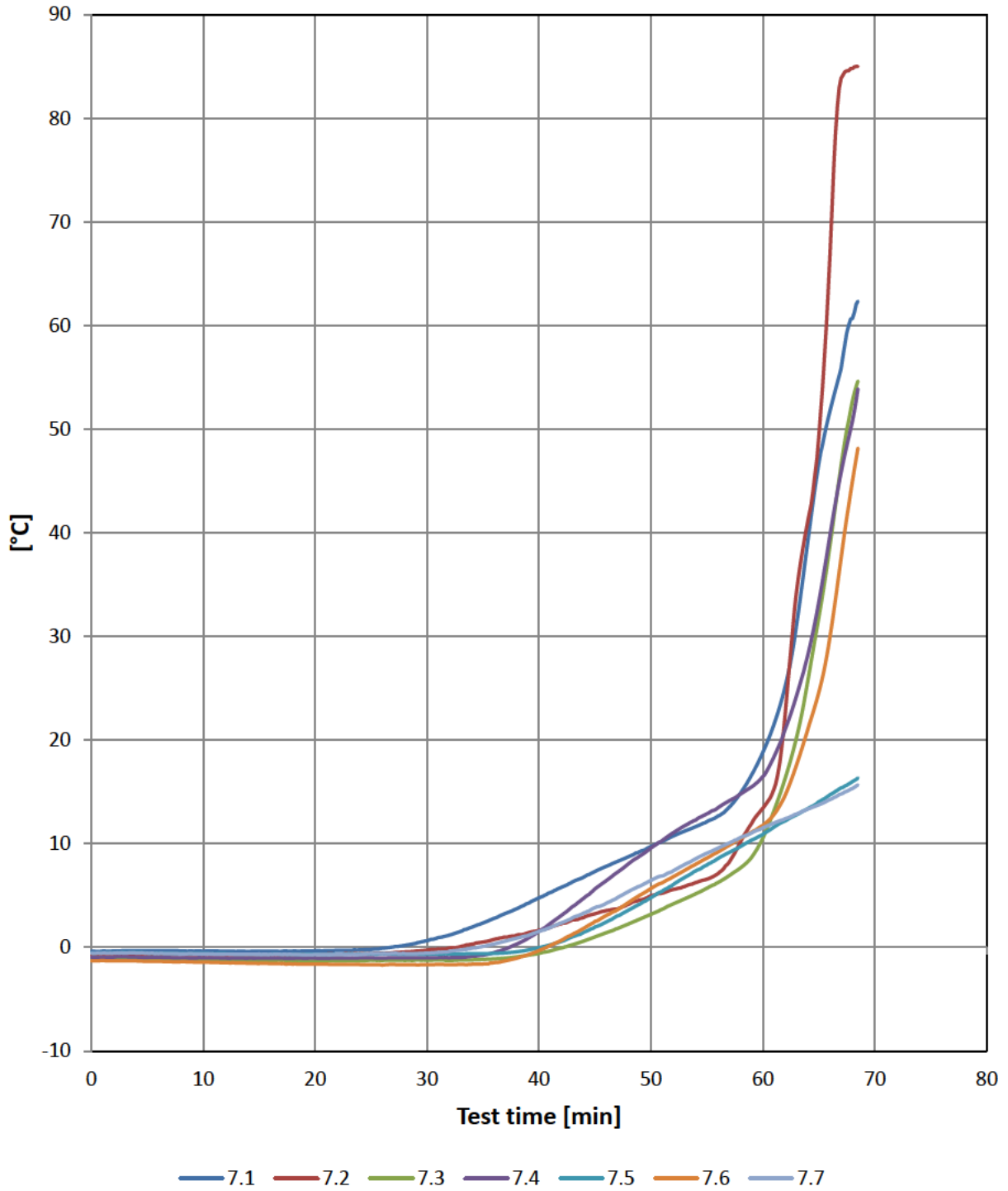
Average temperature rise

Measured with 5 thermocouples on the unexposed side

Min. / °C	6.1	6.2	6.3	6.4	6.5	6.Avg	6.Max
0	0	0	-1	-1	-1	0	0
2	0	0	0	0	0	0	0
4	0	0	-1	0	-1	0	0
6	0	0	-1	-1	-1	0	0
8	0	0	-1	-1	-1	-1	0
10	0	0	-1	-1	-1	-1	0
12	0	0	-1	-1	-1	-1	0
14	0	0	-1	-1	-1	-1	0
15	0	0	-1	-1	-1	-1	0
16	0	0	-1	-1	-1	-1	0
18	0	0	-1	-1	0	-1	0
20	0	0	-1	-1	0	0	0
22	0	0	0	-1	1	0	1
24	0	0	0	-1	2	0	2
26	0	0	0	-1	3	0	3
28	0	0	1	0	4	1	4
30	0	0	1	0	5	1	5
32	0	0	2	0	6	1	6
34	0	0	3	0	7	2	7
36	0	1	4	1	8	3	8
38	0	2	5	1	9	3	9
40	0	3	6	1	10	4	10
42	1	5	6	2	11	5	11
44	2	7	7	2	11	6	11
46	3	9	8	3	12	7	12
48	4	11	8	4	12	8	12
50	5	12	9	5	13	9	13
52	7	14	9	5	14	10	14
54	8	15	10	7	15	11	15
56	10	16	11	8	15	12	16
58	11	18	12	9	16	13	18
60	15	20	13	10	17	15	20
62	22	23	15	11	18	18	23
64	31	26	16	12	19	21	31
66	43	31	18	14	22	25	43
68	53	36	21	15	27	30	53
Failure [min]	-	-	-	-	-	-	-
Failure °C	180	180	180	180	180	140	180

Maximum temperature rise

Maximum temperatures on the unexposed side



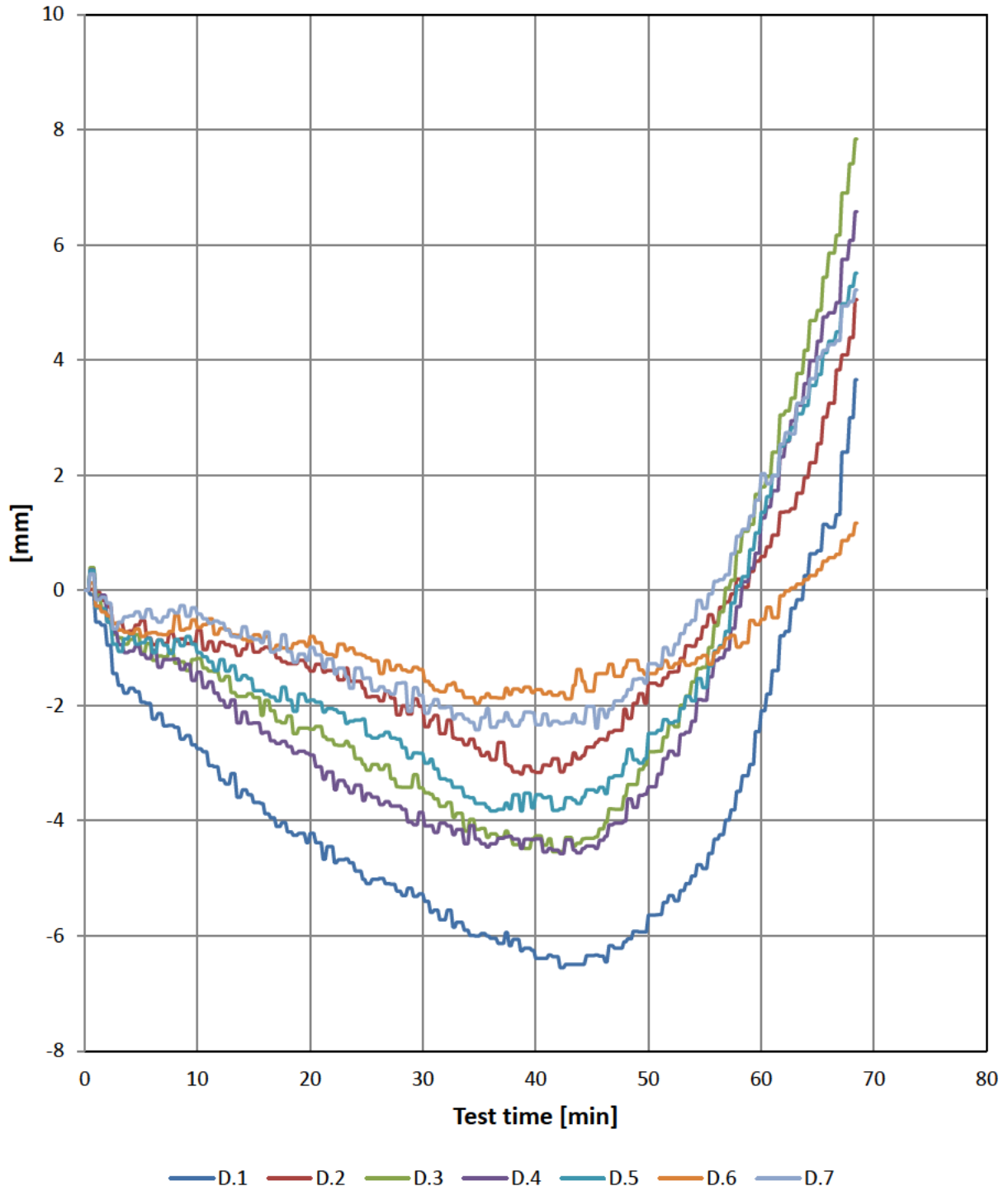
Maximum temperature rise

Maximum temperatures on the unexposed side

Min. / °C	7.1	7.2	7.3	7.4	7.5	7.6	7.7	7.Max
0	0	-1	-1	-1	-1	-1	-1	0
2	0	-1	-1	-1	-1	-1	-1	0
4	0	-1	-1	-1	0	-1	-1	0
6	0	-1	-1	-1	-1	-1	-1	0
8	0	-1	-1	-1	-1	-1	-1	0
10	0	-1	-1	-1	-1	-1	-1	0
12	0	-1	-1	-1	-1	-1	-1	0
14	0	-1	-1	-1	-1	-2	-1	0
15	0	-1	-1	-1	-1	-2	-1	0
16	0	-1	-1	-1	-1	-2	-1	0
18	0	-1	-1	-1	-1	-2	-1	0
20	0	-1	-1	-1	-1	-2	-1	0
22	0	-1	-1	-1	-1	-2	-1	0
24	0	-1	-1	-1	-1	-2	-1	0
26	0	-1	-1	-1	-1	-2	-1	0
28	0	0	-1	-1	-1	-2	-1	0
30	1	0	-1	-1	-1	-2	-1	1
32	1	0	-1	-1	-1	-2	0	1
34	2	0	-1	-1	-1	-2	0	2
36	3	1	-1	0	-1	-1	0	3
38	4	1	-1	0	0	-1	1	4
40	5	2	-1	2	0	0	2	5
42	6	2	0	3	1	1	2	6
44	7	3	1	5	1	2	3	7
46	8	4	1	6	2	3	4	8
48	9	4	2	8	4	4	5	9
50	10	5	3	10	5	6	6	10
52	11	6	4	11	6	7	7	11
54	12	6	5	12	7	8	9	12
56	13	7	6	13	9	9	10	13
58	15	10	8	15	10	11	11	15
60	19	13	11	16	11	12	12	19
62	25	23	16	21	12	15	12	25
64	39	41	26	28	13	21	13	41
66	52	67	39	40	15	30	14	67
68	61	85	53	51	16	45	15	85
Failure [min]	-	-	-	-	-	-	-	-
Failure °C	180	180	180	180	180	180	180	180

Horizontal deformation

Negative values indicate movement towards the furnace



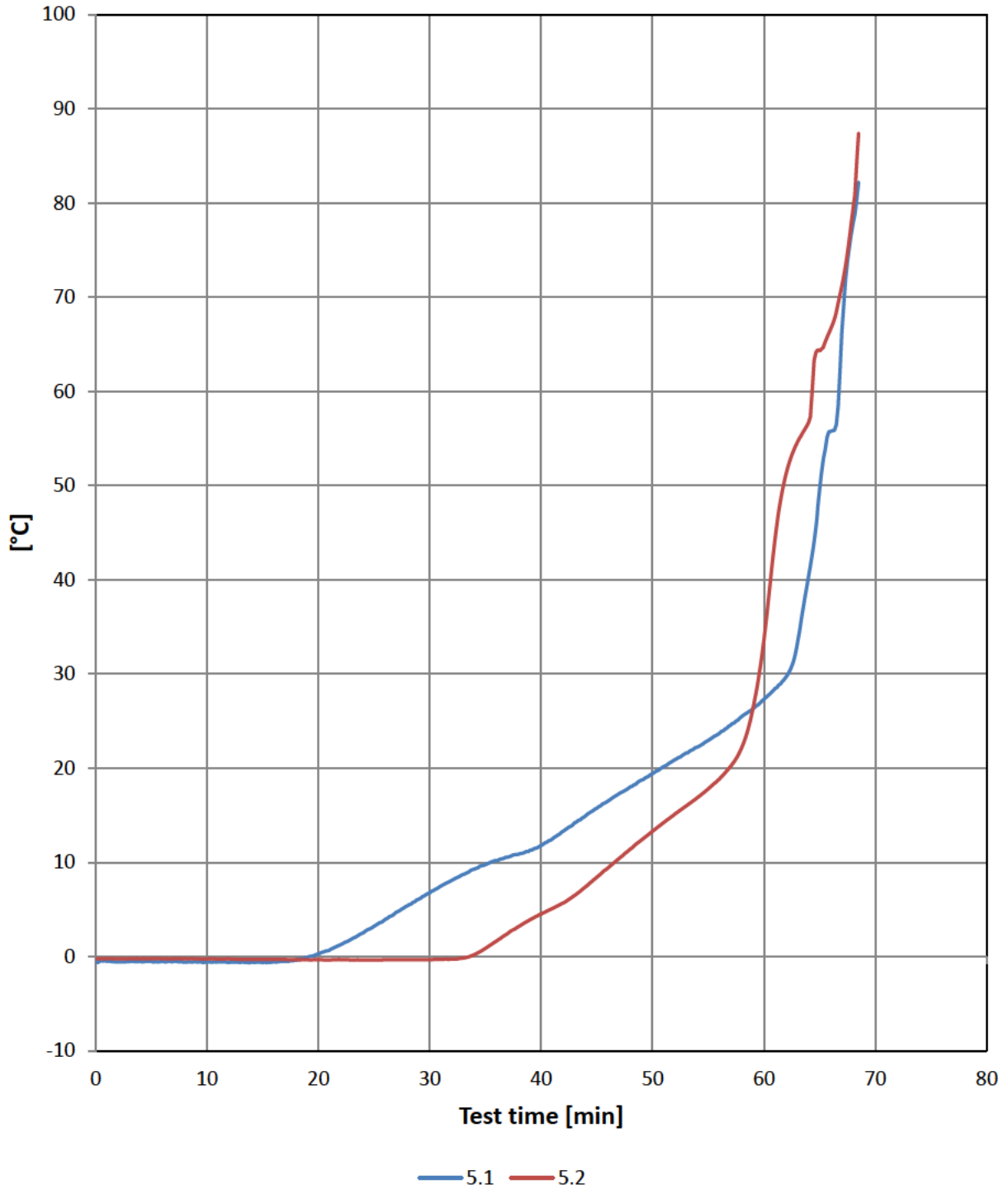
Horizontal deformation

Negative values indicate movement towards the furnace

Min. / mm	D.1	D.2	D.3	D.4	D.5	D.6	D.7
0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	-1.0	-0.3	-0.5	-0.6	-0.6	-0.4	-0.2
4	-1.7	-0.7	-0.9	-1.1	-0.8	-0.8	-0.4
6	-2.2	-0.9	-1.2	-1.0	-1.1	-0.7	-0.5
8	-2.4	-0.9	-1.3	-1.2	-0.9	-0.4	-0.4
10	-2.8	-0.7	-1.2	-1.4	-1.1	-0.6	-0.4
12	-3.3	-0.9	-1.6	-1.9	-1.2	-0.7	-0.6
14	-3.5	-1.0	-1.8	-2.1	-1.5	-0.9	-0.6
15	-3.7	-1.1	-1.9	-2.3	-1.7	-0.8	-0.9
16	-3.9	-1.0	-1.9	-2.5	-1.8	-0.8	-0.7
18	-4.2	-1.3	-2.2	-2.7	-1.9	-1.0	-1.1
20	-4.2	-1.4	-2.4	-2.9	-1.9	-0.8	-1.0
22	-4.5	-1.4	-2.6	-3.2	-2.1	-1.1	-1.2
24	-4.9	-1.6	-2.9	-3.4	-2.3	-1.1	-1.4
26	-5.0	-1.8	-3.0	-3.6	-2.6	-1.2	-1.7
28	-5.2	-2.2	-3.4	-3.7	-2.6	-1.3	-1.6
30	-5.3	-2.0	-3.4	-3.9	-2.8	-1.4	-1.8
32	-5.7	-2.5	-3.8	-4.0	-3.3	-1.8	-2.0
34	-5.9	-2.7	-4.2	-4.4	-3.6	-1.9	-2.2
36	-6.0	-2.9	-4.2	-4.4	-3.8	-1.9	-2.4
38	-6.1	-3.2	-4.4	-4.3	-3.6	-1.7	-2.4
40	-6.4	-3.2	-4.3	-4.3	-3.6	-1.7	-2.3
42	-6.4	-2.9	-4.5	-4.5	-3.8	-1.8	-2.3
44	-6.5	-2.9	-4.4	-4.6	-3.7	-1.4	-2.3
46	-6.4	-2.6	-4.1	-4.3	-3.4	-1.4	-2.1
48	-6.1	-2.1	-3.6	-4.0	-3.0	-1.3	-1.8
50	-5.6	-1.6	-2.8	-3.4	-2.5	-1.4	-1.3
52	-5.3	-1.4	-2.3	-2.8	-2.3	-1.3	-1.1
54	-5.0	-1.0	-1.6	-2.3	-1.9	-1.3	-0.5
56	-4.3	-0.6	-0.6	-1.2	-1.1	-1.1	0.2
58	-3.5	0.2	0.7	-0.3	0.1	-1.0	0.9
60	-2.1	0.6	1.8	1.3	1.4	-0.5	2.0
62	-0.8	1.4	3.1	2.3	2.5	-0.1	2.5
64	0.3	2.0	4.2	3.6	3.2	0.2	3.4
66	1.1	3.3	5.9	4.8	4.3	0.6	4.3
68	3.0	4.4	7.4	6.1	5.3	1.0	5.0

Internal temperature - between chip board and fiber gypsum Unexposed

Mid height



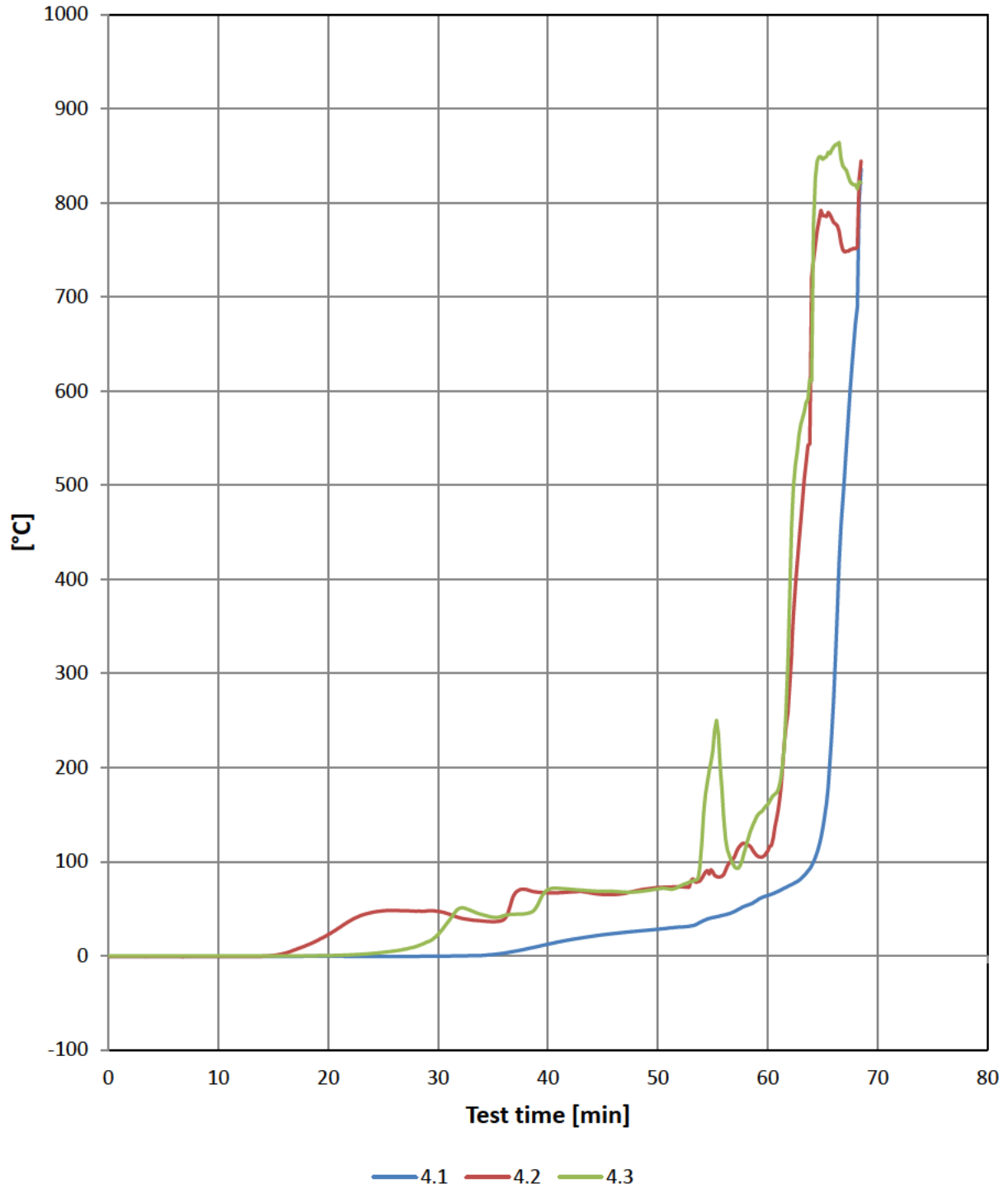
Internal temperature - between chip board and fiber gypsum Unexposed

Mid height

Min. / °C	5.1	5.2	5.Max
0	0	0	0
2	-1	0	0
4	-1	0	0
6	-1	0	0
8	-1	0	0
10	-1	0	0
12	-1	0	0
14	-1	0	0
15	-1	0	0
16	-1	0	0
18	0	0	0
20	0	0	0
22	1	0	1
24	3	0	3
26	4	0	4
28	5	0	5
30	7	0	7
32	8	0	8
34	9	0	9
36	10	2	10
38	11	3	11
40	12	5	12
42	13	6	13
44	15	7	15
46	17	9	17
48	18	11	18
50	19	13	19
52	21	15	21
54	22	17	22
56	24	19	24
58	25	22	25
60	27	34	34
62	30	51	51
64	40	57	57
66	56	67	67
68	78	79	79
Failure [min]	-	-	-
Failure °C	180	180	180

Internal temperature - between studs and chip board Unexposed

Mid height, 1 on third stud fom right, 2 and 3 on insulation to the left of 1 seen from unexposed side



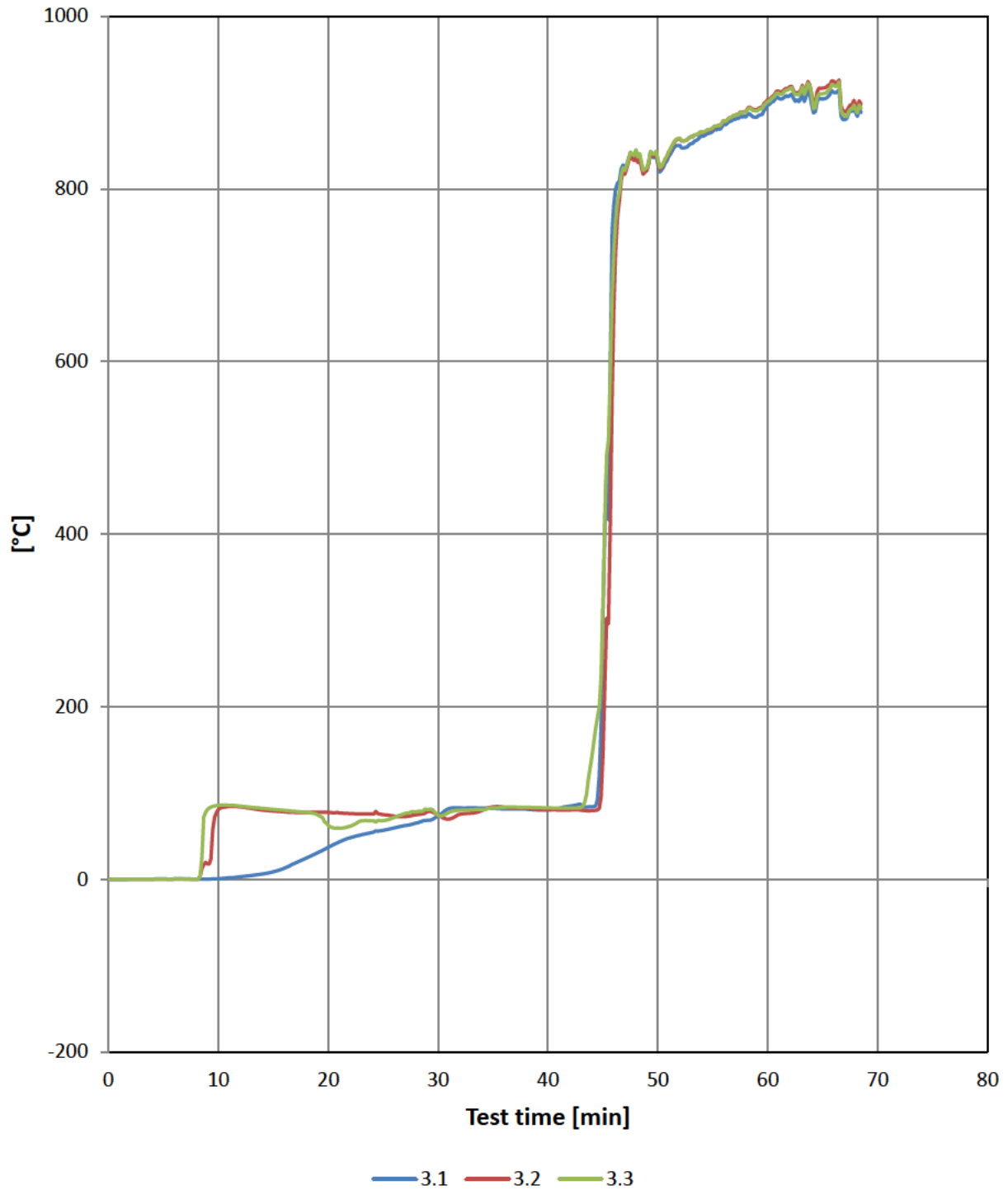
Internal temperature - between studs and chip board Unexposed

Mid height, 1 on third stud fom right, 2 and 3 on insulation to the left of 1 seen from unexposed side

Min. / °C	4.1	4.2	4.3	4.Max
0	-1	-1	0	0
2	0	-1	0	0
4	-1	-1	0	0
6	0	-1	0	0
8	-1	-1	0	0
10	-1	-1	0	0
12	-1	-1	0	0
14	-1	-1	0	0
15	-1	0	0	0
16	-1	3	0	3
18	-1	11	0	11
20	-1	22	0	22
22	-1	37	1	37
24	-1	46	2	46
26	-1	48	5	48
28	0	47	10	47
30	0	47	23	47
32	0	40	51	51
34	0	37	44	44
36	3	39	43	43
38	7	71	45	71
40	12	67	70	70
42	17	68	71	71
44	21	66	69	69
46	24	65	68	68
48	26	69	68	69
50	28	72	71	72
52	30	73	74	74
54	36	82	119	119
56	43	86	147	147
58	53	119	116	119
60	64	111	161	161
62	75	287	382	382
64	96	721	611	721
66	272	779	859	859
68	672	751	820	820
Failure [min]	65.50	61.17	54.33	54.33
Failure °C	180	180	180	180

Internal temperature - between insulation layers

at mid height, 1 and 3 on insulation, 2 on center stud seen from exposed side.



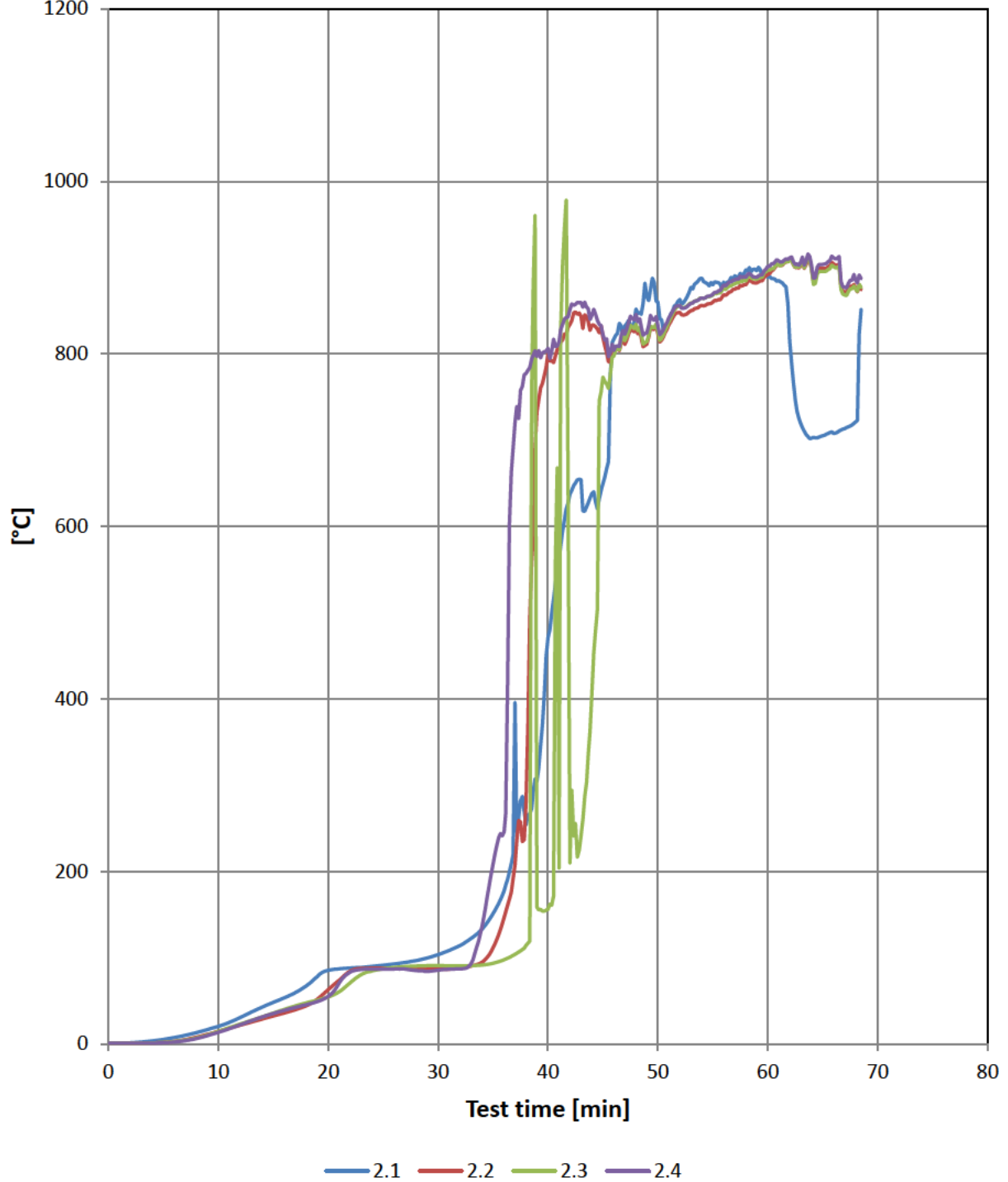
Internal temperature - between insulation layers

at mid height, 1 and 3 on insulation, 2 on center stud seen from exposed side.

Min. / °C	3.1	3.2	3.3	3.Max
0	0	0	0	0
2	0	0	0	0
4	0	0	0	0
6	0	0	0	0
8	0	0	0	0
10	1	81	86	86
12	3	84	85	85
14	6	80	82	82
15	9	79	81	81
16	13	78	80	80
18	25	77	78	78
20	37	77	62	77
22	48	76	61	76
24	54	76	68	76
26	59	73	72	73
28	65	75	78	78
30	73	75	74	75
32	83	75	80	83
34	82	80	81	82
36	81	83	83	83
38	81	82	83	83
40	80	81	83	83
42	85	80	82	85
44	84	80	141	141
46	781	660	726	781
48	843	839	845	845
50	829	832	834	834
52	851	858	859	859
54	861	866	866	866
56	875	879	879	879
58	883	889	889	889
60	897	904	901	904
62	908	918	916	918
64	898	910	909	910
66	912	925	920	925
68	889	897	892	897
Failure [min]	44.83	45.00	44.33	44.33
Failure °C	180	180	180	180

Internal temperature - between studs and chipboard exposed

1,2 and 4 on second stud at mid height, 3 on center stud at height 2460 mm seen from exposed side



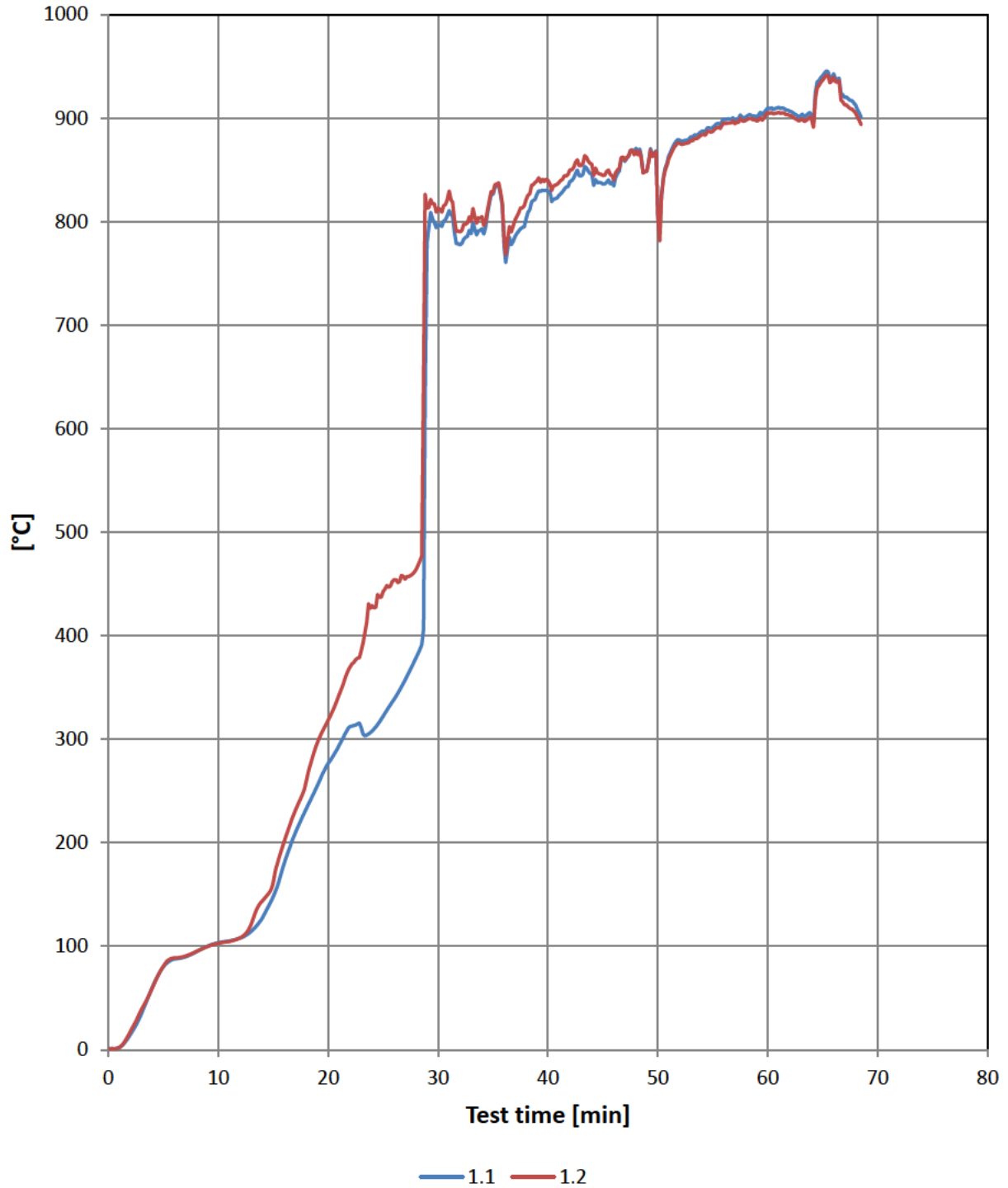
Internal temperature - between studs and chipboard exposed

1,2 and 4 on second stud at mid height, 3 on center stud at height 2460 mm seen from exposed side

Min. / °C	2.1	2.2	2.3	2.4	2.Max
0	1	1	1	1	1
2	1	1	1	1	1
4	4	1	1	1	4
6	7	3	3	2	7
8	13	8	7	6	13
10	20	15	14	13	20
12	31	22	23	22	31
14	43	29	31	31	43
15	48	32	36	35	48
16	54	36	40	39	54
18	67	44	48	45	67
20	85	63	54	55	85
22	88	84	71	83	88
24	90	88	85	87	90
26	93	88	89	87	93
28	97	88	90	85	97
30	104	87	91	85	104
32	114	88	90	87	114
34	133	95	91	136	136
36	178	146	98	246	246
38	254	281	114	777	777
40	471	800	156	806	806
42	638	834	209	852	852
44	638	834	405	845	845
46	817	802	797	804	817
48	852	831	835	846	852
50	860	823	826	832	860
52	863	848	856	856	863
54	888	856	865	865	888
56	883	869	877	880	883
58	897	880	885	889	897
60	889	892	898	902	902
62	815	908	909	911	911
64	702	898	897	902	902
66	708	904	901	912	912
68	721	877	875	886	886
Failure [min]	36.00	36.67	38.33	34.50	34.50
Failure °C	180	180	180	180	180

Internal temperature - Between chipboard and fiber gypsum Exposed

placed in 1/4 points between chipboard and fibergypsum



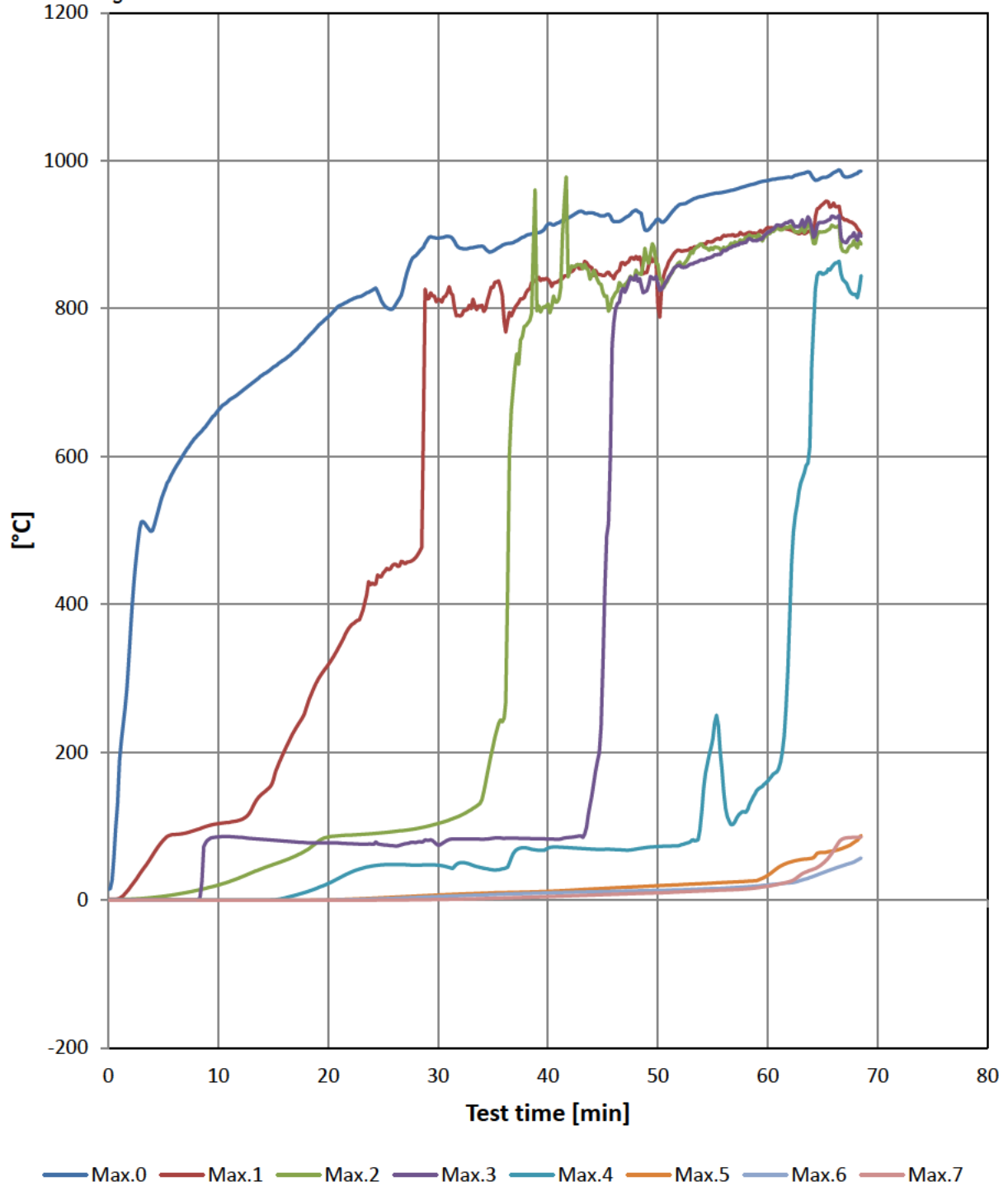
Internal temperature - Between chipboard and fiber gypsum Exposed

placed in 1/4 points between chipboard and fibergypsum

Min. / °C	1.1	1.2	1.Max
0	1	1	1
2	15	18	18
4	61	60	61
6	88	89	89
8	95	95	95
10	103	103	103
12	108	108	108
14	127	144	144
15	148	163	163
16	181	202	202
18	233	260	260
20	277	318	318
22	312	370	370
24	308	429	429
26	339	454	454
28	379	465	465
30	798	813	813
32	778	790	790
34	793	805	805
36	776	783	783
38	803	821	821
40	829	840	840
42	839	850	850
44	846	855	855
46	835	840	840
48	871	869	871
50	805	803	805
52	879	876	879
54	887	884	887
56	899	895	899
58	901	898	901
60	910	906	910
62	907	903	907
64	903	898	903
66	943	940	943
68	913	905	913
Failure [min]	15.83	15.33	15.33
Failure °C	180	180	180

Maximum temperature between the construction layers

Each data serie corresponds to the maximum temperature of all thermocouples in that layer. See drawing 1.7



Maximum temperature between the construction layers

Each data serie corresponds to the maximum temperature of all thermocouples in that layer. See drawing 1.7

Min. / °C	Max.0	Max.1	Max.2	Max.3	Max.4	Max.5	Max.6	Max.7
0	15	1	1	0	0	0	0	0
2	361	18	1	0	0	0	0	0
4	500	61	4	0	0	0	0	0
6	583	89	7	0	0	0	0	0
8	627	95	13	0	0	0	0	0
10	662	103	20	86	0	0	0	0
12	686	108	31	85	0	0	0	0
14	710	144	43	82	0	0	0	0
15	721	163	48	81	0	0	0	0
16	731	202	54	80	3	0	0	0
18	760	260	67	78	11	0	0	0
20	789	318	85	77	22	0	0	0
22	811	370	88	76	37	1	1	0
24	825	429	90	76	46	3	2	0
26	802	454	93	73	48	4	3	0
28	872	465	97	78	47	5	4	0
30	895	813	104	75	47	7	5	1
32	882	790	114	83	51	8	6	1
34	885	805	136	82	44	9	7	2
36	887	783	246	83	43	10	8	3
38	899	821	777	83	71	11	9	4
40	914	840	806	83	70	12	10	5
42	924	850	852	85	71	13	11	6
44	930	855	845	141	69	15	11	7
46	918	840	817	781	68	17	12	8
48	934	871	852	845	69	18	12	9
50	921	805	860	834	72	19	13	10
52	941	879	863	859	74	21	14	11
54	952	887	888	866	119	22	15	12
56	958	899	883	879	147	24	16	13
58	966	901	897	889	119	25	18	15
60	973	910	902	904	161	34	20	19
62	978	907	911	918	382	51	23	25
64	980	903	902	910	721	57	31	41
66	984	943	912	925	859	67	43	67
68	982	913	886	897	820	79	53	85



Photo No. 1 Wooden structure during assembly



Photo No. 2 Test specimen seen during mounting



Photo No. 3 Test specimen seen from unexposed side during mounting



Photo No. 4 Test specimen seen from exposed side during mounting



Photo No. 5 Test specimen seen from unexposed side during mounting



Photo No. 6 Test specimen seen from exposed side during mounting



Photo No. 7 Test specimen seen from unexposed side during mounting



Photo No. 8 Test specimen seen from unexposed side during mounting



Photo No. 9 Test specimen seen from unexposed side during mounting



Photo No. 10 Test specimen seen from unexposed side before test start



Photo No. 11 Test specimen seen from unexposed side at test start



Photo No. 12 Test specimen seen from unexposed side 30 minutes into the test



Photo No. 13 Test specimen seen from unexposed side 40 minutes into the test



Photo No. 14 Test specimen seen from unexposed side 65 minutes into the test



Photo No. 15 Test specimen seen from unexposed side 66 minutes into the test



Photo No. 16 Test specimen seen from exposed side after the test



Photo No. 17 Test specimen seen from exposed side after the test



Photo No. 18 Test specimen seen from unexposed side after the test