

TEST REPORT

NON-LOADBEARING WALL

Name of sponsor:	Ovacon AB		
Product name:	None		
File no.:	PGA12062A	Revision no.:	0
Test date:	16-12-2021	Date:	16-02-2022
Pages:	9	Encl.:	25
Ref:	KLK	/	JBK

Client information

Client: Ovacon AB

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SE-61922 Trosa
Sweden

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Content

	Client information	2
	Content	3
1	Date of test	4
2	Purpose of test.....	4
3	Test specimen	4
4	Drawings and description.....	5
	Description.....	5
	Measured by DBI.....	6
5	Test conditions.....	6
	Conditioning	6
	Mounting	6
	Fire test.....	6
6	Test results.....	7
	Measurements	7
	Visual observations:	7
7	Conclusion	9
8	Remarks	9

1 Date of test

The test was conducted on the 16-12-2021

2 Purpose of test

Examination of the fire-resistance of a non-load-bearing wall.

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

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

in conjunction with

EN 1364-1:2015 Fire resistance tests for non-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	K-100-0-01	04.02.2022	Design of test specimen EI testing Non load bearing wall

The documentation is supplied by the sponsor and it is stamped 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: 221 mm
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The test specimen was a 3.0 m high non-loadbearing wall construction made of OSB fixed to wood studs covered in a spray on insulation material.

The exposed side was constructed of a layer of spray on insulation applied to a layer of OSB, which was held in place by wood studs and a wood frame.

The test specimen was symmetrical.

Timber frame

Timber profiles: The timber frame consists of two profiles which are made of pine with a nominal density of 450-550 kg/m³. 45 x 95 mm timber is placed along the test frame. On the 45 x 95 mm wooden stud two 45 x 45 mm studs are fixed with a 3 mm overlap on each side, creating a gap in the middle for the OSB board to be mounted in.

The 45 x 95 mm profiles are fixed to the concrete test frame using concrete screws which were 7.5 x 82 mm with a c/c of 500 mm. The 45 x 45 mm profiles were fixed to the 45 x 95 mm profiles using wood screws which were 5 x 70 mm with a c/c of 400 mm.
See sponsor drawing no. K100-0-01.

Studs: A total of 2 vertical and 3 horizontal non-load bearing studs were used in the wall construction. The studs are made of 95 x 21 mm pine with a nominal density of 450-550 kg/m³. The vertical studs were spaced with a c/c of 1200 mm fixed with 5 x 70 mm screws at each end to the frame. The horizontal studs were placed at the joint of the OSB boards at 2500 mm. After the OSB3 board was mounted, the studs were fixed to each other with 4.5 x 32.

See sponsor drawing K100-0-01 and photo no. 1.

Materials between the frame and studs An 11 mm thick OSB3 board with a nominal density 600 kg/m³ was mounted to the timber frame and reinforced by non-load bearing studs at the OSB joints fixed with 4.5 x 25 mm screws at a c/c of 5 approx. 300 mm. The OSB boards had the maximum dimensions of 2500 x 1200 mm.

11 mm OSB-3

See sponsor drawing no. K100-0-01 and photo no. 3.

Spray on insulation 60 mm insulation

A layer of 60 mm spray on insulation with a nominal of 140-165 kg/m³ designated "Woodfibre AIR" was applied on both sides of the wall. The spray was applied on all surfaces.

The spray on insulation was a combination of 3 different products.

1. Lapinus granulate insulation – 709R2
2. SprayTec LPA – which is a water-based binding agent in the two-component adhesive system.
3. SprayTec LPB – which is a water-based setting agent in the two-component adhesive system.

See photo no. 4-6.

Measured by DBI

Product		45 x 45	OSB-3	95 x 21	95 x 45	Spray insulation
Density	kg/m ³	550	600	550	550	163
Thickness	mm	45	11	21	45	60
Moisture content	%	14.52	7.75	13.87	16.99	0.52
Organic content	%					1.08
Sampling method		Extra material	Extra material	Extra material	Extra material	Extra material
Drying temperature	°C	105	105	105	105	105

5 Test conditions

Conditioning

The test specimen was delivered on the 09-12-2021 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 simple supported in a test frame suitable for loaded tests with a clear opening of 3000 x 3000 mm.

Free edge was established along a vertical edge of the test specimen (2 x 25 mm stone wool with alu-foil in each side) to allow for unrestrained deformation of the test specimen.

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.

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 pressure was kept equal to the pressure in the laboratory at 0.5 m above the notional floor level during the test. The pressure differential is measured at a height of 1.16 m above notional floor level, which gives a pressure set point of approx. 3.4 Pa at the height of the measuring device.

6 Test results

Duration of the test was 121 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
Enclosures 6.0 and 6.1	Maximum temperature rise Maximum temperature rise on the unexposed side
Enclosures 7.0 and 7.1	Deformation Negative values indicate movement towards the furnace

Visual observations:

Time / Minutes	Visual observations:	U = Unexposed side E = Exposed side
0	Test commences	
9	Weak smoke development from DBI frame - top right corner	U
10	No changes	U
12	No changes	U
13	Weak smoke development from free and fixed edge	U

20	No changes	U/E
25	No changes	U/E
30	No changes	U/E
35	Small cracks beginning to form in insulation	E
40	More small cracks beginning to form in insulation	E
40	No changes	U/E
45	No changes	U/E
49	Discoloration on insulation - top left corner	U
50	No changes	U/E
55	No changes	U/E
59	Cotton pad test top left corner - No ignition or discoloration	U
60	No changes	U/E
65	No changes	U/E
70	Large crack in insulation	E
70	No change	U
73	Smoke development from entire surface	U
75	No changes	U/E
77	Increased discoloration top left color	U
80	Flames on surface of insulation - probably caused by gasses released from wood construction	E
80	No changes	U
85	No changes	U/E
89	Cotton pad top left corner - No ignition or discoloration	U
90	No changes	U/E
94	Discoloration of insulation top right corner	U
97	Discoloration of insulation top	U
103	Increased discoloration on all previous spots	U
105	No changes	U/E
110	Increased discoloration	U
110	No changes	E
115	Increased discoloration	U
115	No changes	E
119	Cotton pad done at top middle deformation mark - No ignition or discoloration	U
120	No changes	U/E
121	Test stopped	U/E

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 1364-1:2015 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): **121 minutes**

- Sustained flaming did not occur during the test.
- The cotton pad was not ignited during the test.
- No through-going openings in the test specimen were created during the test.

Insulation (I): **121 minutes**

- The average temperature rise on the unexposed surface of the test specimen did not exceed 140°C during the test.
- The maximum temperature rise on the unexposed surface of the test specimen did not exceed 180°C during the test.

8 Remarks

The field of direct application of the test results appears from EN 1364-1:2015, 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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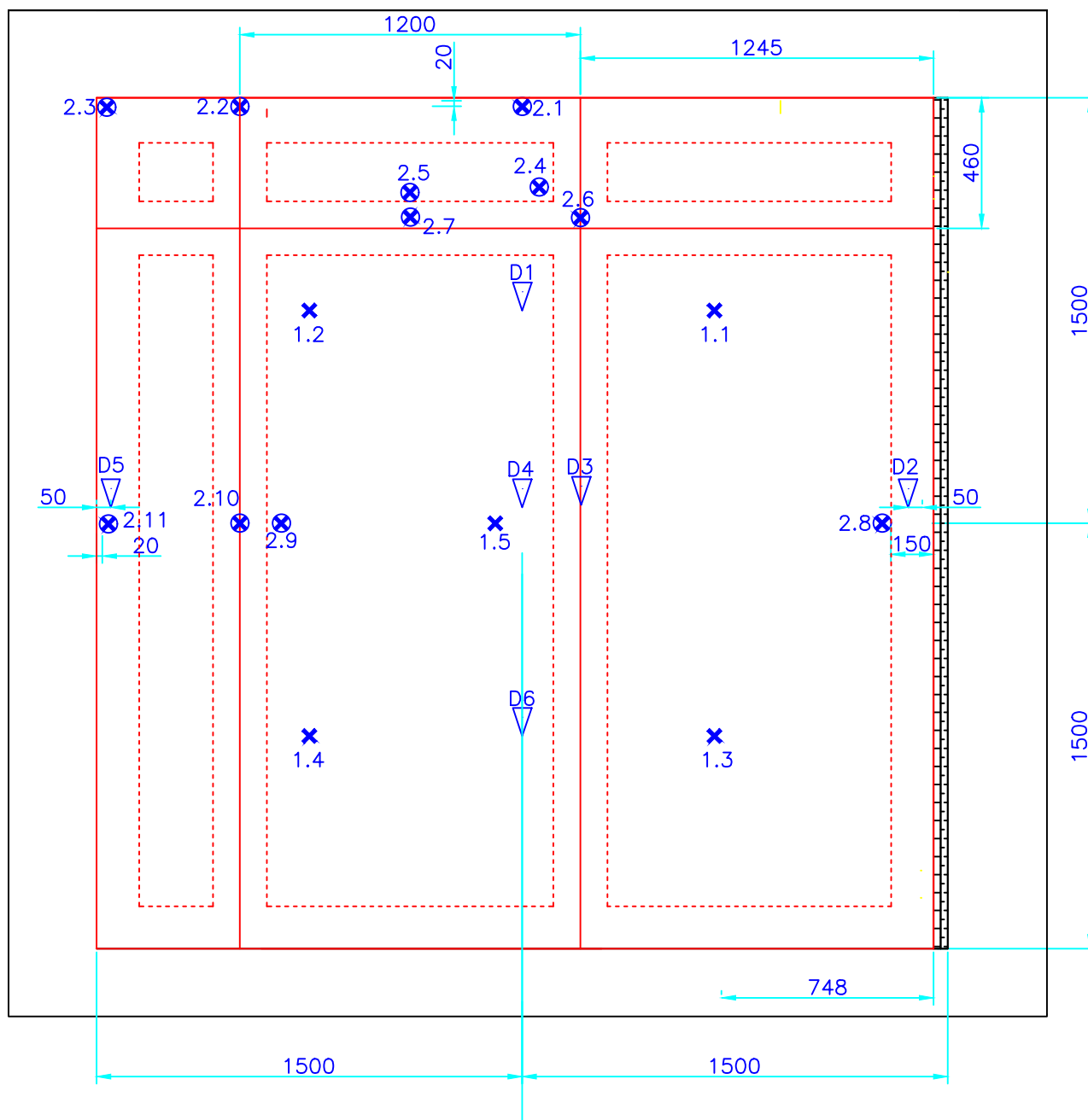
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Enclosures: **25**

DBI drawings:	1
DBI graphs and tables:	12
Photo sheets:	11
Sponsors drawings:	1



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

All measurements are in mm

Danish Institute of Fire and security Technology

Sponsor: Ovacon AB

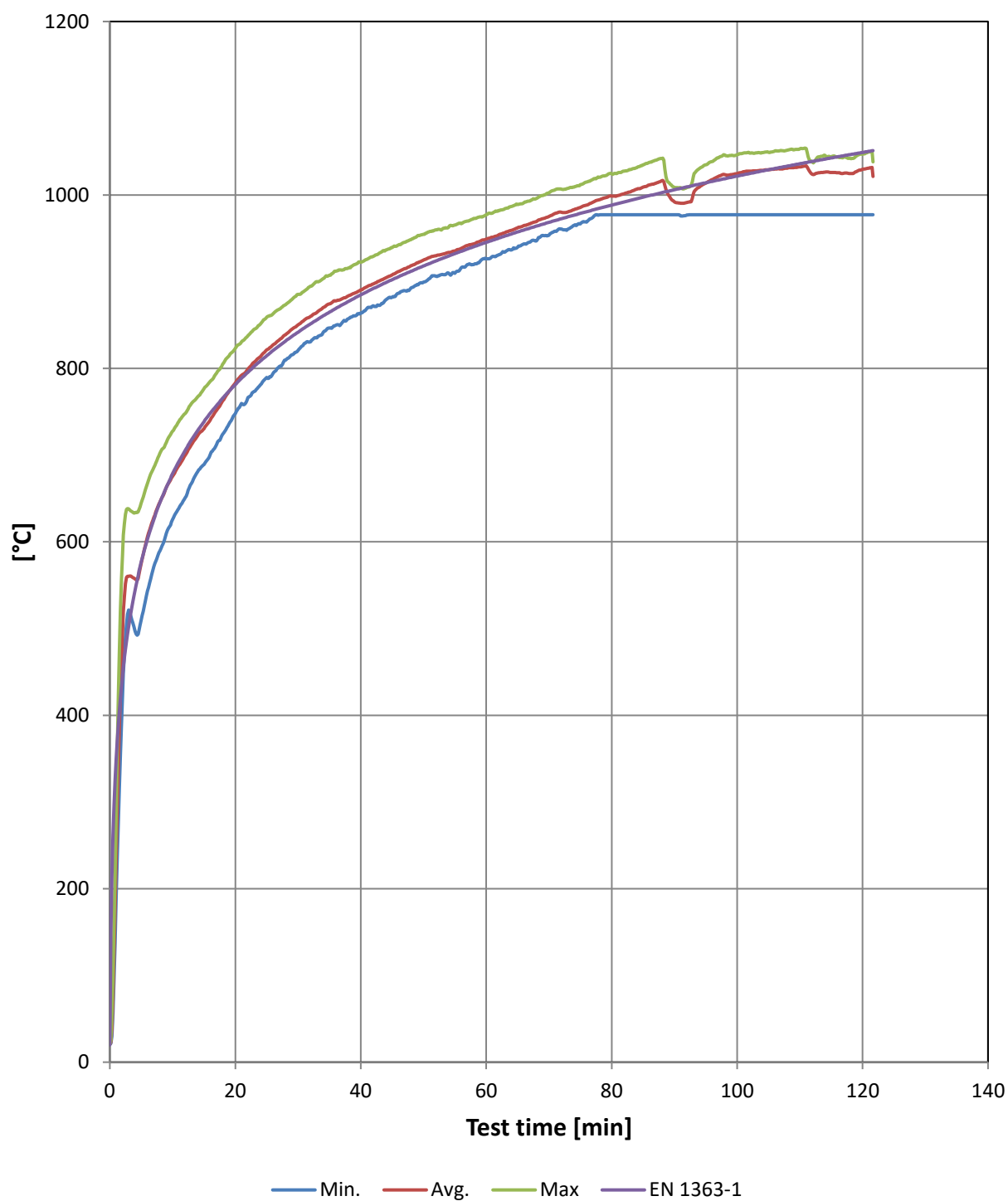
Subject: Non-loadbearing wall

File No.: PGA12062A

Test date: 16-12-2021

Enclosure: 1.0

Furnace temperature

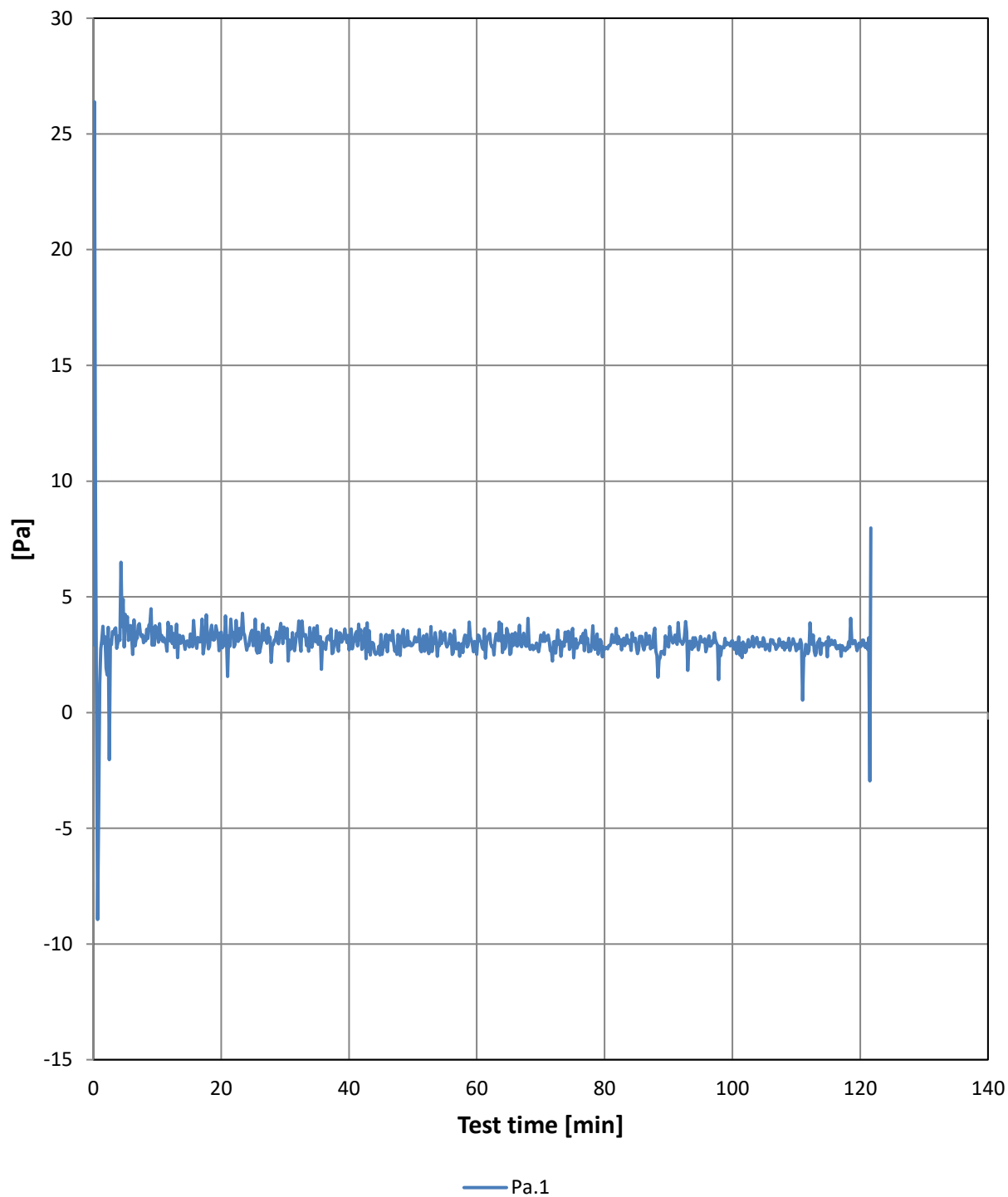


Furnace temperature

Time Minutes	Measured			Norm EN 1363-1	Area under curve		Dev. [%]	Limit [%]
	Minimum	Average	Maximum		Measured	EN 1363-1		
0	21	21	21	20	0	0	0,0	
5	510	575	644	576	2136	2200	-2,9	
10	626	675	727	678	5305	5366	-1,1	15
15	689	731	777	739	8830	8918	-1,0	13
20	748	783	823	781	12615	12723	-0,8	10
25	790	821	859	815	16629	16716	-0,5	8
30	821	850	885	842	20808	20859	-0,2	5
35	846	874	907	865	25121	25127	0,0	5
40	864	891	923	885	29532	29502	0,1	4
45	882	908	939	902	34028	33971	0,2	4
50	900	925	955	918	38611	38522	0,2	3
55	910	935	965	932	43264	43149	0,3	3
60	926	949	977	945	47977	47844	0,3	3
65	940	962	989	957	52754	52601	0,3	3
70	954	975	1002	968	57596	57415	0,3	3
75	966	985	1012	979	62499	62283	0,3	3
80	977	999	1024	988	67463	67201	0,4	3
85	977	1009	1035	997	72478	72166	0,4	3
90	977	992	1009	1006	77521	77175	0,4	3
95	977	1014	1035	1014	82514	82225	0,4	3
100	977	1025	1047	1022	87619	87315	0,3	3
105	977	1029	1049	1029	92756	92442	0,3	3
110	977	1032	1053	1036	97910	97605	0,3	3
115	977	1026	1044	1043	103048	102802	0,2	3
120	977	1029	1047	1049	108178	108031	0,1	3
121	977	1031	1050	1050	109208	109081	0,1	3

Vertical furnace pressure

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



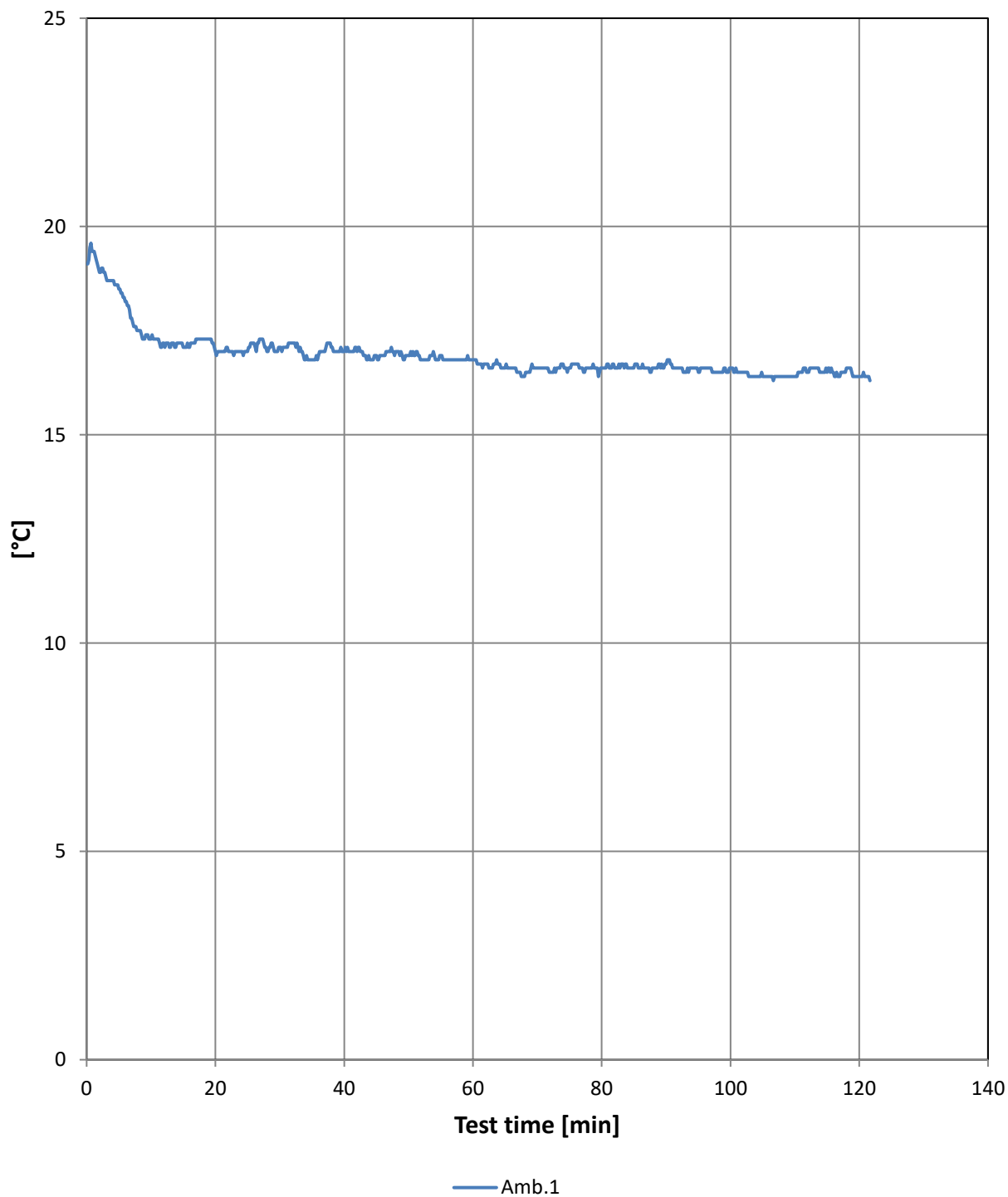
Vertical furnace pressure

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

Min. / Pa	Pa.1
0	2,9
5	4,2
10	3,3
15	2,8
20	3,5
25	2,9
30	3,6
35	3,8
40	2,7
45	3,4
50	2,9
55	3,5
60	2,5
65	3,3
70	3,3
75	3,6
80	2,7
85	2,8
90	2,8
95	3,3
100	3,1
105	3,1
110	2,7
115	3,3
120	2,8
121	3,0

Ambient temperature

The ambient temperature in the laboratory during the test



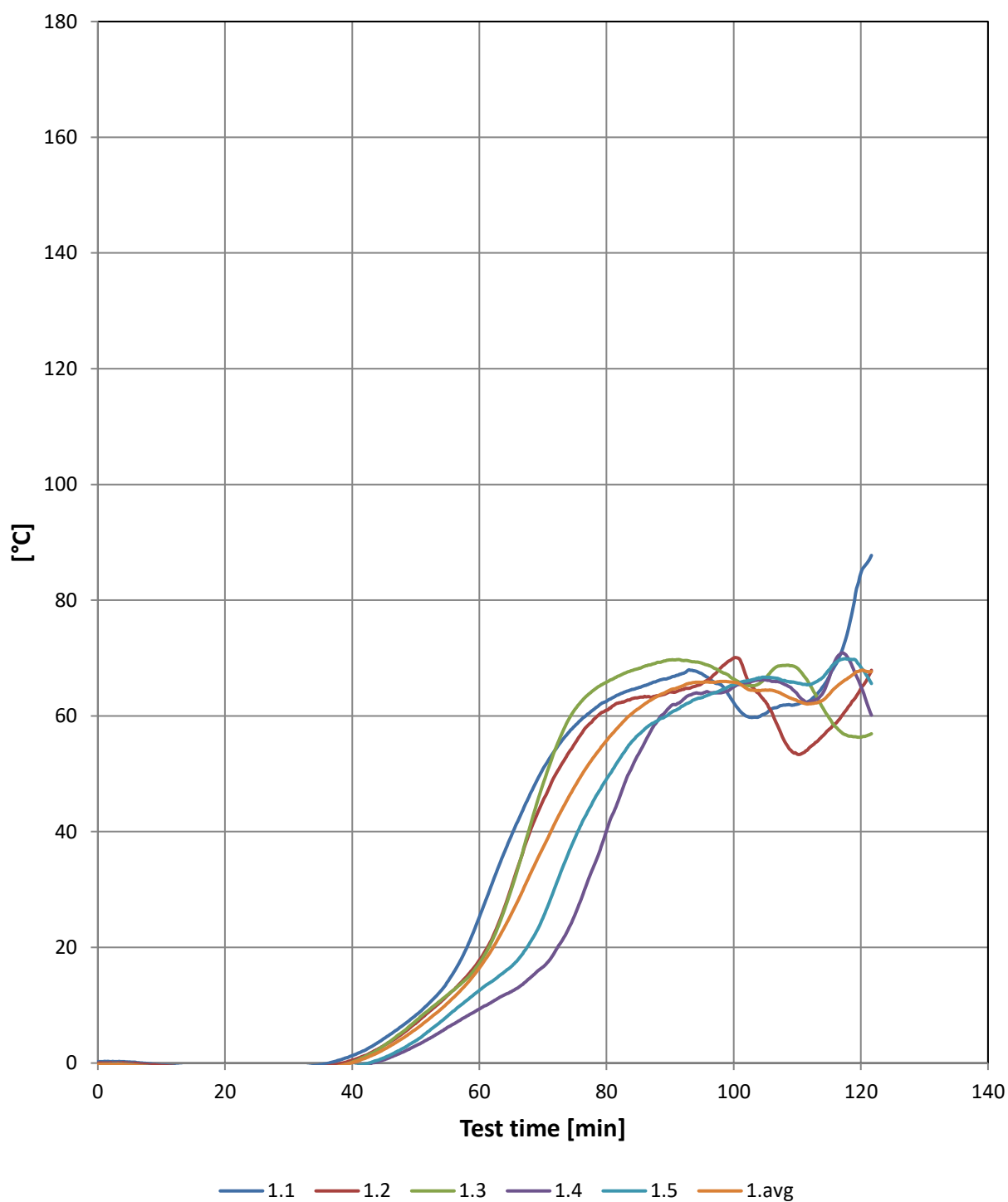
Ambient temperature

The ambient temperature in the laboratory during the test

Min. / °C	Amb.1
0	19,1
5	18,5
10	17,3
15	17,1
20	17,0
25	17,0
30	17,1
35	16,8
40	17,0
45	16,9
50	16,9
55	16,9
60	16,8
65	16,6
70	16,6
75	16,6
80	16,6
85	16,6
90	16,7
95	16,5
100	16,6
105	16,4
110	16,4
115	16,5
120	16,4
121	16,4

Average temperature rise

Measured with 5 thermocouples



Average temperature rise

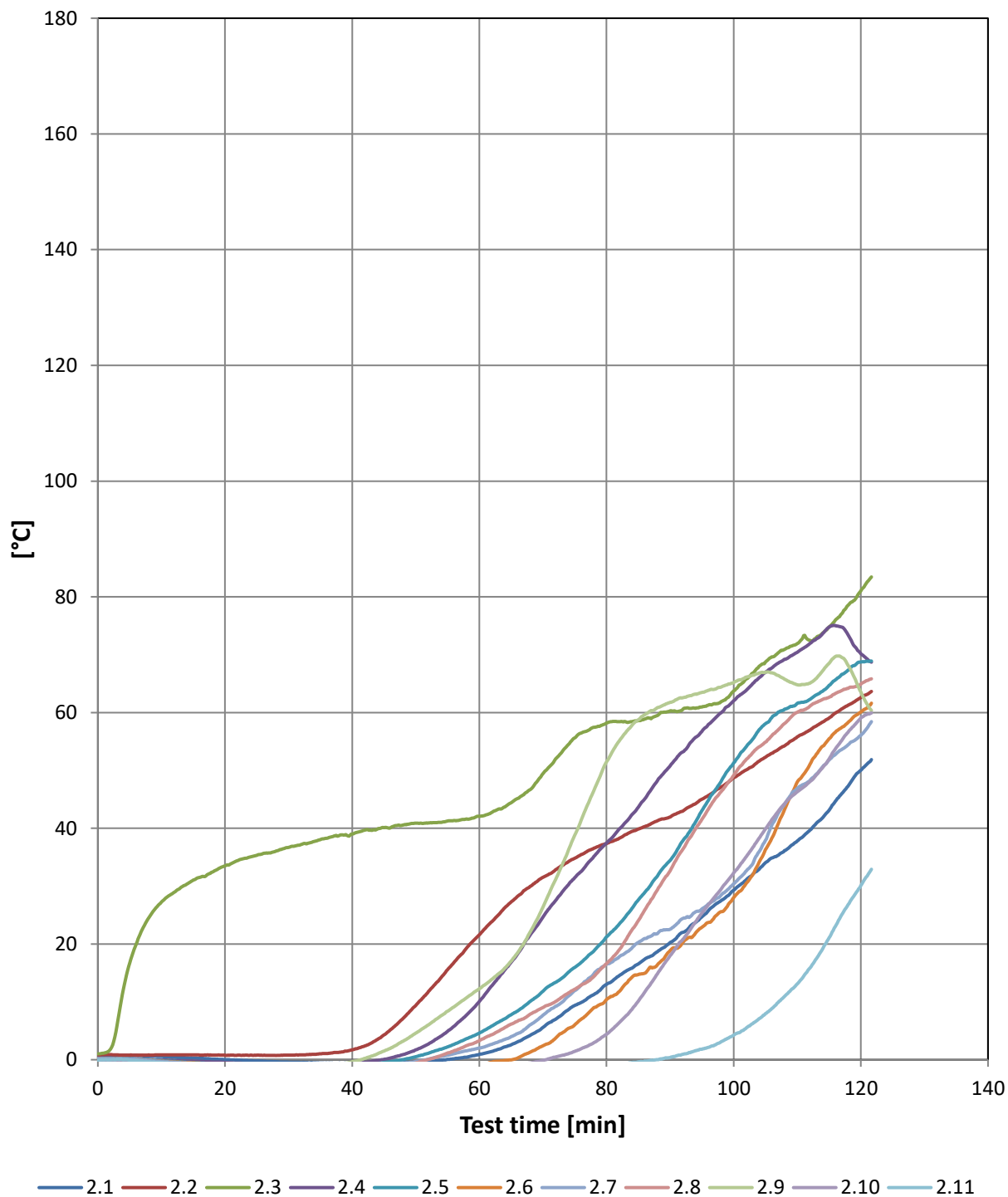
Measured with 5 thermocouples

Min. / °C	1.1	1.2	1.3	1.4	1.5	1.Avg	1.Max
0	0	0	0	-1	0	0	0
5	0	0	-1	-1	0	0	0
10	0	0	-1	-1	-1	-1	0
15	-1	-1	-2	-2	-1	-1	-1
20	-1	-1	-2	-2	-1	-1	-1
25	-1	-1	-2	-2	-2	-2	-1
30	-1	-1	-2	-2	-2	-2	-1
35	0	-1	-1	-2	-1	-1	0
40	1	1	0	-1	-1	0	1
45	4	3	3	1	1	2	4
50	8	7	7	3	4	6	8
55	14	12	12	6	8	10	14
60	25	18	17	9	13	16	25
65	39	30	30	12	17	26	39
70	51	45	48	17	25	37	51
75	58	55	61	26	39	48	61
80	63	61	66	40	49	56	66
85	65	63	68	53	57	61	68
90	67	64	70	62	60	65	70
95	67	66	69	64	63	66	69
100	62	70	66	65	65	66	70
105	60	63	66	66	67	64	67
110	62	53	68	64	66	63	68
115	67	58	60	67	68	64	68
120	85	65	56	65	68	68	85
121	86	66	57	62	67	68	86

Failure [min]	-	-	-	-	-	-	-
Failure °C	180	180	180	180	180	140	180

Maximum temperature rise

Maximum temperature rise on the unexposed side



Maximum temperature rise

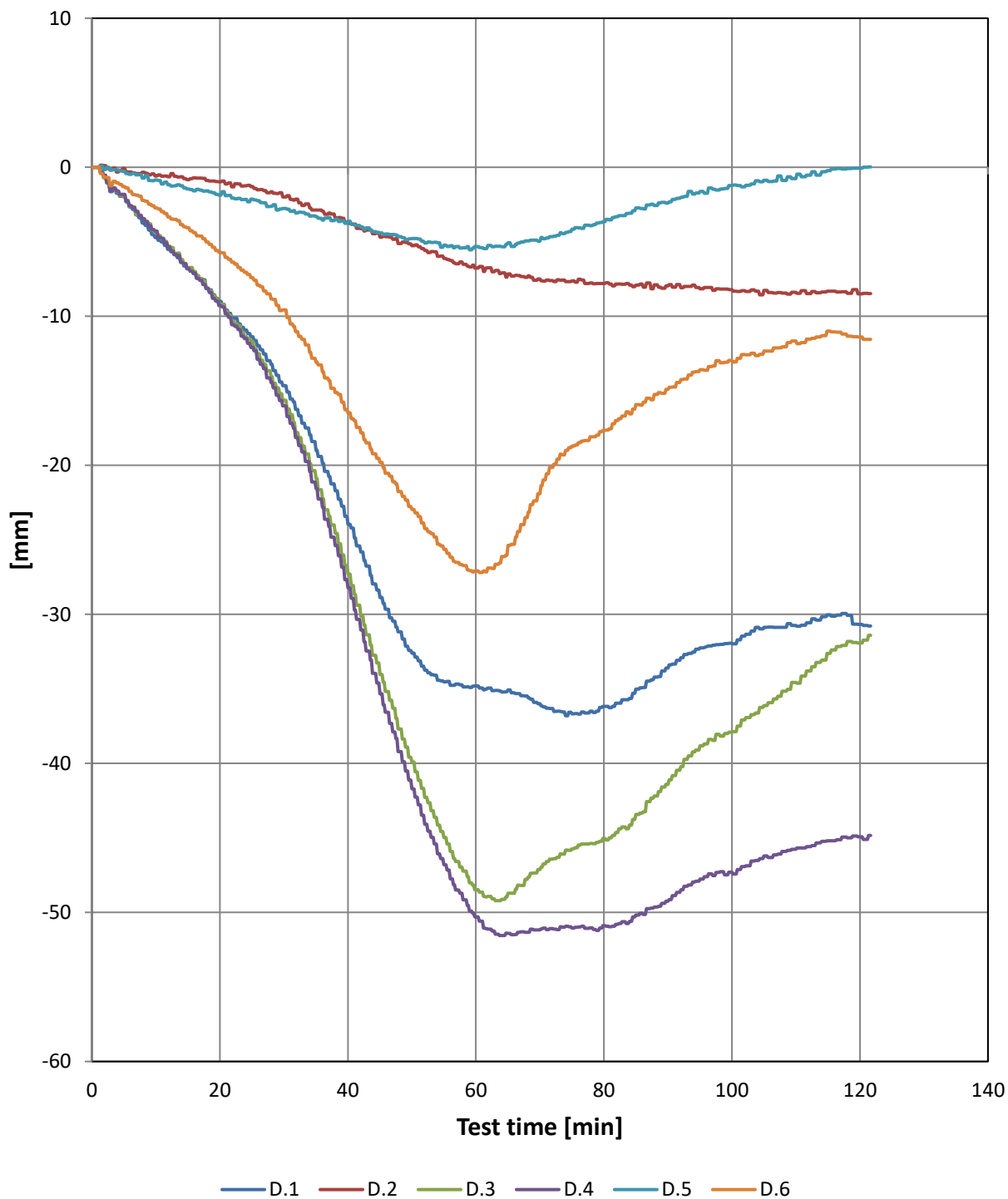
Maximum temperature rise on the unexposed side

Min. / °C	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	2.10	2.11	2.Max
0	1	1	1	0	0	0	0	-1	0	0	0	1
5	1	1	17	0	0	0	0	-1	0	0	0	17
10	1	1	27	0	0	0	0	-1	-1	-1	0	27
15	0	1	31	0	-1	-1	-1	-1	-1	-1	-1	31
20	0	1	34	0	-1	-1	-1	-2	-2	-2	-1	34
25	0	1	35	-1	-1	-1	-1	-2	-2	-2	-1	35
30	0	1	37	-1	-1	-1	-1	-2	-2	-2	-2	37
35	-1	1	38	-1	-1	-1	-1	-2	-1	-2	-2	38
40	-1	2	39	-1	-1	-2	-1	-2	0	-2	-2	39
45	-1	4	40	0	0	-2	-1	-2	1	-2	-2	40
50	0	9	41	2	1	-2	0	-1	5	-2	-2	41
55	0	16	41	5	2	-1	1	1	8	-2	-2	41
60	1	22	42	10	5	-1	2	3	12	-2	-2	42
65	3	27	44	17	8	0	4	6	17	-1	-2	44
70	6	32	49	25	12	2	8	9	26	0	-2	49
75	9	35	56	31	16	6	12	12	39	1	-1	56
80	13	37	58	37	21	10	16	17	51	4	-1	58
85	17	40	59	44	28	15	20	24	59	10	0	59
90	20	42	60	51	34	19	23	33	62	18	0	62
95	25	45	61	57	43	23	26	42	63	25	2	63
100	29	49	64	62	51	28	30	49	65	32	4	65
105	34	52	69	67	58	36	38	55	67	40	8	69
110	38	56	72	70	62	48	47	60	65	46	13	72
115	43	59	75	75	65	55	52	63	69	52	21	75
120	50	63	81	70	69	60	56	65	64	59	30	81
121	51	63	83	69	69	61	57	66	61	60	32	83

Failure [min]	-	-	-	-	-	-	-	-	-	-	-	-
Failure °C	180	180	180	180	180	180	180	180	180	180	180	180

Deformation

Negative values indicate movement towards the furnace



Deformation

Negative values indicate movement towards the furnace

Min. / mm	D.1	D.2	D.3	D.4	D.5	D.6
0	0,0	0,0	0,0	0,0	0,0	0,0
5	-2,0	-0,1	-1,9	-1,8	-0,3	-1,3
10	-4,7	-0,6	-4,4	-4,3	-0,9	-2,7
15	-6,8	-0,8	-6,7	-6,8	-1,5	-4,1
20	-9,0	-1,0	-9,2	-9,3	-1,9	-5,7
25	-11,4	-1,3	-11,7	-12,1	-2,1	-7,4
30	-14,7	-2,0	-15,6	-16,0	-2,8	-9,6
35	-19,0	-2,9	-20,9	-21,6	-3,3	-13,1
40	-24,0	-3,8	-27,3	-28,2	-3,6	-16,5
45	-28,9	-4,7	-34,0	-35,3	-4,4	-19,8
50	-32,6	-5,3	-39,9	-41,7	-4,8	-23,0
55	-34,5	-6,1	-45,0	-46,8	-5,2	-25,6
60	-34,8	-6,8	-48,5	-50,3	-5,3	-27,1
65	-35,1	-7,2	-48,7	-51,4	-5,1	-25,4
70	-36,0	-7,5	-47,1	-51,2	-5,0	-21,9
75	-36,7	-7,6	-45,7	-51,1	-4,2	-18,7
80	-36,2	-7,8	-45,0	-50,9	-3,7	-17,7
85	-35,0	-7,9	-43,4	-50,2	-2,7	-15,9
90	-33,6	-8,0	-41,4	-49,2	-2,4	-14,9
95	-32,3	-8,2	-38,8	-47,8	-1,6	-13,6
100	-31,9	-8,2	-37,9	-47,3	-1,2	-13,0
105	-30,9	-8,3	-36,1	-46,2	-0,9	-12,3
110	-30,7	-8,4	-34,6	-45,8	-0,8	-11,7
115	-30,0	-8,3	-32,6	-45,2	-0,2	-11,0
120	-30,7	-8,5	-31,9	-44,9	-0,1	-11,4
121	-30,8	-8,5	-31,7	-45,1	0,0	-11,6



Photo No. 1 Wood frame, studs and OSB wall during mounting process.



Photo No. 2 Finished wall exposed side before application of spray on insulation.



Photo No. 3 Finished wall unexposed side before application of spray on insulation.



Photo No. 4 Application of spray on insulation exposed side.



Photo No. 5 Application of spray on insulation unexposed side.



Photo No. 6 Finished application of spray on insulation unexposed side.



Photo No. 7 Test specimen before testing.



Photo No. 8 Test specimen at start of testing.



Photo No. 9 Test specimen after 15 minutes of testing.



Photo No. 10 Test specimen after 30 minutes of testing.



Photo No. 11 Test specimen after 45 minutes of testing.



Photo No. 12 Start of discoloration top left corner.



Photo No. 13 Cotton pad result top left corner at 59 minutes of testing.



Photo No. 14 Test specimen after 60 minutes of testing.

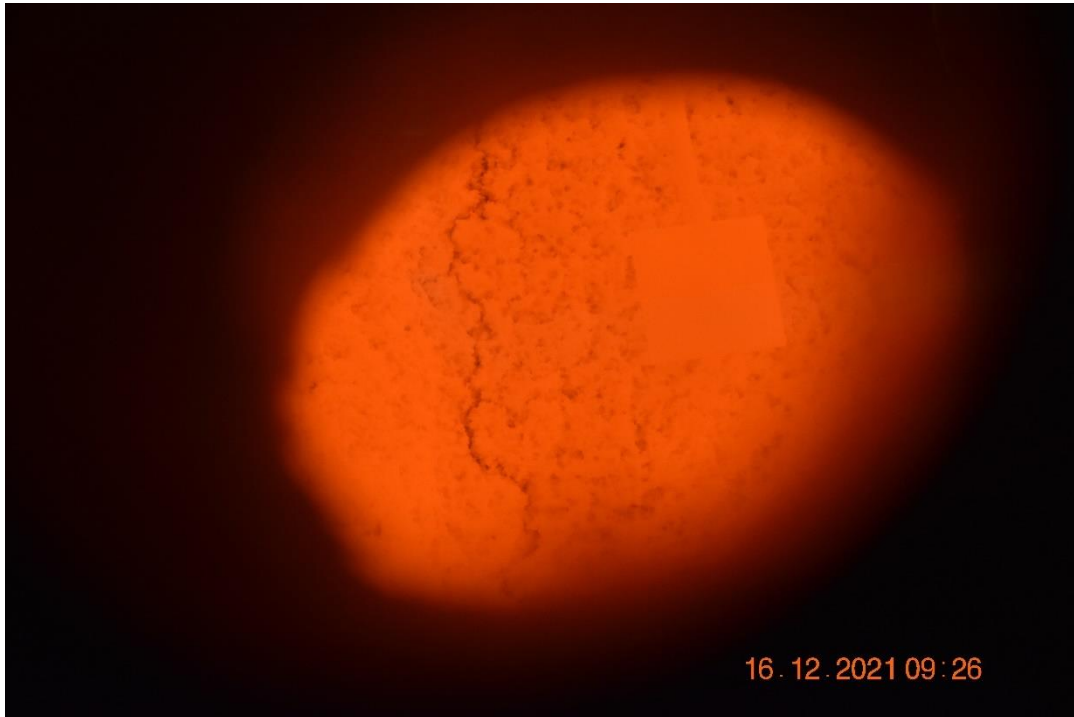


Photo No. 15 Crack in insulation exposed side after 70 minutes of testing.



Photo No. 16 Test specimen after 74 minutes of testing.



Photo No. 17 Cotton pad result top left corner at 89 minutes of testing.



Photo No. 18 Test specimen after 90 minutes of testing.



Photo No. 19 Increase in areas with discoloration after 105 minutes of testing.



Photo No. 20 Cotton pad result top left corner at 119 minutes of testing.



Photo No. 21 Test specimen after 120 minutes of testing.

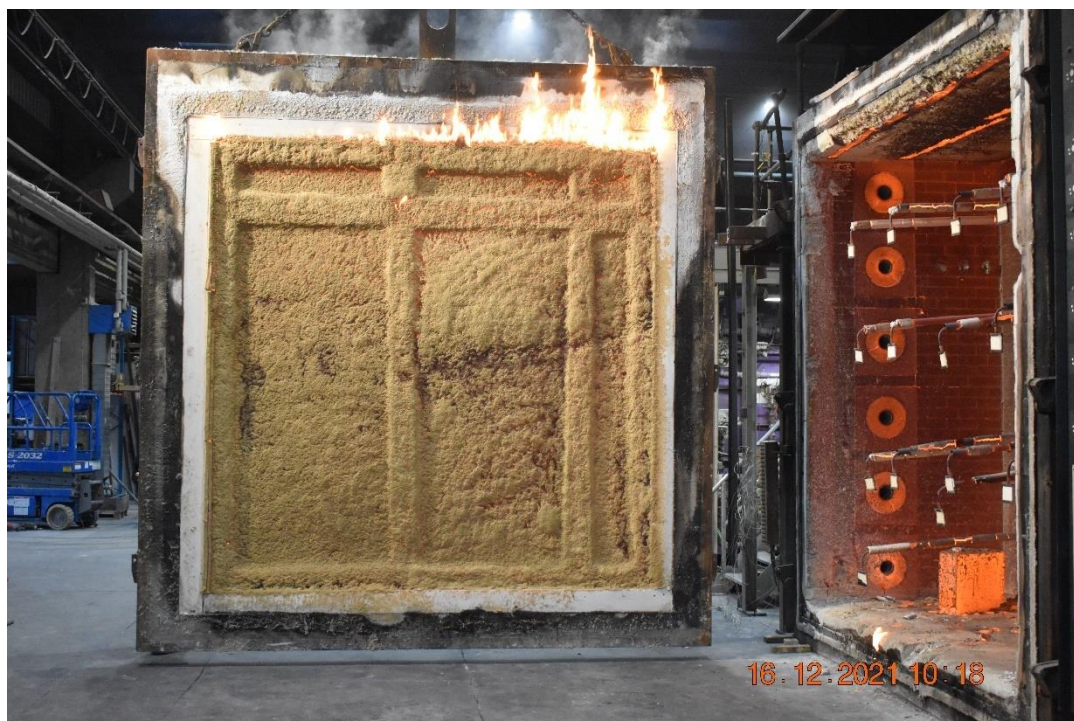
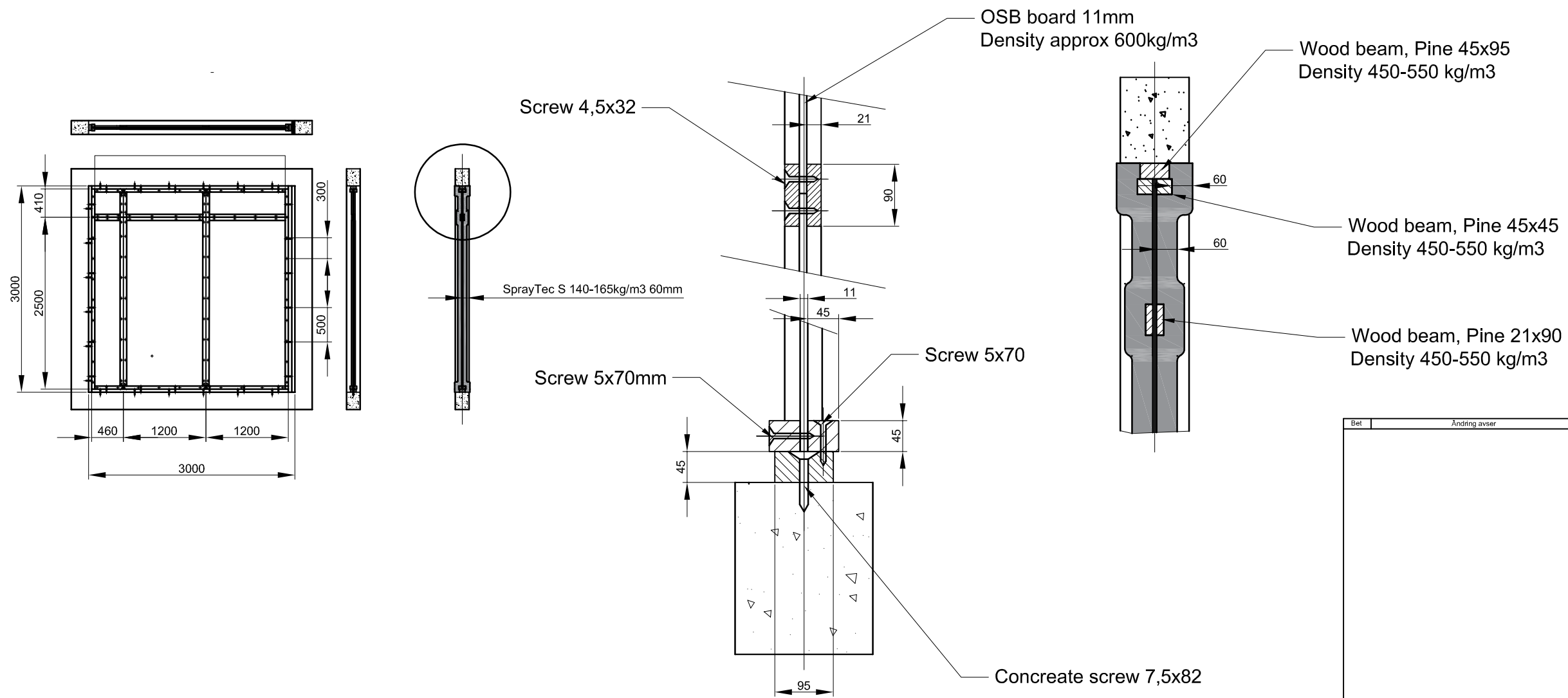



Photo No. 22 Exposed side of test specimen after 121 minutes of testing.



Bet		Ändring avser		Sign		Datum	
Ovacon AB							
							
	A						
	K						
	E						
	V						
	W						
	L						
Uppdrag		Ritad av Dahn Ahlström		Handläggare Dahn Ahlström			
Datum 2022-02-04		Ansvarig					
Design of test specimen EI testing Non loadcarring wall							
Skala 1:50 / 1:5		Ritningsnummer K-100-0-01					