



Test Report

Loadbearing roof

Name of sponsor: Nordic Build A/S
Product name: Loadbearing roof
File no.: PGA11340A
Test date: 16-01-2019 **Date:** 28-01-2019
Pages: 10 **Encl.:** 44
Ref: RBI / ADR



DBI

Client information

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Date of test

The test was conducted on 16-01-2019.

Purpose of test

Examination of the fire-resistance of a loadbearing and separating roof.

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

DS/EN 1363-1:2012 Fire resistance tests – General requirements

in conjunction with

EN 1365-2:2014 Fire resistance test for loadbearing elements – Part 2: Floors and roofs

Test specimen

The trade name and sponsors identification mark is stated below:

Trade name:	Loadbearing roof
Identification mark:	None

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

The sponsor delivered one test specimen for fire testing.

The process of verification was carried out by DBI - Danish Institute of Fire and Security Technology. The laboratory oversaw the fabrication of the test specimen, material for verification of density, thickness, moisture and organic content were sampled during the inspection.



Drawings and description

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

Type	Drawing No.	Dated	Subject
Drawing	1	11.12.2018	Tagelement
Drawing	2	11.12.2018	Tagelement
Drawing	3	11.12.2018	Tagelement vederlagsdetalje
Drawing	4	11.12.2018	Tagelement vederlagsdetalje
Drawing	5	11.12.2018	Tagelement
Drawing	6	11.12.2018	Tagelement tværsnit
Drawing	7	11.12.2018	Tagelement Produktionstegning
Drawing	8	11.12.2018	Tagelement Produktionstegning
Drawing	9	11.12.2018	Tagelement Produktionstegning
Data sheet			M4 composite board (2 pages)
Data sheet			Stone wool (2 pages)
Data sheet			Adhesive
Data sheet			Steel (2 pages)

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 assembly, the test and after the test.

The sponsor carried out the mounting of the test specimen.

Test specimen

External measures: Full length: 6172 mm Width: 2900 mm Thickness: 474 mm

The test specimen was a loadbearing roof construction made of elements of steel, M4 composite boards and stone wool. The test specimen consisted of 12 elements – further documentation see drawing 2, 5 and 6.

The test specimen was built of individual elements with a width of 250 mm – further documentation see drawing 6.

The elements at free edge had a width of 200 mm.

Each individual element consisted of two 0.9 mm profiled flanges of steel. The two flanges of steel were connected through a M4 composite board – the M4 composite boards were glued with 140 g/m to the flanges of steel. The vertical joints in the M4 composite boards were also glued. Stone wool was installed between the two flanges of steel – there was no glue used to bond the stone wool to the flanges of steel. Each individual element formed an insulated beam. The individual elements were connected in an airtight tongue and groove lock – further documentation see drawing 8.



The self weight of the construction was 0.58 kN/m².

The test specimen was symmetrical.

Components

Boards	15 mm M4 composite boards designated Cantona M4 komposit with a nominal density of 1.100 kg/m ³ . The M4 composite boards had a height of 472 mm and were installed with two joints in the longitudinal direction of the test specimen – 1850 mm / 2400 mm / 1850 mm.
Insulation	420 mm stone wool insulation designated Rockwool Flexibatts 34 with a measured density of 42 kg/m ³ . The nominal density is not indicated. The stone wool was installed in full length of the test specimen – 6100 mm – with a plural number of joints.
Adhesive	A two component adhesive designated PKI ProFect 41176 + 91102 with a nominal density of 1.6 kg/L + 1.2 kg/L.
Steel	Exterior side of the test specimen was formed with steel plates designated Aluzinc with a bulk density of 3750 kg/m ³ .

Measured by DBI

Product		Flexibatts 34	M4 Composite	M4 Composite
Density	kg/m ³	42	1001	1001
Thickness	mm		15	15
Moisture content	%	0.55	14.06	23.06
Organic content	%	2.1	-	-
Sampling method		Extra material	Extra material	Extra material
Drying temperature		105 °C	55 °C	105 °C

Test conditions

Conditioning

The test specimen was delivered on the 14-01-2019 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 length and width of 6000 x 3070 mm (exposed area). The loadbearing roof element was supported 50 mm in from the furnace edges resulting in a total loaded roof span of 6100 mm.

Free edges between the roof and the furnace frame were established along both vertical edges of the test specimen (2 x 25 mm stone wool in each side) to allow for unrestrained deformation of the test specimen.



Loading

The test specimen was loaded with a total applied load of 21.0 kN (1.21 kN/m²) placed as two line loads in the two quarter sections each on 10.5 kN.

The moment of force in the deck from the applied load during the fire test was 5.43 kNm/m.

The total applied load of 21.0 kN corresponds to a load of 2141 kg. With a total weight of the loading equipment of 681 kg, the load delivered from the piston was set to 1460 kg.

Prior to the uploading, the applied load was verified by placing the piston under a load cell. The oil pressure needed to obtain the required load 1460 kg was determined. This pressure was controlled during the test.

The load was applied as a downward oriented point load in the quarter sections of the deck, e.g. there was no eccentricity in the loading conditions.

The load was applied in 10 steps prior to the fire test. The fire test was commenced approx. 30 minutes after reaching the final load on the test specimen. The fully applied load was kept during the full extend of the fire test.

The self weight of the construction was 0.58 kN/m² giving a moment of force in the deck of 2.61 kNm/m (with a 6000 mm span).

The total moment of force in the deck originating from the load and the self weight was 5.43 kNm/m + 2.61 kNm/m = 8.04 kNm/m.

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 1363-1:2012.

The thermocouples were constructed according to the description in EN 1363-1:2012.

The pressure was kept at 20 Pa just below the aerated concrete deck. The pressure differential was measured 100 mm below the loaded deck, which gives a pressure set point of approximately 20 Pa at the height of the measuring device.



Test results

Duration of the test was 36 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 | Horizontal furnace pressure
The differential pressure in the furnace during the test, measured 100 mm below the test specimen |
| 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
Temperature rise on the unexposed side |
| Enclosures 6.0 and 6.1 | Maximum temperatures
Temperature rise on the unexposed side |
| Enclosures 7.0 and 7.1 | Load
The load on the deck during the test |
| Enclosures 8.0 and 8.1 | Deformation
The vertical deflection measured on the unexposed side (positive values indicates movement towards the furnace) |
| Enclosures 9.0 and 9.1 | Deformation per minute
D1, D3: at the edges, D2: in the center |
| Enclosures 10.0 and 10.1 | Load during loading phase
Total load prior to the test |
| Enclosures 11.0 and 11.1 | Deformation during loading phase
The vertical deflection measured prior to the test on the unexposed side (positive values indicates movement towards the furnace) |



Visual observations:

Time / Minutes	Visual observations:	U = Unexposed side E = Exposed side
0	Test commences	
4	Visual deformation seen from unexposed side	U
6	Nothing to observe on exposed side	E
8	Faint smoke development at mid length, free edge located by loading equipment	U
11	Increased smoke development along free edge, both sides of the test specimen	U
16	The tongue and groove locks seem to connect on the entire surface	E
19	Significant increased deformation seen from unexposed side	U
23	Nothing new to observe on exposed side	E
26	Increased smoke development along both simple supported ends	U
31	Nothing new to observe regarding smoke development	U
32	Nothing new to observe on exposed side	E
34	Significant increased deformation seen from unexposed side	U
36	Test stopped	

After the test, the test specimen was examined:

- The glued joints in the M4 composite boards failed during the test
- The movement in the simple support was limited
- The connection in the tongue and groove locks was intact

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.

Conclusion

Fire resistance testing according to 1365-2:2014 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:

Load-bearing capacity (R): 36 minutes

- The load on the test specimen was maintained during the entire test
- The measured vertical deflection did not exceed the criteria of $C = L^2/(h \times 400) = 189.9$ mm during the test
- The measured rate of vertical deflection did exceed the criteria of $dC/dt = L^2/(h \times 9000) = 8.4$ mm/min after 33.83 minutes of testing

Note: according to EN 1363-1:2012 §11.1 the criteria for rate of deflection does not apply in the first 10 minutes of the fire test.

**DBI****Integrity (E): 36 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): 36 minutes

- During the test no failure of insulation occurred to failure of integrity
- 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

Remarks

The field of direct application of the test results appears from 1365-2:2014, 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, and where appropriate EN 1363-2. 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.

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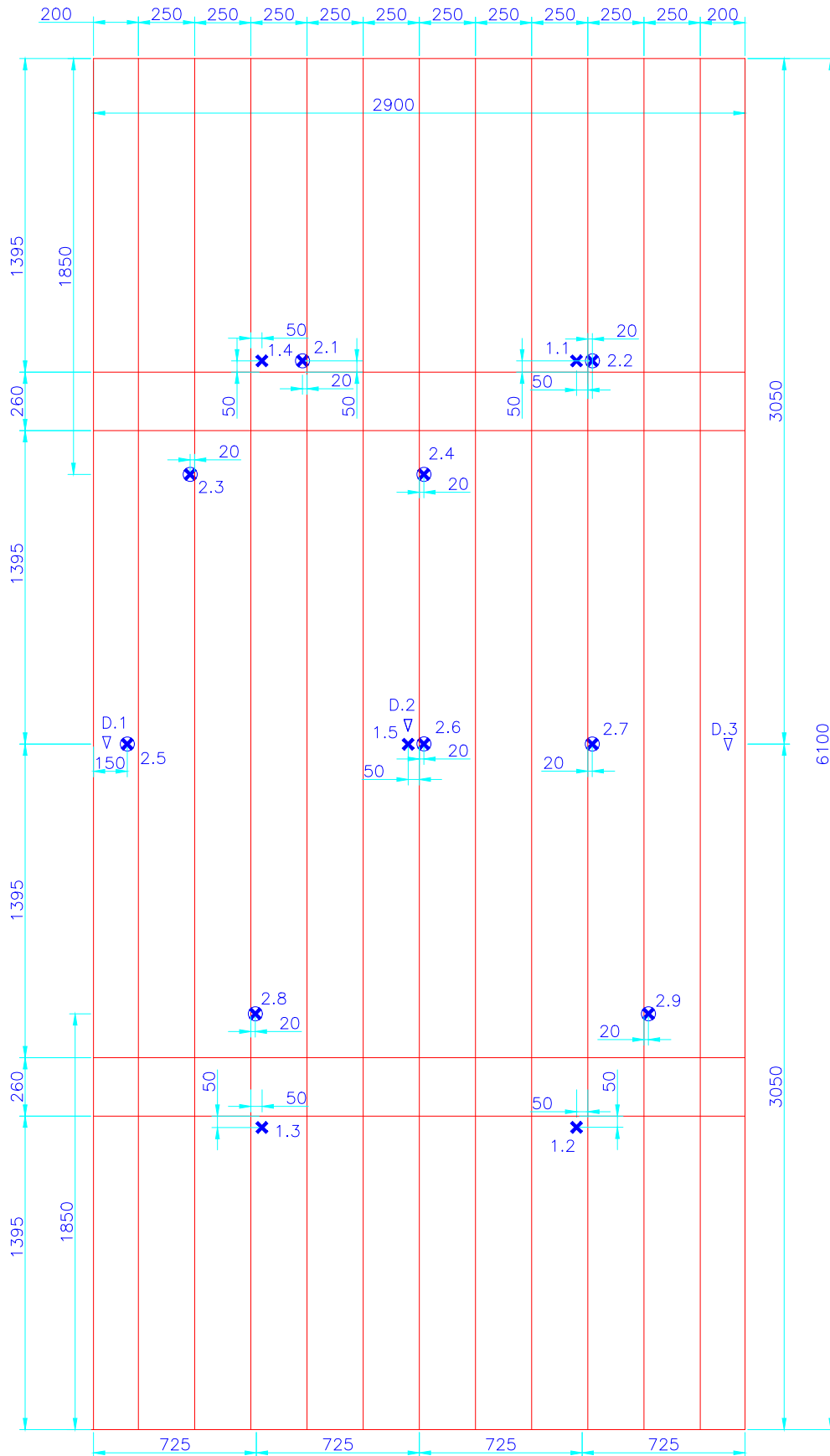
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Enclosures:

DBI drawings:	1
DBI graphs and tables:	20
Photo sheets:	7
Sponsors drawings:	16

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

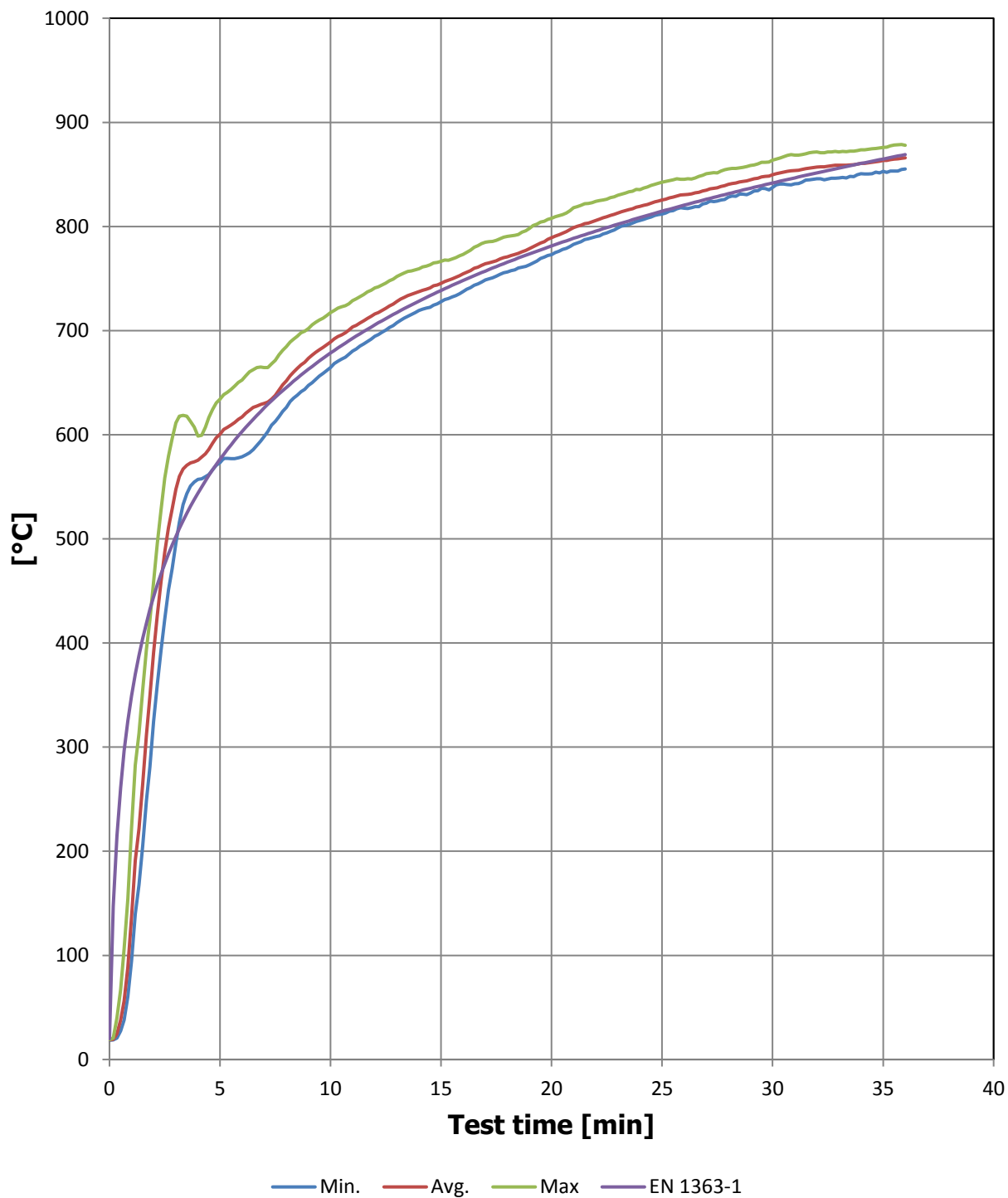
All measurements are in mm

Danish Institute of Fire and security Technology

Sponsor: Nordic Build A/S
 Subject: Loadbearing roof

File No.: PGA11340A
 Test date: 16-01-2019
 Enclosure: 1.1

Furnace



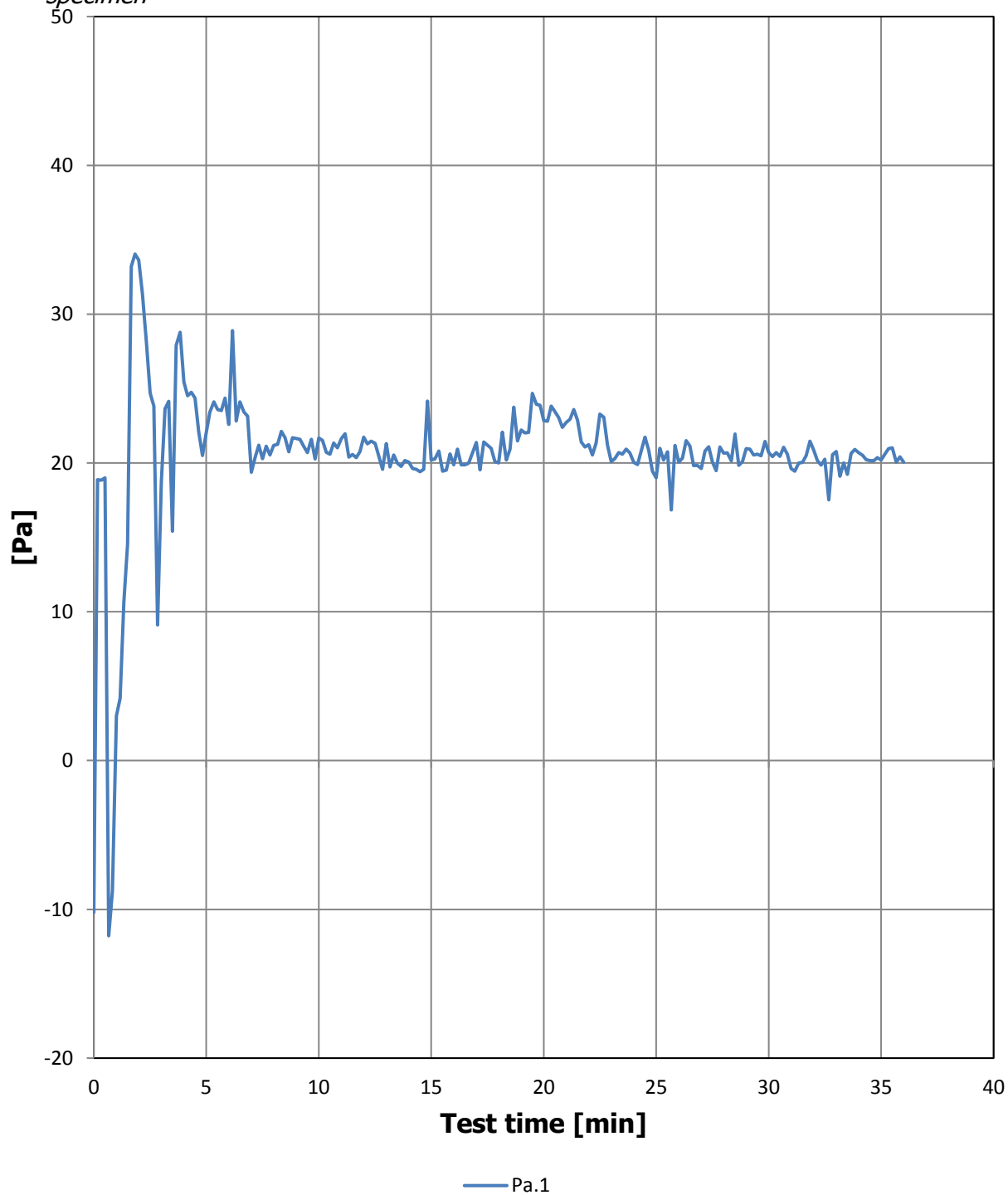


Furnace

Time Minutes	Measured			Norm EN 1363-1	Area under curve		Dev. [%]	Limit [%]
	Minimum	Average	Maximum		Measured	EN 1363-1		
0	19	19	19	20	0	0	0,0	
1	95	137	223	349	51	238	-78,7	
2	325	391	459	445	318	640	-50,4	
3	496	548	612	502	798	1115	-28,4	
4	557	575	599	544	1366	1639	-16,7	
5	573	601	634	576	1953	2200	-11,2	
6	579	617	653	603	2562	2790	-8,2	15
7	598	630	665	626	3187	3405	-6,4	15
8	626	652	685	645	3827	4041	-5,3	15
9	647	674	702	663	4490	4695	-4,4	15
10	665	689	717	678	5171	5366	-3,6	15
11	680	703	729	693	5868	6051	-3,0	15
12	695	716	741	705	6577	6750	-2,6	14
13	708	728	752	717	7299	7462	-2,2	14
14	719	738	759	728	8032	8185	-1,9	13
15	728	745	767	739	8773	8918	-1,6	13
16	738	754	773	748	9523	9662	-1,4	12
17	749	764	785	757	10282	10414	-1,3	12
18	756	771	791	766	11050	11176	-1,1	11
19	763	779	798	774	11824	11945	-1,0	11
20	773	789	808	781	12608	12723	-0,9	10
21	783	799	818	789	13402	13508	-0,8	10
22	790	806	824	796	14204	14300	-0,7	9
23	799	813	830	802	15013	15099	-0,6	9
24	806	819	835	809	15830	15904	-0,5	8
25	812	825	843	815	16652	16716	-0,4	8
26	818	831	845	820	17480	17534	-0,3	7
27	822	835	851	826	18313	18357	-0,2	7
28	828	840	855	832	19150	19186	-0,2	6
29	832	845	859	837	19993	20020	-0,1	6
30	837	850	864	842	20840	20859	-0,1	5
31	841	854	868	847	21692	21703	-0,1	5
32	846	857	872	851	22547	22552	0,0	5
33	847	859	872	856	23405	23406	0,0	5
34	851	861	874	860	24264	24264	0,0	5
35	853	863	876	865	25126	25127	0,0	5
36	855	866	878	869	25991	25994	0,0	5

Horizontal furnace pressure

The differential pressure in the furnace during the test, measured 100 mm below the test specimen





Horizontal furnace pressure

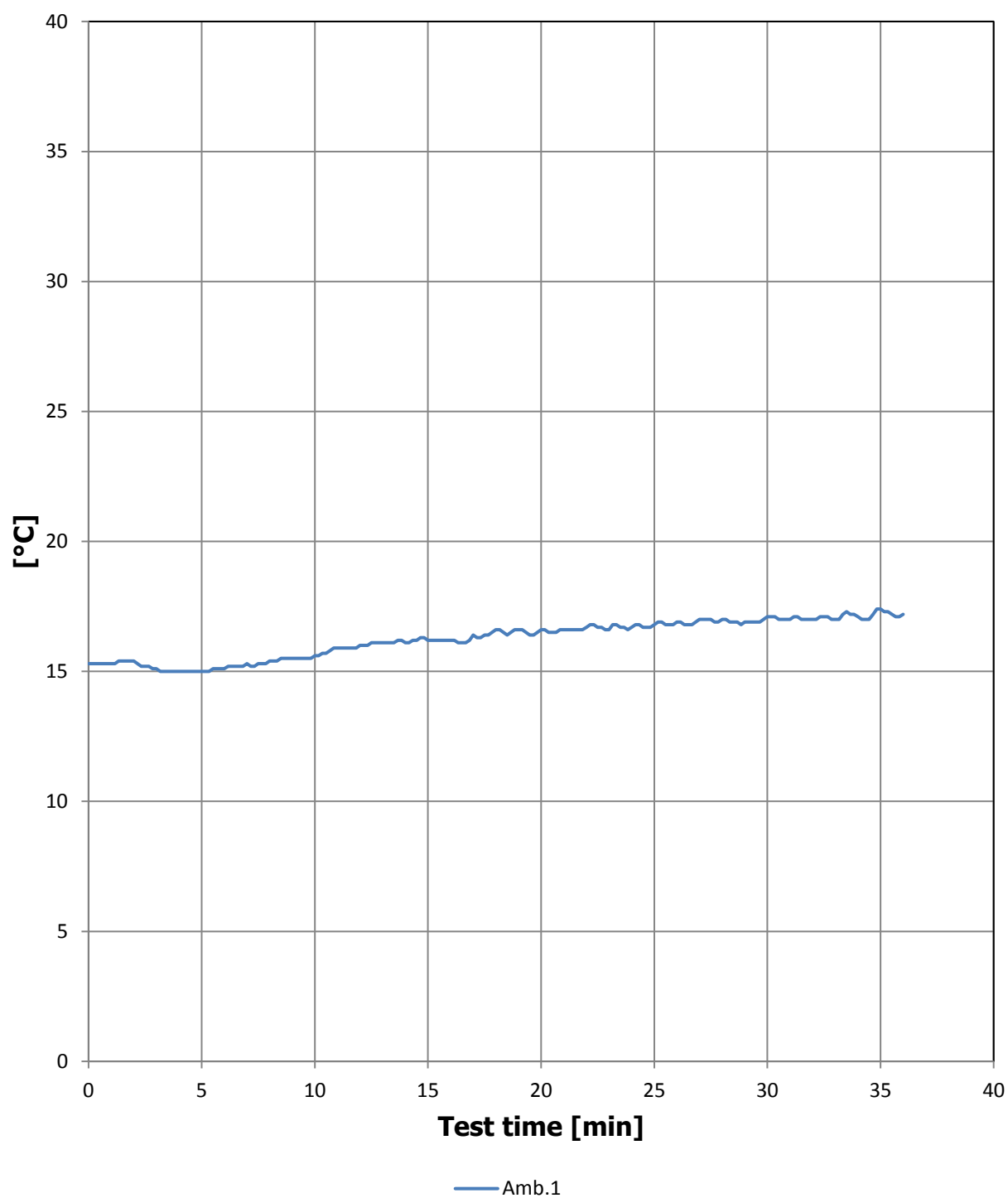
The differential pressure in the furnace during the test, measured 100 mm below the test specimen

Min. / Pa	Pa.1
0	-10,2
1	3,0
2	33,6
3	18,7
4	25,4
5	22,0
6	22,6
7	19,4
8	21,2
9	21,6
10	21,7
11	21,6
12	21,7
13	21,3
14	20,1
15	20,2
16	19,9
17	21,4
18	20,0
19	22,2
20	22,8
21	22,7
22	21,2
23	20,1
24	20,0
25	19,0
26	20,1
27	19,6
28	20,7
29	21,0
30	20,7
31	19,6
32	20,9
33	20,8
34	20,7
35	20,2
36	20,1



Ambient temperature

The ambient temperature in the laboratory during the test



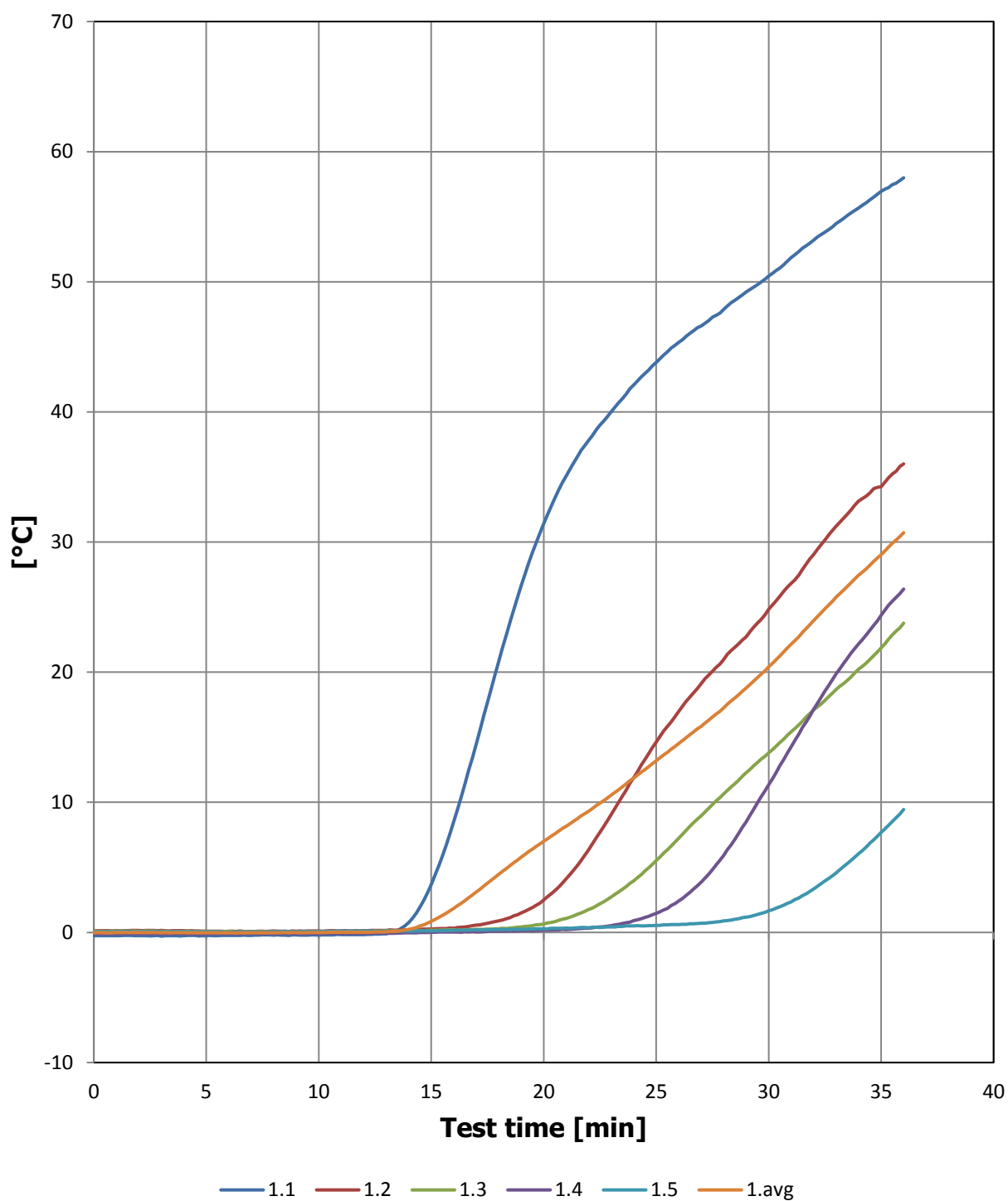
Ambient temperature

The ambient temperature in the laboratory during the test

Min. / °C	Amb.1
0	15,3
1	15,3
2	15,4
3	15,1
4	15,0
5	15,0
6	15,1
7	15,3
8	15,4
9	15,5
10	15,6
11	15,9
12	16,0
13	16,1
14	16,1
15	16,2
16	16,2
17	16,4
18	16,6
19	16,6
20	16,6
21	16,6
22	16,7
23	16,6
24	16,7
25	16,8
26	16,9
27	17,0
28	17,0
29	16,9
30	17,1
31	17,0
32	17,0
33	17,0
34	17,1
35	17,4
36	17,2

Average temperature

Temperature rise on the unexposed side





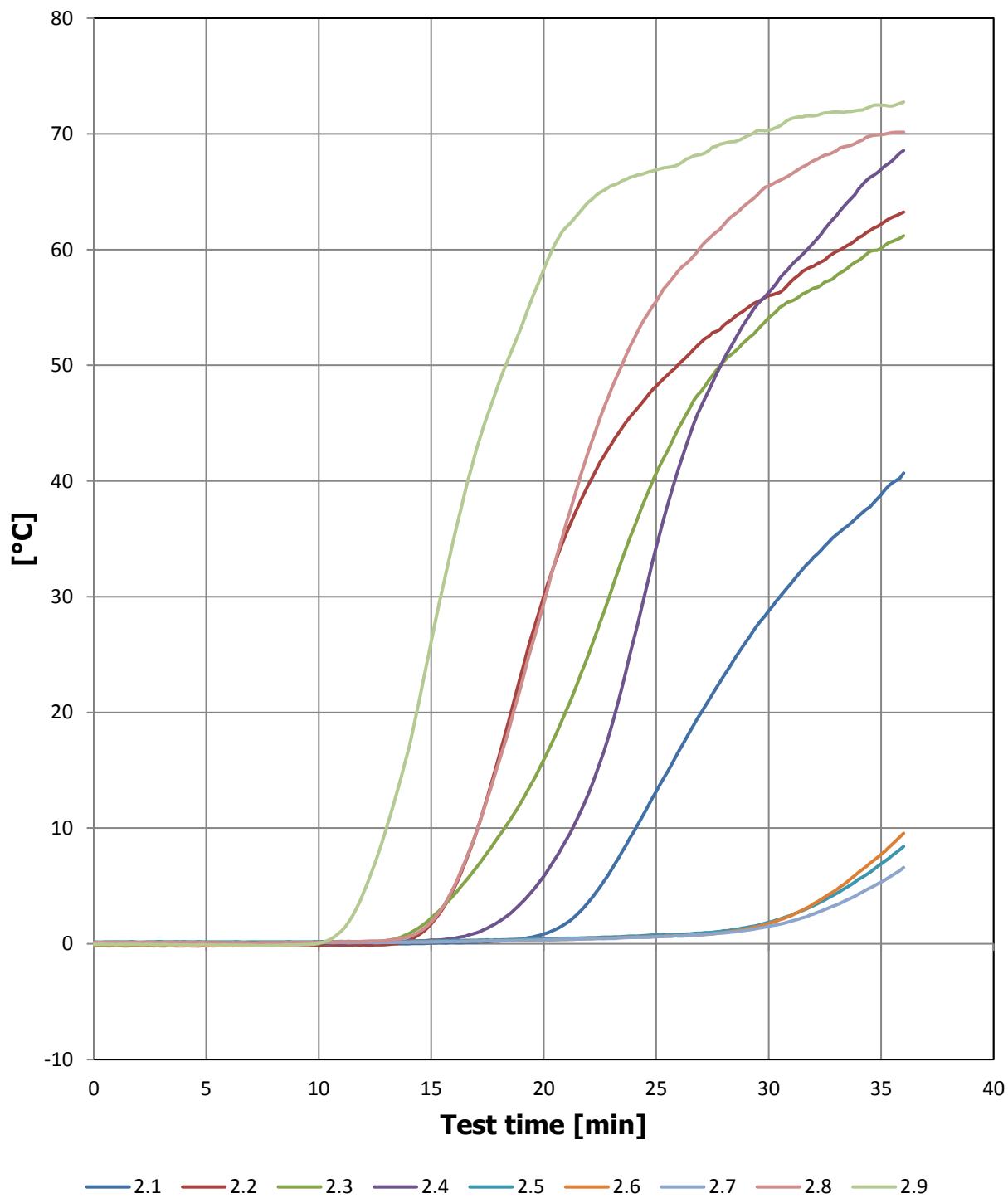
Average temperature

Temperature rise on the unexposed side

Min. / °C	1.1	1.2	1.3	1.4	1.5	1.Avg	1.Max
0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0
14	1	0	0	0	0	0	1
15	4	0	0	0	0	1	4
16	9	0	0	0	0	2	9
17	15	1	0	0	0	3	15
18	21	1	0	0	0	4	21
19	27	1	0	0	0	6	27
20	31	2	1	0	0	7	31
21	35	4	1	0	0	8	35
22	38	6	2	0	0	9	38
23	40	9	3	1	0	11	40
24	42	12	4	1	1	12	42
25	44	15	6	1	1	13	44
26	45	17	7	2	1	15	45
27	47	19	9	4	1	16	47
28	48	21	11	6	1	17	48
29	49	23	12	9	1	19	49
30	50	25	14	11	2	20	50
31	52	27	15	14	2	22	52
32	53	29	17	17	3	24	53
33	54	31	19	20	5	26	54
34	56	33	20	22	6	27	56
35	57	34	22	24	8	29	57
36	58	36	24	26	9	31	58
Failure [min]	-	-	-	-	-	-	-
Failure °C	180	180	180	180	180	140	180

Maximum temperatures

Temperature rise on the unexposed side





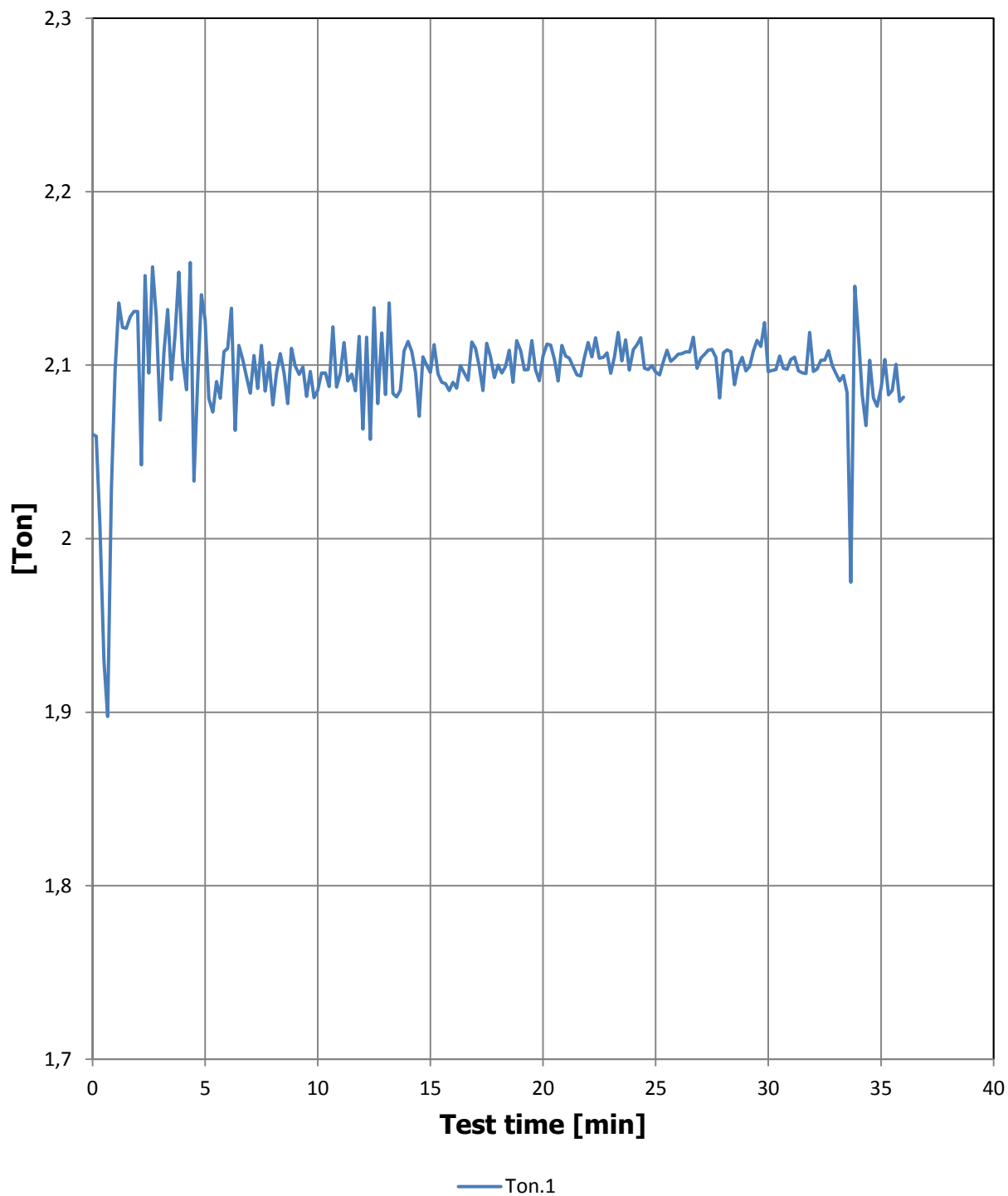
Maximum temperatures

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.Max
0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	1	1
12	0	0	0	0	0	0	0	0	4	4
13	0	0	0	0	0	0	0	0	10	10
14	0	0	1	0	0	0	0	1	17	17
15	0	2	2	0	0	0	0	2	26	26
16	0	5	4	0	0	0	0	5	35	35
17	0	10	7	1	0	0	0	10	43	43
18	0	16	9	2	0	0	0	16	48	48
19	0	23	12	4	0	0	0	22	53	53
20	1	30	16	6	0	0	0	29	58	58
21	2	35	20	9	0	0	0	36	62	62
22	4	40	25	13	1	0	0	43	64	64
23	6	43	31	19	1	0	0	48	66	66
24	10	46	36	26	1	1	1	52	66	66
25	13	48	41	34	1	1	1	56	67	67
26	17	50	45	41	1	1	1	58	67	67
27	20	52	48	46	1	1	1	60	68	68
28	23	53	50	50	1	1	1	62	69	69
29	26	55	52	54	1	1	1	64	70	70
30	29	56	54	56	2	2	2	66	70	70
31	31	57	56	59	2	2	2	67	71	71
32	33	59	57	61	3	3	3	68	72	72
33	35	60	58	63	4	5	3	69	72	72
34	37	61	59	65	6	6	4	69	72	72
35	39	62	60	67	7	8	5	70	72	72
36	41	63	61	69	8	10	7	70	73	73
Failure [min]	-	-	-	-	-	-	-	-	-	-
Failure °C	180	180	180	180	180	180	180	180	180	180

Load

The load on the deck during the test



Graph showing indication of load, determined from oil pressure measurement in piston

Load

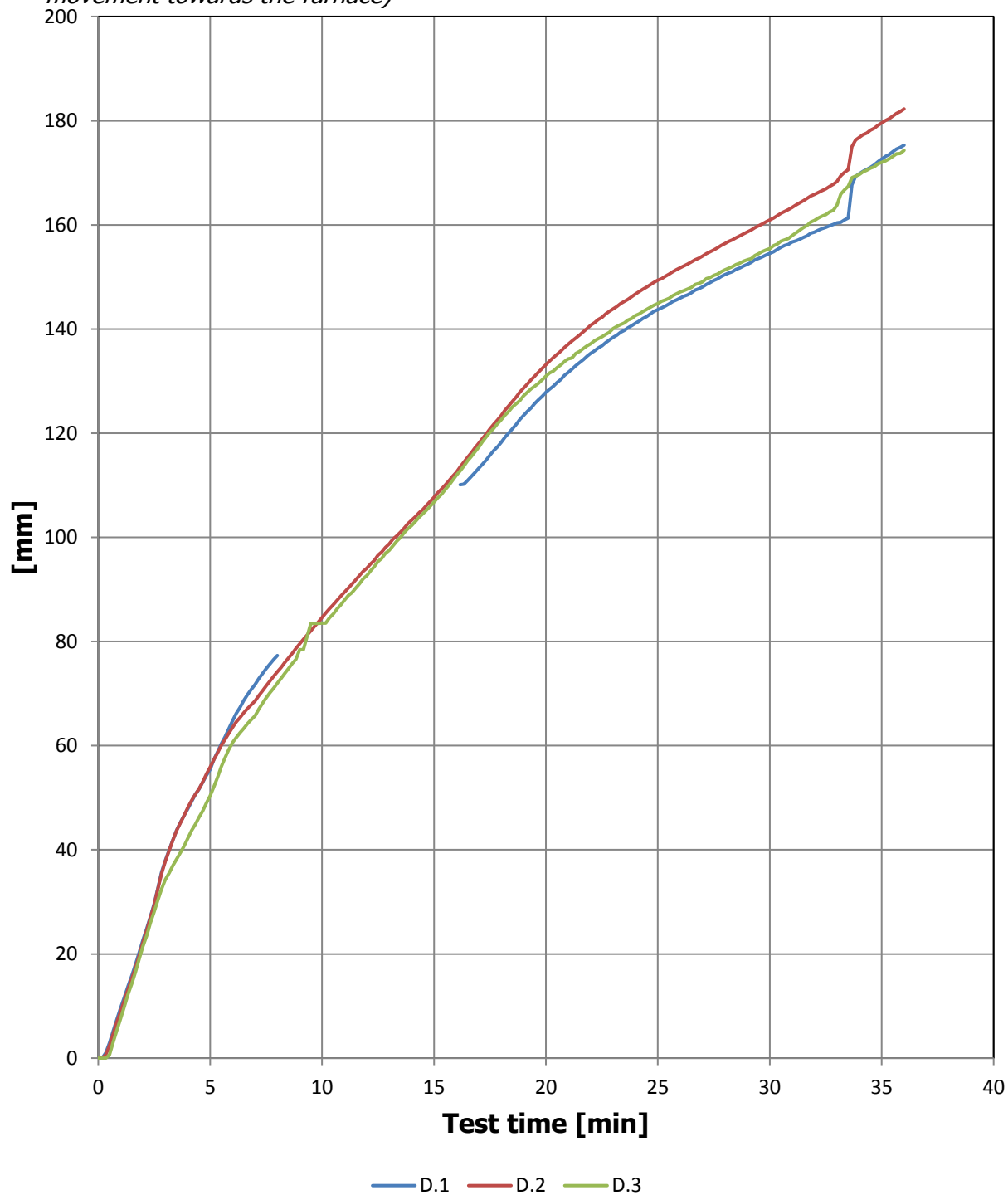
The load on the deck during the test

Min. / Ton	Ton.1
0	2,06
1	2,10
2	2,13
3	2,07
4	2,10
5	2,13
6	2,11
7	2,08
8	2,08
9	2,10
10	2,09
11	2,10
12	2,06
13	2,08
14	2,11
15	2,10
16	2,09
17	2,11
18	2,10
19	2,11
20	2,11
21	2,11
22	2,11
23	2,10
24	2,11
25	2,10
26	2,11
27	2,10
28	2,11
29	2,10
30	2,10
31	2,10
32	2,10
33	2,10
34	2,12
35	2,09
36	2,08

Graph showing indication of load, determined from oil pressure measurement in piston

Deformation

The vertical deflection measured on the unexposed side (positive values indicates movement towards the furnace)



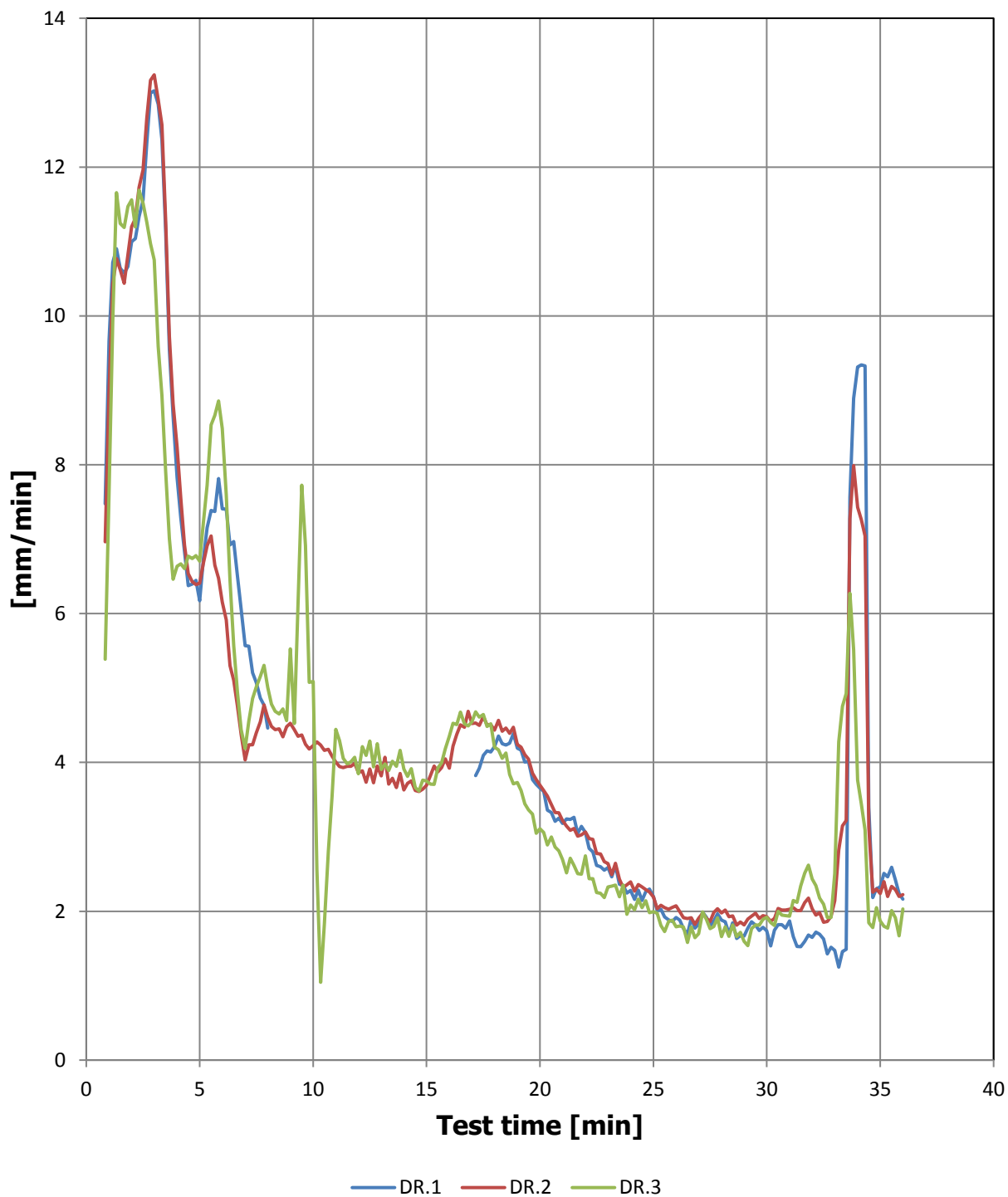
Deformation

The vertical deflection measured on the unexposed side (positive values indicates movement towards the furnace)

Min. / mm	D.1	D.2	D.3	D.Max
0	0,0	0,0	0,0	0,0
1	9,7	9,0	7,6	9,7
2	22,7	22,3	21,5	22,7
3	37,9	37,8	34,3	37,9
4	47,9	48,1	42,2	48,1
5	55,4	55,9	50,4	55,9
6	64,8	63,5	60,6	64,8
7	71,8	68,6	65,7	71,8
8	77,3	74,2	72,0	77,3
9	0,0	79,5	78,4	79,5
10	0,0	84,6	83,5	84,6
11	0,0	89,5	88,0	89,5
12	0,0	94,1	92,7	94,1
13	0,0	98,7	97,5	98,7
14	0,0	103,3	102,3	103,3
15	0,0	107,7	106,8	107,7
16	0,0	112,5	112,0	112,5
17	113,3	118,0	117,3	118,0
18	118,2	123,4	122,6	123,4
19	123,4	128,7	127,2	128,7
20	127,8	133,1	130,9	133,1
21	131,7	137,1	134,3	137,1
22	135,3	140,7	137,2	140,7
23	138,4	143,9	140,1	143,9
24	141,1	146,7	142,6	146,7
25	143,7	149,3	144,9	149,3
26	146,0	151,8	147,1	151,8
27	148,1	154,0	149,1	154,0
28	150,5	156,4	151,3	156,4
29	152,4	158,6	153,3	158,6
30	154,5	160,9	155,4	160,9
31	156,7	163,3	157,9	163,3
32	158,6	165,8	160,9	165,8
33	160,4	168,3	163,8	168,3
34	169,8	176,8	169,7	176,8
35	172,6	179,6	172,0	179,6
36	175,3	182,3	174,3	182,3
Failure [min]	-	-	-	-
Failure [mm]	189,9	189,9	189,9	189,9

Deformation per minute

D1, D3: at the edges, D2: in the center



Note: according to EN 1363-1:2012 §11.1 the criteria for rate of deflection does not apply in the first 10 minutes of the fire test.



Deformation per minute

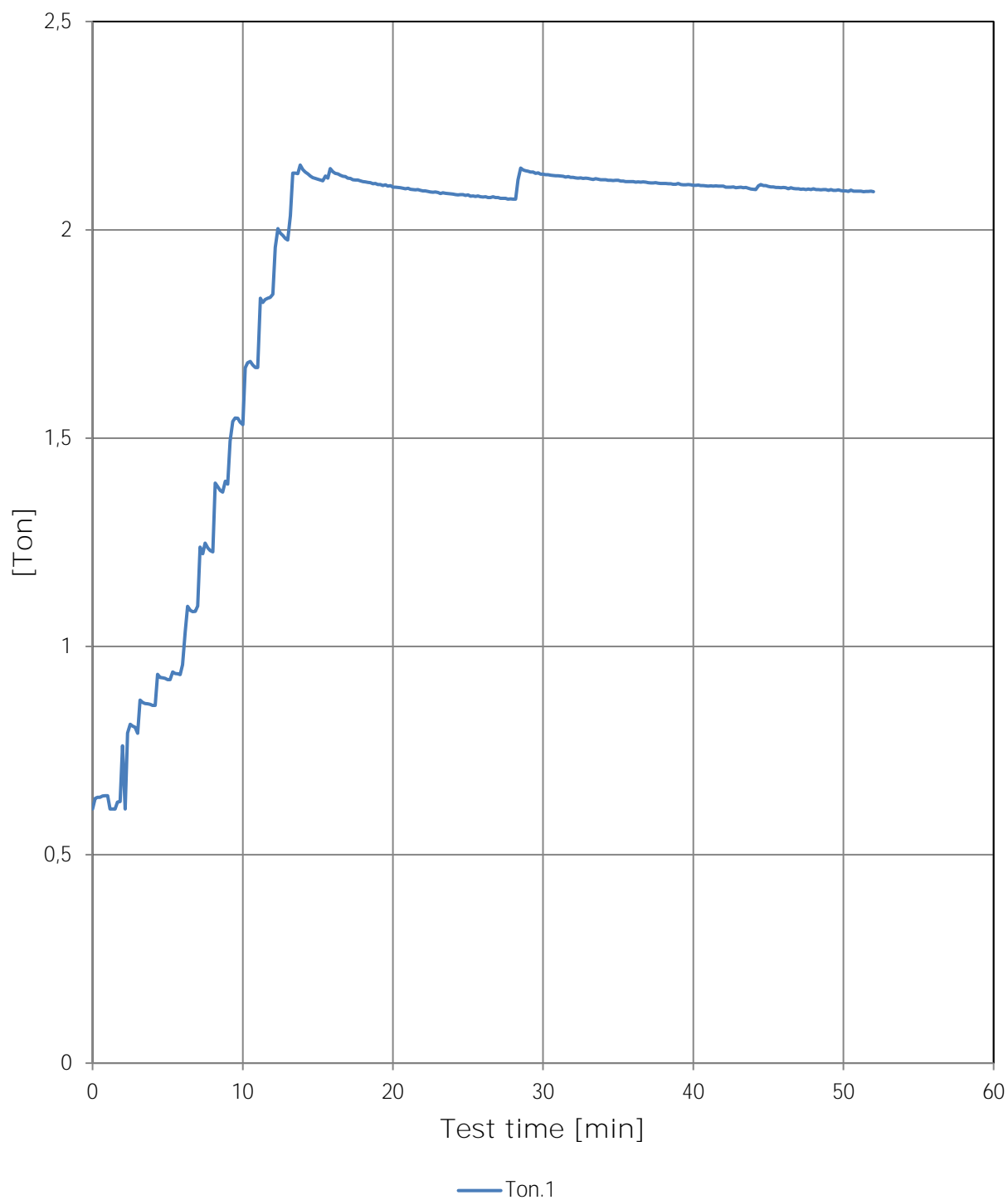
D1, D3: at the edges, D2: in the center

Min. / mm/min	DR.1	DR.2	DR.3	DR.Max
0	0,00	0,00	0,00	0,00
1	9,66	8,98	7,62	9,66
2	11,00	11,20	11,56	11,56
3	13,02	13,24	10,75	13,24
4	7,83	8,24	6,63	8,24
5	6,17	6,41	6,71	6,71
6	7,41	6,15	8,49	8,49
7	5,57	4,03	4,19	5,57
8	4,46	4,60	5,01	5,01
9	0,00	4,53	5,52	5,52
10	0,00	4,23	5,09	5,09
11	0,00	4,00	4,44	4,44
12	0,00	3,86	3,85	3,86
13	0,00	3,82	3,90	3,90
14	0,00	3,63	3,91	3,91
15	0,00	3,69	3,75	3,75
16	0,00	3,92	4,35	4,35
17	0,00	4,52	4,54	4,54
18	4,21	4,43	4,21	4,43
19	4,19	4,24	3,73	4,24
20	3,65	3,69	3,11	3,69
21	3,18	3,22	2,70	3,22
22	3,06	3,06	2,74	3,06
23	2,59	2,64	2,33	2,64
24	2,28	2,39	2,08	2,39
25	2,20	2,19	1,99	2,20
26	1,92	2,07	1,79	2,07
27	1,83	1,91	1,70	1,91
28	1,88	1,98	1,66	1,98
29	1,67	1,82	1,59	1,82
30	1,74	1,93	1,92	1,93
31	1,87	2,03	1,93	2,03
32	1,65	2,04	2,43	2,43
33	1,47	2,14	2,50	2,50
34	9,32	7,43	3,76	9,32
35	2,32	2,24	1,87	2,32
36	2,16	2,22	2,03	2,22
Failure [min]	33,83	-	-	33,83
Failure [mm/min]	8,40	8,40	8,40	8,40

Note: according to EN 1363-1:2012 §11.1 the criteria for rate of deflection does not apply in the first 10 minutes of the fire test.

Load during loading phase

Total load prior to the test



Graph showing indication of load, determined from oil pressure measurement in piston

Load during loading phase

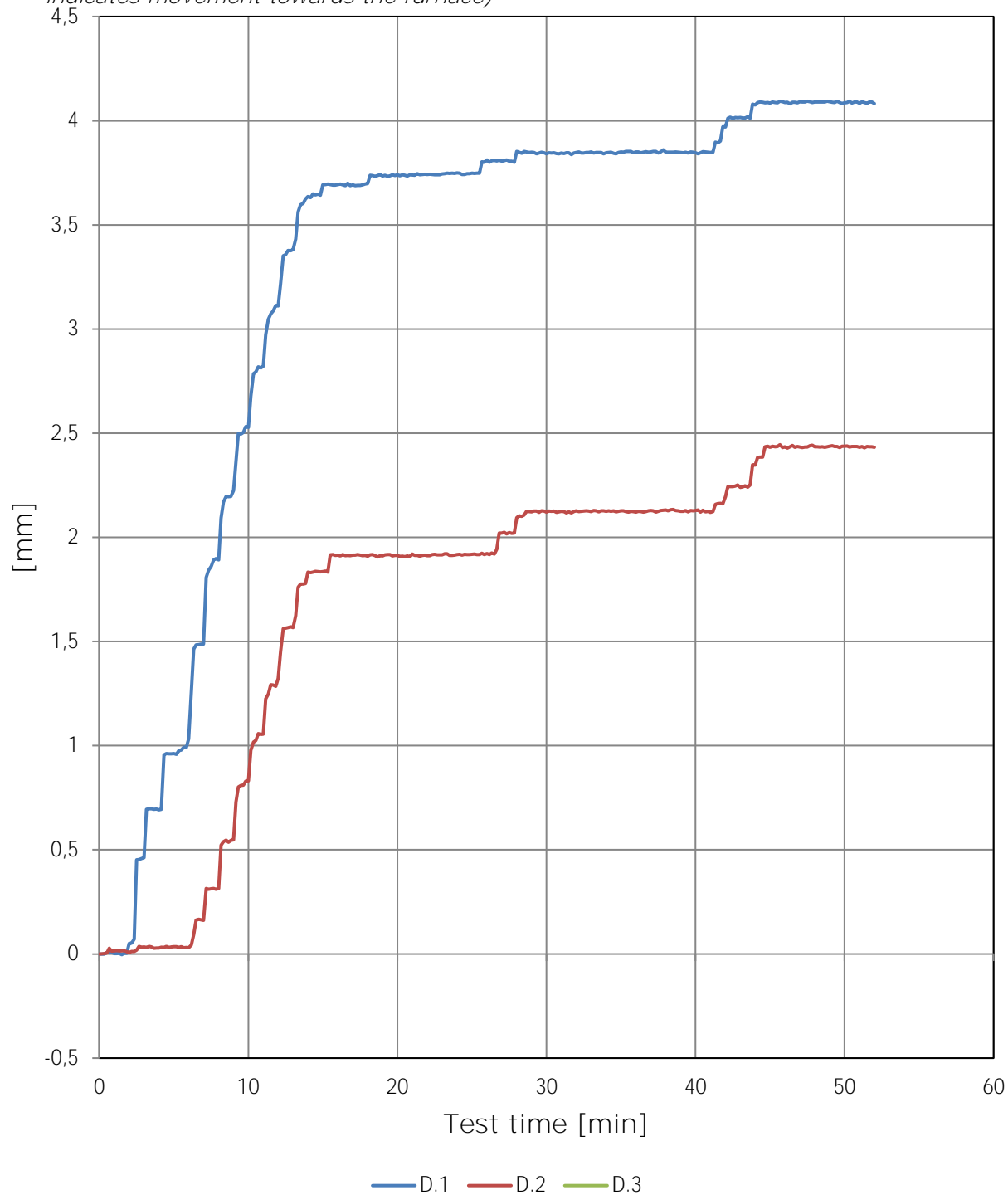
Total load prior to the test

Min. / Ton	Ton.1
0	0,61
2	0,76
4	0,86
6	0,96
8	1,23
10	1,53
12	1,85
14	2,14
15	2,12
16	2,14
18	2,12
20	2,10
22	2,09
24	2,09
26	2,08
28	2,07
30	2,13
32	2,13
34	2,12
36	2,12
38	2,11
40	2,11
42	2,11
44	2,10
46	2,10
48	2,10
50	2,09
52	2,09

Graph showing indication of load, determined from oil pressure measurement in piston

Deformation during loading phase

The vertical deflection measured prior to the test on the unexposed side (positive values indicates movement towards the furnace)



Deformation during loading phase

The vertical deflection measured prior to the test on the unexposed side (positive values indicates movement towards the furnace)

Min. / mm	D.1	D.2	D.3	D.Max
0	0,0	0,0		0,0
2	0,1	0,0		0,1
4	0,7	0,0		0,7
6	1,0	0,0		1,0
8	1,9	0,3		1,9
10	2,5	0,8		2,5
12	3,1	1,3		3,1
14	3,6	1,8		3,6
15	3,7	1,8		3,7
16	3,7	1,9		3,7
18	3,7	1,9		3,7
20	3,7	1,9		3,7
22	3,7	1,9		3,7
24	3,7	1,9		3,7
26	3,8	1,9		3,8
28	3,9	2,1		3,9
30	3,8	2,1		3,8
32	3,8	2,1		3,8
34	3,8	2,1		3,8
36	3,8	2,1		3,8
38	3,8	2,1		3,8
40	3,8	2,1		3,8
42	4,0	2,2		4,0
44	4,1	2,3		4,1
46	4,1	2,4		4,1
48	4,1	2,4		4,1
50	4,1	2,4		4,1
52	4,1	2,4		4,1

Failure [min]	-	-	-	-
Failure [mm]	189,9	189,9	189,9	189,9